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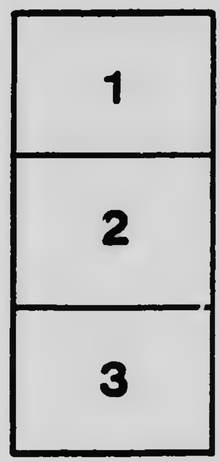
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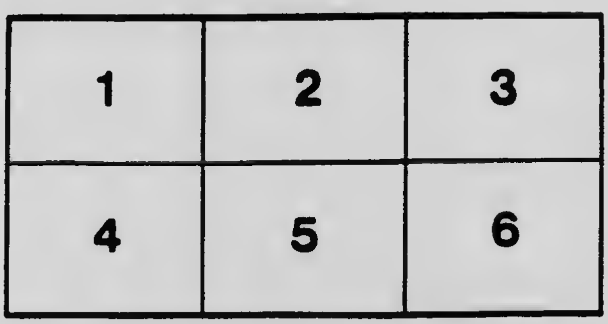
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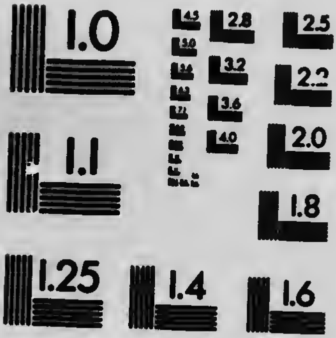

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THE NEW PRACTICAL REFERENCE LIBRARY

EDUCATOR VOLUME

CONTAINING HUNDREDS OF SPECIAL ARTICLES ON CANADIAN SUBJECTS, TOGETHER WITH COURSES OF READING AND STUDY, OUTLINES, QUESTIONS AND GRAPHIC ILLUSTRATIONS

Editor-in-Chief

JAMES LAUGHLIN HUGHES

Chief Inspector of Schools, Toronto, Ontario

Associate Editor

A. MELVILLE SCOTT

Superintendent of Schools, Calgary, Alberta

VOLUME VI

INCLUDING INDEX

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The Mother's Creed

I BELIEVE, with the gardener, that the youngest plants should have the tenderest care; that the habits of early youth should be so moulded as to develop fixed traits of good character in the adult.

I believe what one wills to be, one can be; "that education lays the foundation, but that self-education erects the building;" that the mind can only possess that which it does.

I believe that obstacles and reverses are but quality-testing stepping-stones to success; that the room for improvement is the largest room in the world.

I believe that within the breast of every child is an instinctive desire to be good; to grow; to learn; to work; to love; to achieve.

I believe in home encouragement; that a home without good, useful books is like a home without windows; that where children are there should be found the treasure thoughts of the greatest men and women of all ages which ever beckon on and on, inspiring to higher ideals and nobler ambitions.

I believe that the mind can only be rightly formed when it is rightly informed; that opportunity ever knocks at the door of those who are rightly equipped to fight life's battles; that the power to think grows by exercise.

I believe in the pleasure of self-sacrifice, the price paid by hundreds of mothers of world-renowned men.

I believe in the education that stimulates thought; develops self-reliance and leads to a delight in whatever is fair in nature, in whatever is true and beautiful in literature and art.

—J. H. H.

The Teacher's Creed

I BELIEVE in boys and girls, the men and women of a great to-morrow; that whatsoever the boy soweth the man shall reap.

I believe in the curse of ignorance; in the efficacy of schools; in the dignity of teaching; and in the joy of serving others.

I believe in wisdom as revealed in human lives as well as in the pages of the printed book; in lessons taught, not so much by precept as by example; in ability to work with the hands as well as to think with the head; in everything that makes life large and lovely.

I believe in beauty in the schoolroom, in the home, in daily life and out of doors.

I believe in laughter; in love; in faith; in all ideals and distant hopes that lure us on.

I believe that every hour of every day we receive a just reward for all we are and all we do.

I believe in the present and its opportunities; in the future and its promises; and in the divine joy of living.

—Edwin Osgood Grover.

He that loveth a book will never want a faithful friend, a wholesome counselor, a cheerful companion, and an efficient comforter.

THE NEW PRACTICAL REFERENCE LIBRARY

VOLUME SIX—THE EDUCATOR

INTRODUCTORY

This Volume and Its Object

The Desire for an Education. An educator of note has placed himself on record as saying that a person is half educated as soon as he begins to seek knowledge for its own sake. Certainly firm determination to advance one's education at once gives stimulus to every serious and worthy endeavor, adds poise and mental balance, suggests positive direction for the expenditure of energy and begets a feeling of the responsibilities of life, as regards both the person himself and his duty toward the world. A young man or woman begins to grow just as soon as there is discovered in the soul an ardent desire for growth.

The methods by which one may acquire an education are manifold. Chief among these are the public institutions of learning; however, the benefits of the regularly appointed school systems unfortunately are denied to many and are not embraced by others for lack of appreciation. Self-education is the only means by which a vast number rise in the mental plane; the history of numberless self-instructed, yet notable, men and women gives courage to young people everywhere to believe there is practically no limit to their own powers, if but determination be yoked to ambition.

Helps to instruction, of a dependable character and true to pedagogical ideals, are rare. The lone student under the evening lamp, the mother attempting to help the son or daughter on the lessons of the day, the teacher impelled by necessity to seek new material and attractive ways of presenting trite subjects—all recognize this fact. The publishers of THE NEW PRACTICAL REFERENCE LIBRARY have labored hard and with unsparing expenditure to produce something to meet the growing demand for truly helpful study aids. To the five volumes of the REFERENCE LIBRARY has been added this valuable sixth volume; the two units combine to give to student, parent and teacher a home school of practical knowledge. In the six volumes, such care has been taken in arrangement that any subject of importance can be studied in a systematic manner.

The EDUCATOR aims to develop a desire for knowledge for its own sake and to awaken a deeper interest in those subjects which are closely related to the every-day affairs of its readers. It is planned in a way to arouse interest, systematize study, create or stimulate the habit of investigation, strengthen self-reliance, broaden the view of life and add to the sum total of information useful in every avenue of endeavor.

The Outlines and Type Studies. The outlines and type lessons have been carefully prepared with the view that they shall enable the teacher and pupil to pursue in a systematic manner the subjects to which they are allied. This sixth volume contains models of this character on practically every department of secondary education, and these are so arranged as to make them valuable in all branches of school work. The models furnish the ambitious teacher with an abundance of suggestive material for any line of study during idle hours, and they also point the way to successful review work. From these outlines the teacher will find it an easy and pleasant task so to arrange and present the branches she teaches that the interest of pupils in their work will be greatly increased.

Courses of study are in use in all public schools and teachers are expected to conform to these in their daily work. In the preparation of THE EDUCATOR the editors have made frequent reference to and use of the best courses of study in the Dominion of Canada, and the work in this volume is so arranged as to conform to the best of these models and thus meet the most practical needs of teacher and pupils.

It should be noticed that all the main divisions of each outline are treated with care and exactness in this set of books. To illustrate: In the outline on *Agriculture* there are various subdivisions, such as soils, plants, etc., each fully and interestingly presented in such a way that it can be outlined. The reader is also referred constantly to lists of correlated subjects, by means of which it is possible to extend easily his study and research.

The Questions. Features which will appeal to parents and teachers alike are the lists of interesting questions which follow the outlines. The importance of putting questions in good form is appreciated by every teacher and mother, and the lists in this volume furnish excellent models for many others. These questions also afford the student, young or old, a wide field for pleasant and profitable study. It must be apparent that by the use of this feature in connection with THE NEW PRACTICAL REFERENCE LIBRARY many an otherwise long, rainy day or winter evening can be devoted to profitable exploration into some field of knowledge. Home study clubs may be organized. Father and mother will find an hour spent with the children in study invaluable to themselves. The habit of alloting a few minutes each day in this way must recommend itself to all who value time and who know what it means to be well informed.

It will be noticed that many of the questions relate to the children's immediate surrounding—the home, the playground, the neighborhood, their city and county. This leads to keener observation and increases vastly their appreciation. For home study work, begin with topics relating to the breakfast table—coffee, sugar, salt, orange, tea; note the interest immediately aroused and the earnest effort to procure information concerning these things. Many of the questions will awaken curiosity; curiosity will in turn excite interest, and interest leads to investigation and study.

In consulting THE NEW PRACTICAL REFERENCE LIBRARY for the information sought from these questions, the student should turn to the subject most directly referred to in the question. Almost all the questions are based on information found in the LIBRARY. Their value lies in the fact that they must be investigated. There is soon developed the habit of research, and this leads to a stronger desire for knowledge. A few questions are asked in THE EDUCATOR that compel the use of pencil and paper to answer, such as, "How many Nova Scotias can be carved from Alberta?" "What would be the population of Saskatchewan were it as thickly settled as New Brunswick?" In each subject the information needed as a basis for solution will be found in regular alphabetical order in this set of books.

How to Study

How Education is Acquired. What you know has come to you in three ways. You have listened to the words of the teacher, who with elaborate care has uncovered valuable truths to your understanding; you have kept your eyes open and by observation and experiment, perhaps in lonely vigils, have forced answers to your persistent inquiries; you have made wise choice of books, and in them have found the wisdom of centuries.

All three elements combine to give one a good education. The presence of the teacher is essential in the years of early youth; then is formed the desire to study, the determination to ask nature and art and science to give up their secrets; the true teacher creates in her pupils a longing for knowledge of the things which always lie just a little beyond the present vision. Fortunate is the boy or girl whose dominant trait is an inflexible determination to advance.

Benefits of Observation. Shakespeare knew he wrote the truth when he said there were "sermons in stones," and "books in running brooks." Bryant urged us to "go forth unto the open sky and list to Nature's teachings." It would be difficult to estimate the proportion of our practical knowledge which results from alert observation—"keeping our eyes open." It is the beginning of all education. Little children are "animated question boxes;" Nature puts thousands of questions to them, and they have every right to have those questions answered. As they grow older, if the faculty of observation has not been discouraged, boys and girls naturally help themselves to answers to their inquiries, by consulting books and periodicals, diligently seeking the truth from every source available. Few people get so old that they lose desire for investigation, provided they started right.

Colleges and universities do not train all the educated people of any generation. Their graduates doubtless are more scientifically developed, but the ambitious, determined young man or woman who has to depend upon home study and local assistance may easily distance the majority of the college bred. Some of the greatest men and women hold college diplomas and degrees; the same have been earned by many who cannot more than earn a mere living. Merely going to college does not insure success; the mental and physical equipment which may make a college course successful will help a young person to a liberal education through his own efforts. Once solve the question, "How should I study?" and the learning of the world, just as far as you wish to follow it, lies at your hand for mastery.

Some Principles. Below are a few brief definitions and suggestions, stripped of technical and psychological detail, which will be helpful to every student:

STUDY. The systematic application of the mind to the purpose of acquiring knowledge, especially from the printed page.

INTEREST. The mental satisfaction one experiences from the study of a subject, or the appeal which the unfolding of a subject makes to one. Interest is present when one feels a desire to continue an investigation well begun.

ATTENTION. To succeed with study one must be able to shut out from the mind all subjects and thoughts unrelated to the subject at hand. The mind cannot be active and alert in pursuit of definite facts which it is necessary to grasp, weigh, classify and properly assign, if ideas and devices entirely foreign to the investigation are at the same time encouraged or even permitted on the horizon of thought.

CONCENTRATION. This may be defined as intensified attention. Concentration is merely a matter of practice, and reaches its highest degree of perfection when one is able to keep his mind upon his work, regardless of usual noises and ordinary conversation near at hand. Do not believe after even scores of attempts that you cannot acquire the fine art of concentration. It is possible, in every case. When your interest is sufficiently strong the thing is achieved. Marshal the forces of your will. The parallel rays of the sun falling directly upon an object are harmless. Pass them through the burning glass, concentrate them upon one spot, and you may start a mighty conflagration.

UNDERSTANDING. To understand any matter is to grasp fully its inherent truth and to identify it clearly in its connection with all related facts. As long as one sentence on a page remains in the least obscure do not turn the page Hunt for the missing element, and do not abandon the search until you discover it.

It is study of this character that renders mastery of any subject comparatively easy. A wise old teacher once said that Greek could be made as simple as arithmetic; it is only necessary to master—to understand—every part of lesson one before beginning lesson two, and knowing you have mastered lesson two before approaching lesson three. He was right. If one always proceeds from the *known*—mark the emphasis—he will have slight difficulty in overcoming the unknown.

In developing your understanding of a subject, omit no step in its unfolding. One step leads to another only a little ahead; do not omit the first one in advance and jump to one still farther ahead because it may appear attractive; you may be missing something important—a link in the chain which sooner or later you must go back and pick up.

Study Principles, Not Rules. When you comprehend the principles of a subject in their relation to each other and their relation to other subjects, the rules will take care of themselves. In fact, your best rules will be those which you deduce from your study. Rules are based upon principles, and unless principles are understood rules are of little value.

Correlation of Subjects. While on any topic keep in mind its relation to other departments of education. To illustrate: Note the close connection between history and geography, between literature and all of the sciences, and trace these connections to the fullest possible extent. It is only in this way that the full significance of any subject can be understood.

Study Systematically. This you are bound to do if you trace relations which the various departments of a topic bear to each other. The systematic arrangement of a subject under divisions and subdivisions assists in its mastery and also aids the memory. Suppose you wish to learn about coal. You will wish to know (1) what it it; (2) how it is formed; (3) the different kinds or varieties; (4) where it is found; (5) the countries leading in its production; (6) its principal uses; (7) how long it has been used; (8) when it was discovered in the United States, whether it is produced in Canada, and the first use in your country to which it was put. It is well to have an outline at hand of any subject it is intended to study.

Use Reference Books. No one text-book contains all of the information to be obtained on one subject. Neither does it point out all of the vital relations of this subject to others. Therefore, one who wishes to study broadly needs to have at hand other works. Among the most valuable of these is a reference work which contains the leading facts in the subjects presented. The use of such a work broadens one's study, saves time, and leads to a fuller comprehension of the subject than is otherwise possible. Collateral works on the same subject are also of value.

We do not wish here to state a matter which may be in any sense out of place, but in connection with the subject of reference books it is well to call attention that in the six volumes of The New Practical Reference Library we believe there is offered to the private student the greatest amount of help in condensed and usable form that can be found in print. We stated above that one should study a subject from a well-prepared outline. This sixth volume presents hundreds of outlines embracing almost every topic within the range of secondary education, and if studied according to outline one is sure to have omitted no material fact and to have developed the topic in a logical and sensible manner.

Study with Energy. When you study put your best effort into the work. Never allow yourself more time than is necessary to accomplish a task. Many people permanently injure their capacity for mental work by acquiring listless habits of study.

Study to Apply Your Knowledge. The only test of knowledge is ability to use it. A boy may commit to memory all of the rules in his arithmetic, but if for his father he cannot compute interest on a note he does not know the rule for finding interest, however glibly he may repeat it.

The Key to Growth. The spirit of self-help is the basis of all genuine growth in the individual. The opportunities for study which the quiet of the home offers are unequaled. The way the leisure hours have been used has determined the success or failure of legions of men and women.

How do you spend your leisure hours?

To the Ambitious Young Man and Woman

There are more than six million people out of school in the Dominion. Whatever the school may do to transform the unlettered child into a reasonable, rational being, it has fallen far short of its exalted purpose in the case of that young person who leaves its doors without an ambition to continue his study by himself.

Bishop Spaulding says that education lays the foundation, but that self-education erects the building. It is a very wise person who determines that there shall be no time limit to the years during which he shall study and continue to develop. No one is so great in business or so skilled in the arts or the professions that he can afford to neglect self-improvement. Not to grow is to retrograde.

Someone who is just now a rival of yours for local honors or emoluments is possibly working hard while you sleep too long or play too much. Some day you may wonder why he is always "lucky" in pushing ahead of you and others and grasping the coveted places. Do not call it "luck;" it is *preparedness*. Your outlook this minute is as fair and promising as his.

Life is a battle. The victors are those who advance to meet their opportunities and who hesitate not to grapple with the most serious obstacle; they get strength for every fray from each addition to their fund of practical knowledge; knowledge gives them power.

Most people unconsciously waste time sufficient for the acquirement of a classical education. In many instances this time is wasted because when the leisure fifteen minutes come they have nothing at hand on which to spend that quarter of an hour.

The ambitious young person denied the advantages of a broad education will find that The New Practical Reference Library and The Educator places at his disposal, systematized and classified, the fruits of ages of investigation.

An hour a day devoted systematically to study will give any man a good education in the course of years. It will give him capital on which he will draw dividends throughout life. Today more than ever before it is the man who knows, the man who is broadly and correctly informed, the man who is ready to grasp opportunities as they come, who succeeds. An old Arab proverb, whose authorship has been unknown for hundreds of years, is worth remembering:

A man who knows not and knows not he knows not,
He is a fool; shun him.
A man who knows not and knows he knows not,
He is simple; teach him.
A man who knows and knows not he knows,
He is asleep; wake him;
A man who knows, and knows he knows,
He is wise: follow him.

"Industry is the one really great thing you will need. If you want the highest positions you must pay the price. This world runs a one-price store and has no bargain counters. Don't expect the goods unless you are willing to pay the price." So said a very sensible man, who became Governor of his state and later United States Secretary of the Treasury.

To the Boys and Girls

The boys and girls of today are going to be the great merchants, the teachers, the preachers, the lawyers, the manufacturers, the honest and respected carpenters, the engineers, the charity workers and the competent home-makers in the days soon to come.

Just now you are finding this to be a great, big, beautiful world, and of course you are thankful every day that you live in it; has it occurred to you that you may be destined to take an important part in the great things that are going to happen within your lifetime? There are very many things you must learn in getting ready for all that is before you, and your knowledge will come to you in many ways. Much of it will be secured in school, from teachers and books; much from your reading and study at home, with the help of your parents; but a very great proportion of what you are to know you will get day by day simply by keeping your eyes open and seeing things that are constantly taking place all about you.

It isn't simply a knowledge of arithmetic that makes a man a good merchant, nor is it enough that he knows grammar and history. Everything he learns which helps to make him think along straight lines is just as useful as mathematics and science. So when you learn that almost on the same day every spring a certain kind of bird makes its appearance in your neighborhood, and that on almost the same day every fall it flies south again, and you associate this knowledge with other related truths, you are being educated. You are learning to think and to reason, and when from all the knowledge you have acquired you can discuss any question reasonably, you are well advanced in education.

A man named Robert Louis Stevenson once wrote,

"This world is so full of a number of things,
I'm sure we should all be as happy as kings."

This applies very directly to boys and girls. Every time you step out of doors into the sunshine and among the trees you are in the midst of a world of wonders. The wonders are there, but that doesn't necessarily mean that you see them. Most things in nature are shy; they do not thrust themselves before your faces, but wait quietly for you to discover them.

In the world of birds there are hundreds of facts that you will learn with enthusiasm, and the more you know about these feathered friends the brighter and more attractive will all outdoors be to you. What birds build their nests on the ground? What one never builds, but takes possession of a home that another has built? What ones are masons, building their nests of clay? Do you know why the meadow lark and the oriole are in the blackbird family, or why the robin and nightingale are thrushes?

The flowers constantly remind us of all that is good and beautiful, and boys and girls, and men and women, too, are better because of knowing them. You can find out in a day enough about our common flowers to keep you wondering for a month. The wild rose is a very common blossom. You doubtless know that the large, beautiful rose in our front yards belongs to the same family, but have you compared this wild specimen with other flowers? You will find that the spring blossoms of the peach, the pear, the apple and the strawberry are very much like it. Indeed, we class the rose and all of these in one important flower family. The lily, the tulip and the hyacinth all belong to the lily family. Can you find why we class the onion and the asparagus as relatives of the lily and members of its family? Learn all you can about the locust, clover, peas and beans; if you study far enough their close relation will be shown as members of the pulse family. Under "Botany," in this volume, we tell a good deal more about these families of flowers, fruits and vegetables.

Did you ever gather buttercups? Of course you have done so, many times. But can you draw the roughest kind of sketch of what the leaf of a buttercup looks like? Can you tell how the bark of the poplar tree differs from the bark of a maple tree? Do you know why the pupils of a cat's eyes differ from those of a dog's? If you do know such things as these, the education of your eyes has begun.

Everywhere you go in the summer time you can find thousands of tiny insects crawling along the ground. Each has an existence just as real as that of the huge elephant, and there is something interesting about most all of them. There is enough to learn about the ant to employ your spare time for weeks. We give you a good deal of help in the study of the ant in "Nature Study," in this volume, and there is also a beautiful colored picture in the same place.

In a certain sense, no books can help in this part of education, this learning to see by seeing; but in another sense books are a great help. For it is true that we often see a thing after we have looked at a picture or read a description of it, when we have overlooked it scores of times before.

This is a wonder world, indeed! Not one of us will ever learn more than a small part of what nature can tell us if we are always watchful. THE NEW PRACTICAL REFERENCE LIBRARY was made to be of special help to boys and girls in their search for knowledge. Many color plates that will help educate you are provided, and they have been made particularly attractive, with your interests in mind. Do you want to know more about the honey bee, or about sugar, corn, cotton, silk, insects that look like the things to which they cling, the ant, flowers, birds and their nests and eggs—they are all shown true to the coloring of nature and are accompanied by carefully written descriptions. Read these books and have your eyes open every time you go out of doors. Ask questions of parents and teachers and be determined to understand the secrets of nature. They are waiting for you to discover them.

The boys and the girls with eyes and minds alert to see and know things in nature, and with questioning lips to demand answers to things they cannot understand, are on the sure road to success.

To the Teacher

A Place of Highest Honor. The person who underestimates the position among the professions that teaching occupies is unworthy to enter the schoolroom as an instructor of the young.

Giving all possible honor to the dignity of the ministry, admitting the service to mankind of the medical and legal professions, yet it remains true that the influence of the teacher upon the boy and girl is powerful beyond the precept and example of any other persons, excepting the father and mother in the home. The purity of the life of the preacher is accepted as a matter of course—such qualities are expected of him as of one considered, justly or otherwise, as "set apart." The sincere and blameless example of the teacher occasions more comment, commendation and emulation; a laxness in deportment or a serious blemish in character is as quickly noted and is as likely to serve as a pattern. Teacher and pupils are in intimate association; the latter are forming their futures—are "finding" themselves—and the responsibility of being a pattern and examplar is on the former, no matter how strongly she may wish it otherwise.

The Making of a Man. The teacher may turn a wayward boy into the making of a truly great man; we have witnessed the miracle. A single incident will mark the beginning, then nothing but level-headed management and tact are needed to complete the transformation. Exalted may that teacher feel if in thirty years some strong man may say, "Your example and your training gave me my inspiration." The teacher's power is a thing not to be lightly esteemed. It is always in evidence and always forceful, usually it is most conspicuous when unconsciously displayed.

Educational Preparation. There is another side to the teacher's responsibility—extremely essential in the estimation of all, all important in the view of many. It is the degree and quality of educational equipment. If you stand before your classes with little comprehension of the subject-matter of the lesson; if you bring to your duties a feeling that you will in some manner get through the day without serious difficulty and without exposing your lack of knowledge, even though you fail to make careful preparation, you are not doing your duty—to yourself, to your trusting and dependent pupils, or to your salary-paying patrons.

Every year somewhere in the United States and Canada higher educational qualifications are demanded as a basis for granting teachers' certificates. The standard is fairly high now, but it is going to be higher. You must face this fact and should not do so with resentment; it is for the good of every interest concerned. The boys and girls of this day are getting the preparation with which they will assume the duties of tho men and women of tomorrow; before you in the schoolroom is a possible future governor or representative in Parliament; a manager of a great public enterprise; a budding scientist or a great writer; a girl with latent power to hold the world's attention. If you judge the future man or woman by the unattractive dress, the freckles and the snub nose, you are not a teacher; you are merely a time-server. The children deserve something better behind the teacher's desk—sympathy, insight, imagination, that feeling of responsibility which will exalt the work of the day.

Continue to Grow. Strive, then, to make yourself intellectually worthy to stand before the little men and women. Give them the best that is in you; just as long as you feel unequal to the task study hard to improve yourself. Constantly find new, fresh material for your charges; this will require continual and patient research, but is worth every effort that may be put into it. The benefit you will get for yourself will exceed the great service to your pupils.

In this volume you will find literally hundreds of plans to develop your efficiency and add to the breadth of your understanding. Acquaint yourself with what this volume contains and learn how it supplements the subject-matter of THE NEW PRACTICAL REFERENCE LIBRARY. No better aid to the hard work of the day could well be offered you.

To Parents

Some of Your Troubles. Your time is limited; your duties call with insistence; few days are sufficiently long in which to do well all the things you know should be done. There is work in the kitchen, in the parlor, in the office, demanding attention; household supplies to be purchased, children to be cared for, furniture to be dusted, table to be set and cleared away; clients to be pacified or angered, patients to be cured or left with hope abandoned, goods to be bought and sold. Surely the stress seems not to be less from month to month, but rather to grow more severe. There is not time to raise your head from the work at hand; no opportunity to get away from encircling duty.

So have you believed, and so have others; that is the attitude of most of us. We are workers, bound to toil to sustain our lives and care for those to whom we are under loving and legal obligation. That there can be much variation in this unattractive program of life seems impossible. However, examples all around us prove without question that every one of us busy people always finds the time to do the things he wants to do. If parents rise to their full responsibilities and deal justly with their children and with the world there must be found the hour for relaxation, for vision not bounded by labor; the hour of mental and spiritual exaltation, shared with others for the common good.

The Responsibilities of Parents. The country imposes upon parents the moral responsibility of rearing their children in such environment as will develop useful citizens. This should be a function of government, crystallized into law, because necessary to the perpetuation of our institutions. To date we have reached the point where there is a legal demand that the child be given educational privileges until at least fourteen years of age. It is not enough; citizenship should reflect higher intelligence.

We do not do our whole duty when we feed, clothe and shelter the boy and girl. They are more than animals; there is more than the physical to develop. Neither is it enough when we merely comply with every legal demand respecting their education. The children look for and naturally expect assistance and sympathy from the parent in everything which will strengthen the halting footsteps. That child will complete the grammar school work and nine times out of ten will enter high school who at home has needed coöperation. The loyal boy or girl knows that father and mother are wise and good—why not demonstrate your goodness and do your best to measure up to the juvenile standard of wisdom established thus in faith and love and perfect trust?

Surround the child with an atmosphere of mutual understanding; give him to know that the problems of existence that he has to solve are your problems, too; place at his command efficient helps to study and then help him in his studies—you then have risen to the full stature of true parent.

Many of us wonder why some boys take such delight in their school work, while others manifest so little interest in it. Let us visit the homes of two boys belonging to these respective classes.

The Interested Boy. In the home of the boy who is interested we find a lad with an active and inquisitive mind. He asks scores of questions, some the result of his day's work at school, some prompted by his father's and mother's discussion or reading, others the result of his observations in the home or on his way to and from school; still others have arisen because of his own thinking and discussions with his playfellows. We admire his interest and alertness. We realise that he has begun right, and with a little direction will continue right. Instinctively we think of the successful professional and business men whom we have known as having been just such boys, retaining all the years the habits and traits of early boyhood. Inquiry reveals the fact that this boy has been blessed with teachers who helped him most by leading him to help himself. They have stimulated him to observe and investigate subjects and questions, and to think—in short, to do for himself. We also learn what is far more important—that this boy is constantly encouraged along his lines of study by an interested father and mother, who are never too busy to answer his questions, and who provide him with the means for self help and improvement.

The Uninterested Boy. In the second home we find a boy who manifests no interest in his school work or studies. He does not observe; he does not ask questions; he does not think or reason. He has a mind, but does not hunger for knowledge; he prefers idleness to activity; in short, he seems to be asleep rather than wide awake. Again, we call to mind the many idlers and no-accounts, the shiftless and dependent whom we have known, and in imagination we see them in their boyhood in the same condition as the boy before us. Inquiry reveals the fact that this boy's teachers have stimulated him to think, to observe and to do for himself, but that he fails to respond because his first efforts along this line have met with no encouragement from father or mother, who feel that their whole duty is done when he is sent off to school, forgetting that he needs their help, their encouragement, and, above all, their interest in his work.

Again, father and mother cannot help him because they do not understand his work, or are too busy to give it their time. He finds no helpful working tools on his study table. The question that he was assigned to look up yesterday he cannot answer on his return to school today. After numerous failures he feels that the odds against him are too great, the humiliation too much, and he becomes discouraged. Soon he loses all heart and interest in his work, and simply drifts. The teacher's best efforts will fail unless they are seconded by home influence.

The Right Help. This sixth volume of THE NEW PRACTICAL REFERENCE LIBRARY has been prepared to enable parents and teachers of the first boy to hold and develop his interest; to enable the parents and teachers of the second boy to encourage and awaken and stimulate in him a desire to learn and achieve. It furnishes a field of natural research and delightful study.

In the preparation of THE NEW PRACTICAL REFERENCE LIBRARY, the educators have aimed to give information in simple, concise, and interesting manner on practically every subject that will come up in connection with a boy's entire school life, and, best of all, to give it in such a way that he can find it by himself and for himself. Intelligent parents and teachers have long felt the need of such a work.

The progress of events makes a broader equipment necessary to success in the present than it did in former years. The equipment that was sufficient for a boy twenty-five, or even ten or five years ago, is not sufficient today. The world is nearer to us; life is more complex, more full of meaning, and to succeed requires a better trained mind than was required in the days of our fathers. Some parents are so engrossed in the accumulation of property or the prosecution of business that they give little attention to the educational needs of their children. Such should bear in mind that "To make a life is more than to make a living."

A Developing Science. Agriculture is the oldest of occupations and the foundation upon which all others have been reared. It is at once the must extensive business in the world and one of the leading sciences. It is a business, because so many follow it as a means of livelihood; it is a science, because earnest men are studying, arranging, and classifying the facts they have learned about agriculture, and in the light of known things they are reaching out in search of unknown truths, that they may be classified and handed down for the benefit of humanity for all time to come. Science is classified knowledge; so long as men knew only certain isolated facts regarding agriculture, and were ignorant of the relation one truth bore to another, agriculture was not on a scientific basis.

Modern demands are creating a wonderful change in our point of view; the progress of civilization, the competition with other occupations and the constantly increasing demand for agricultural products are compelling us to set aside old methods and bring into existence a new era for the farmers of the world. Concerning this, the director of the Agricultural Experiment Stations of the United States Government recently said:

"Without doubt the character of our agriculture is rapidly changing. It is becoming more highly diversified, its occupations are becoming more complicated, the use of intricate machinery is becoming more common and necessary and, in general, successful farming now requires a wider knowledge and a greater skill."

Why the Farm Was Not Attractive. We have heard much in recent years about desertion of the farm by young men and women—that their education has been "away from the farm, to the city and to the factory." Not only has hard labor induced this exodus, but another cause can be as reasonably assigned. The methods employed by the old-time agriculturist have been too slip-shod, his horizon too limited; the esthetic feelings have been discouraged by reason of the drudgery necessary with ancient tools and worn-out ideas. The dawn of a new era is here, bringing with it the application of scientific ideas to every branch of the industry; improved machinery which multiplies results and saves time and toil and money; and a growing feeling of dignity and position which affects the entire social structure.

There are men and women and young men and young women not yet awake to the new era in agriculture. They do not know that the Dominion government spends very large sums of money annually to learn of the agricultural possibilities of each section of every province and that all the resulting valuable information is given to the public without the slightest cost. They do not know why certain crops so frequently fail, but if they would write to the nearest Agricultural Experiment Station they might learn the reason. They should wish to know something about rotation of crops on such soil as covers their farms: the information is ready for them if they but apply for it.

The whole country is beginning to recognize the great advancement in agriculture, and still greater benefits will be ours when the fullest advantage is taken of the scientific experimentation constantly carried on under provincial and national authority.

Recognizing the supreme importance of agriculture among our industries, the editors of The New Practical Reference Library have placed in that work ample information along all lines of agricultural development. See *Agricultural Experiment Stations; Agriculture; Ag-*

riculture, Department of; Corn; Cotton; Irrigation; Milk; Soil; Wheat, and many other kindred topics. In addition to articles of this nature the article in this sixth volume deals more specifically with the farmer's needs and shows how in many ways he can lighten his labors and at the same time increase his products.

Professor L. H. Bailey of Cornell University says: "In an agricultural community all the farms of the neighborhood will afford training in the elements of failure and success." It is for each farmer to determine which elements shall prevail in the training which his farm affords. Old conditions and practices can no longer win, but under the new methods now in vogue, the farmer's life can be made the most enjoyable and the most substantial on earth.

Scientific Farming. The application of the principles of physics, chemistry, botany and other branches of physical science to agriculture in a scientific manner is of comparatively recent date, so recent, in fact, that only a small percentage of the acreage under cultivation in the Dominion is tilled in accordance with scientific methods. The chief requisites in scientific farming are analysis of the soil to determine the crops and fertilizers best adapted to it, selection and testing of seed to secure the greatest yield, operation and care of agricultural machinery, the study of the life history of noxious insects and plant diseases for the purpose of their prevention and extermination, the application of scientific principles to animal husbandry and the keeping of such a system of accounts as will show the expenditures, receipts and net gain or loss of each crop or other enterprise undertaken.

Seed

Importance. Fertile soil, good seed and proper tillage practically insure a bountiful harvest. As careful attention should be given to the selection of seed as to the preparation of the soil. Unfortunately, many farmers overlook this important factor in their success, and, instead of a bountiful crop, they reap a moderate or a small harvest. The importance of good seed is now so fully realized that the various Agricultural Stations and the Department of Agriculture at Ottawa are giving special attention to the production of seed for planting. In some sections seed-growers' associations are formed, which devote their attention to the production of the seed most used in their respective provinces and both the Experiment Stations and the national Department of Agriculture issue bulletins containing full directions for the selection, storing and testing of seed.

Character of Good Seed. Good seed has the following characteristics:

a. It is plump. With the exception of certain varieties of peas, sweet corn and onions, whose seeds are a ways wrinkled, the seed should be well filled and smooth. Seed of this sort contains the most food for the growing plant.

b. It is of good color and luster. Good seed has a bright, clear color, appropriate to the sort to which it belongs, and it usually has a certain amount of luster or a shiny appearance. If the seed lacks the luster it indicates that it was packed in bulk before being thoroughly dried. In this case it may have heated so as to kill the germ.

c. It is not too old. Young seeds are more desirable than old ones, since the proportion of those which grow diminishes with age. Seeds that have been raised the previous season should be selected whenever possible. However, if this seed is of poor quality, the farmer must use his judgment whether to take this or good seed that is older.

Selection of Seed. The time to select seed is before the harvest, since in making the selection the characteristics of the entire plant should be taken into consideration. The first point to consider is productiveness. Seed should be taken from plants having the greatest yield. The second point is resistance to drought and disease. The third is the time of ripening. These points are readily seen when applied to the selection of the seed of any important crop, such as corn or wheat. It is usually wise for the farmer to raise his own seed, for then he is sure of the variety. In selecting seed corn the farmer should watch his field during the growing of the crop and mark those stalks which retain their full vigor and bear more than one ear of about the average size, provided the ears on these stalks are well filled and rounded out at the butt and tip. It is not wise to select ears from stalks standing alone or stalks which bear only one ear, though that ear is unusually large. Seed taken from such stalks is not so productive as that taken from stalks which grow under ordinary conditions and bear two or more ears.

Before the corn harvest, the farmer should go to his field, bearing these points in mind, and gather seed for the next crop.

Storing the Seed. Seed should be thoroughly dried, then stored in dry, cold places. In the case of corn, a large number of ears should not be piled upon one another, for in damp weather this condition is liable to cause mold. Seed racks in which individual ears are placed or cords to which several ears are attached and then hung on racks or beams form convenient and safe means for storing seed corn.

Seed for wheat, oats and other grains should be stored in small bulks and carefully protected from moisture. Unless the seed is thoroughly dry when harvested, the grain is liable to be damaged by frost. When this occurs only a small portion of the seed will grow.

Testing Seed. Before planting it is wise to test the seed, unless the farmer is sure that it is good. A simple but effective apparatus can be made by taking a large plate, and placing upon it a sheet of blotting paper, which should be marked off into spaces one inch square. In each of these spaces place a number of seeds from the seed to be used, usually five or ten. Moisten the blotting paper, then lay a damp cloth or another sheet of blotting paper over the seed and cover with another plate, inverting it over the first. Keep this apparatus in temperature about the same as that of the soil at the time of planting. From day to day lift the upper sheet of paper and inspect the seeds, noticing their progress in germination. The germination should be completed in a week to ten days, depending upon the kind of seed. Notice the number of seeds in each square which show signs of producing good, strong plants and the number which have not germinated. Supposing ten seeds are in the square and eight of these have germinated, it is safe to draw the inference that 80 per cent of the seed will grow. If less than this per cent germinate, the seed should be regarded as unsafe.

If one wishes to make a thorough test of seed corn, a large testing apparatus consisting of a box several feet square can be made and the seed taken from each ear placed in the squares marked off in the box. When this is done, the ears should be numbered, the number on the ear corresponding to the number on the seed case in which the seed is placed. By this method, poor ears can be detected and withdrawn. The apparatus is easily constructed and the testing can be done at the season of the year when the farmer usually has ample time for this sort of work. By continuing to select and test his seed from season to season in this way, any farmer can improve his grade of corn or wheat or the grade of any other crop which he raises. The profit from the increase in yield far more than compensates for the extra time and trouble taken.

Agricultural Machinery

Wonderful Improvement It is a far cry from the hand sickle of our forefathers to the harvester and binder of the present day, or from the old hand skimmer to the modern cream separator. However, these machines are no more complex than those in general use in most thriving farming communities. The operation and care of these machines require intelligence and some degree of mechanical skill.

On the farm, power is required for tilling the soil, planting the seed, harvesting the crops, threshing, transportation and such other operations as are necessary to transform raw material into usable products, as in the grinding of corn, separating cream from milk and churning the cream. This power can be furnished by man, domestic animals and motors. The first is the most expensive and the last the least so. Wherever practicable, farmers are installing gasoline engines for grinding feed, operating cream separators, cutting fodder, pumping water and various other operations. Moreover, in some localities the auto-truck is displacing the draft horse and on some large farms in the northwest the traction engine is taking the place of the team for plowing, hauling and seeding.

Care of Machinery. This complicated farm machinery is expensive, and if it is made profitable it must be so cared for that it will last a long time. Many farmers by lack of care allow their machinery to deteriorate more rapidly from weather than from use. In other words, they allow it to rust out faster than it wears out. But when properly cared for and preserved, farm machinery is a profitable investment. When not in use, it costs nothing to keep it, while the teams, which can be used only a portion of the year, are a constant source of expense. The progressive farmer is constantly studying these conditions and changing his methods so as to meet them in a successful manner.

When any farm machine is in use, the operator should see that all bolts are kept tight, and all bearings are well oiled. Just as the railroad engineer goes carefully over his locomotive before starting on a trip, so should the operator of a farm machine go over his machine every morning before beginning the work of the day. The few minutes thus spent may save vexatious delays and costly repairs.

Machines should not be left exposed to the weather, even in a dry climate. When the work of the season is completed, the machine should be thoroughly cleaned, the iron and steel exposed to the air and unpainted should be coated with oil and the machine stored in a dry building.

The Soil

Value. The soil is the great storehouse of wealth, not only for the farmer, but for all others as well. A fertile soil is the first requisite to successful agriculture Soil is considered fertile when it contains an abundance of plant food in such state that the plants can appropriate it as needed. The chief ingredients of this food are nitrogen, potash and phosphorus, which occurs in the form of phosphates. The nitrogen is obtained from the decomposition of organic matter which constitutes that portion of the soil known as humus. Potash and phosphorus exist in the mineral portions of the soil, which must be chemically decomposed before these substances can be used by the plant. Many soils, rich in potash and phosphorus, or both, are unavailable because these substances are not in a state to make them available for plant food. On such soils the sort of fertilizer needed is some ingredient that will decompose the rock particles which hold the potash and phosphorus in insoluble form.

Soil Analysis. Before the farmer can obtain the best results from his labors, he must understand thoroughly the condition of his soil; that is, he should know the plant foods it contains and the relative proportion of each. Also, he should know whether or not each of these foods is in such a state that it is available for the plants. So important is this knowledge that the agricultural colleges are making soil surveys throughout their respective provinces and the Dominion Department of Agriculture is doing a similar work for the tillable portions of the public lands.

Any farmer wishing to know the chemical constituents of his soil should write to the agricultural college of his province.. If the soil in the vicinity of his farm has been surveyed, he will obtain the desired information. If it has not been surveyed, he will be told what steps to take to secure the analysis. In general, the funds of these colleges do not enable them to analyze soil for individual farmers. The college will, however, refer the farmer to some chemist who will make the analysis for him. The fee is usually ten dollars, but if the knowledge gained enables the farmer to produce more bountiful crops, or to render fertile what the farmer supposed to be worthless soil, the money is very wisely invested. Analysis of the soil of many so-called worn-out farms shows that right methods of treatment will in a few years make them as productive as ever. The best authorities state that the first 16 inches of soil contain an average of 7,122 pounds of nitrogen, 6,035 pounds of phosphoric acid and 23,160 pounds of potash to the acre. Fertilizing the soil means setting these ingredients free as frequently as it means supplying them.

How to Study Soil. First determine whether or not the soil has been formed chiefly from the underlying rock. If it has, it is of the same composition as the rock, with the addition of humus. If the soil is alluvium, or soil that has been deposited by water which overflowed the land, its composition will be very different from that of the soil upon higher levels in the same locality. Moreover, alluvium contains a large proportion of humus.

To determine the texture of soil, dry a quantity, then break it into fine particles. If it is lumpy and pulverizes with difficulty, it contains a good proportion of clay. If more than one-half of it is clay, it is known as clayey soil. If about three-fourths of it is sand, it is a sandy soil, If one-fifth of it is lime, it is a limy soil. A soil containing a mixture of sand and clay is loamy.

A perfect soil contains these various ingredients in suitable proportion. It must have sufficient sand to enable it to absorb the requisite quantity of air and moisture, and to render it warm and friable. It must have sufficient clay to prevent the rapid leaching or evaporation of water, sufficient lime to aid in the decay of vegetable matter and enough humus to enable it to retain the best amount of moisture and to furnish the necessary material for the chemical changes necessary to healthy plant growth.

Next determine whether or not the soil is "sour." Soils that have not been worked for a long time are liable to contain an excess of acid. Crops do not thrive in such soils, and before planting, it is always wise to test them for acidity. For this test, procure a small quantity of litmus paper from a drug store. Take a quantity of the soil and moisten it. Lay a strip of litmus paper upon it. If the soil is sour the paper will soon turn red. Soils containing excess of acid can be restored to their normal condition by treating them with slaked lime or hot ashes.

To determine the relative proportion of humus, thoroughly dry a quantity of soil and weigh it. Then place it on an old shovel blade or some other flat metallic surface and heat it to redness. The humus will be burned out. After cooling, weigh again.

What was the loss in weight?

What proportion does this loss sustain to the first weight?

Local conditions may suggest further investigation, and if the farmer is in doubt as to the best method of procedure he should write to his agricultural college, from which he may always feel sure that he will receive reliable information.

Insects and Plant Diseases

Insects. The yearly damage caused by noxious insects is practically beyond estimate. Official estimates place the total loss to the apple crop caused by the codling moth in Canada and the United States at more than $20,000,000 a year. The damage to wheat and corn wrought by the chinch bug exceeds $25,000,000. In addition to these we have the damage to the tobacco crop, the potato crop, nearly all varieties of fruit and all kinds of garden vegetables, and to these must be added the ravages of insects which damage or destroy forest and shade trees. The destruction of these pests is one of the most difficult tasks with which the farmer is confronted, and in order to preserve his crops from serious damage he must understand thoroughly the habits of the insects which affect them.

Study of an Insect. The study of an insect includes a study of its life history, that is, following it through the first stages of development from the egg to the imago, or perfect insect. In the course of his observations, the farmer should take note of the following points: the time at which the eggs appear and the plants and parts of plants upon which they are laid; the time required for the eggs to hatch, the plants and parts of plants upon which the larvae feed; the number of days the insect remains in the larval state; the kind of chrysalis or cocoon which it forms and the places in which the cocoons are lodged, the time which the insect spends in the pupal state; that is, the time that elapses from the forming of the cocoon to the appearance of the perfect insect. The insect lives but a few days, in some cases but a few hours, but during that time it mates and the female deposits her eggs, thereby making provision for the second brood.

To make a concrete application of the above suggestions, we will apply them to the history of the codling moth. We seldom see the moth, which is small, with brown silky wings, crossed by numerous gray and brown lines of scales. Near the hind angle of each front wing is a large dark-brown spot, marked with streaks of bronze and gold. The female lays her eggs on the apple or on leaves or other parts of the tree near the apple, soon after the blossoms fall. When found upon the apple the eggs appear as a small white dot, closely resembling a drop of milk. As soon as the egg hatches, the larva, a tiny worm, works its way to the center of the apple, where it lives and grows, feeding upon the fruit, especially the seeds. When the larva has reached its full growth, it crawls out of the apple, leaving a blackish wormhole, and proceeds to find a suitable place for its cocoon. The trunk of the tree, crevices, large branches and the crotch of the tree are favorite places, and cocoons in large numbers are often found in the rough bark on these parts of apple trees.

Since the core of the apple is an extension of the stem, the damage wrought to it weakens the stem, and the apples thus affected fall before they are ripe. In most orchards they constitute by far the largest part of the windfalls. Many apples fall before the worm has reached its maturity, and if this fruit is left upon the ground the worms soon crawl out and form cocoons upon the trunk of the tree. Therefore in orchards affected by the codling moth, windfalls should be frequently gathered.

There are always some worms that do not reach maturity until after the fruit is harvested. These may form cocoons on the inside of the box or barrel in which the fruit is stored. If the fruit is stored in the cellar and the boxes and barrels are left open, the cocoons may be formed on the walls of the cellar. Hence all receptacles and places in which apples are stored should be thoroughly fumigated with bisulphide carbon before fruit is stored in them the second time.

From the above description of the codling moth, one can quite easily infer how its ravages may be greatly lessened, if not entirely stopped. If the rough bark is scraped from the trees, many favorite places for depositing cocoons are destroyed. Again, by winding folds of burlap around the trunk of the tree, and folding them so that the worms can crawl under the folds, most of the cocoons that will be formed by the worms coming from other places can be gathered and destroyed. All old apple trees and shrubbery, as well as other objects which may afford lodging places for cocoons, should be removed from the orchard. These methods are measurably successful in preventing the increase of the codling moth, but by far the most effective method of destroying this pest is that of spraying the trees with a solution of paris green as soon as the blossoms fall. So important, in fact, is spraying considered where apple growing is a specialty, that stringent laws have been passed in the United States compelling every orchardist to see that his trees are thoroughly sprayed at the right time. If this is not done, the inspectors are authorized to do it at the orchardist's expense. The above description shows a method of observation which will enable the farmer to become acquainted with the life history and the habits of the insect that feeds upon his crops. The time taken for this work is more than amply repaid in saving the crops from damage or destruction. By writing to the nearest Agricultural Experiment Station, also to the Department of Agriculture at Ottawa, any farmer can secure valuable information about the destruction of noxious insects common to his locality or to the crops which he grows. See *Chinch Bug; Gypsy Moth; Potato Bug; Insecticides.*

Plant Diseases. Plant diseases should be studied in a manner similar to that outlined above for insects. Most of these diseases are caused by parasites, usually known as fungi, growing upon the plant. The fungi draw the nourishment from the plant and this prevents its growth, . in many cases destroys its life. Fungi are propagated by minute organisms called spores. When the spore lights upon a plant upon which it is to live, it sends out a minute thread which penetrates and apparently takes root in the inner part of the leaf or stalk. When perfected, each of these minute plants sends forth into the air a multitude of spores which produce another crop. The most injurious fungi are mildews, rusts, smuts and potato blight.

Prevention of plant diseases requires careful study. If the seed is suspected, it should be treated before planting with some solution which will kill the spores. Fields in which the disease has appeared should have the old stubble burned over and be cleared of all shrubbery and other objects in which the spores may find refuge, before plowing for the second crop. Even with these precautions it is wise to plant the field the second season with a different sort of grain, selecting something upon which these spores cannot feed. See *Bacteria; Mildews; Rusts; Smuts; Yeasts.*

The Dairy

Some of the leading scientific principles of animal husbandry are readily illustrated by showing their application to a dairy farm. To conduct a dairy successfully the dairyman must give careful attention to the following particulars:

1. Careful selection of his herd.
2. The construction and maintenance of suitable stables and other buildings necessary to the work.
3. Providing the right sort of pasturage.
4. Providing the right sort of feed in addition to pasturage.
5. Facilities for the care and marketing of the dairy products.

Neglect of any one of these points is liable to lead to failure in the enterprise.

The Herd. The cows should be selected with reference to the main purpose for which the dairy is conducted. If the dairy is to supply milk for city markets, the cows should be chosen with due regard to the quantity of milk which they produce. If the dairy is devoted to supplying the market with butter, more regard must be paid to the quantity of butter fat in the milk than in the former case.

Experienced dairymen are good judges of cows and seldom make mistakes in the selection of herds. For the benefit of those of less experience the following points, taken from Brook's *Animal Husbandry*, are given:

HEAD—Small, lean and bony, with large muzzle and mouth. The nose and face should be free from fleshiness.

EYE—Full, large, lively in expression, but at the same time mild, clear and bright. The whole expression of the face and eye should be motherly.

FOREHEAD—May be either straight or dishing, but the latter gives a more well-bred appearance.

EAR—Thin, large, active, and for most breeds should be of an orange color within.

NECK—Should be rather thin, especially near the head, and long. It should be free in most breeds from loose, pendent skin.

HORNS—Should be of moderate size.

SHOULDERS—The animal at the shoulders may be from two to four inches lower than at the hips. The shoulders themselves should be thin, especially at the top, lean and bony.

CHEST—Should be deep, that is, it should have a large measurement from top to bottom. It is less broad and roomy than in beef breeds. The section through the animal behind the shoulders should have an elliptical outline. Too great thinness behind the shoulders is, however, a mark of weak constitution.

BACK—Should be rather long and rugged. The vertebrae of the backbone should be rather wide apart so that the fingers may be pressed down between the points in the ridge of the back. This is only one feature of the general looseness of structure which is looked for in the dairy type, as contrasted with the close, compact structure which is desirable in the beef type.

LOINS—Should be fairly broad, the hip bones rather high and well apart. The bones, moreover, are often rather farther forward than in the beef type. This gives a long and strong hind quarter.

bone, and the lower line, or the line of the belly, approaching each other from behind. When looked at from behind or from above, the animal should also present a wedge shape, the lines of the wedge approaching each other from rear to front. The dairy cow, therefore, shows a double wedge. The ribs, to harmonize with this general wedge shape, are rather flat immediately behind the shoulders. At this point they do not spring out very widely, but toward the posterior part of the animal the ribs spring out from the backbone more and more broadly in order to give room for large internal organs "for a big workshop."

THE UDDER—The udder should not be very pendent, but should obtain capacity by breadth,

A MODEL DAIRY BARN

THIGHS—The thighs should be thin, especially on the inside, in order to give room for a large udder.

FLANK—The flank is well up, and rather thin.

LEGS—The legs should be rather short and the hind legs may be rather crooked. The bones of the legs should be moderately fine. The fore-legs are comparatively near together, the hind legs wide apart.

TAIL—The tail should be long and fine, with a long switch. A long tail is believed to indicate that the vertebrae of the backbone are somewhat loosely connected, which, as has been pointed out, is considered highly desirable.

THE GENERAL OUTLINE—When looked at from the side, the general outline should be that of a wedge, the upper line, or line of the back-

being wide from side to side, extending well forward, well backward also, and high up between the thighs. It should be broadly and firmly attached to the abdomen. The skin of the udder should be thin and delicate. The udder should be well filled out at the bottom between the teats, and the latter should be wide apart, squarely placed, and of good size.

A daily record of each cow should be kept and those that do not reach the required standard should be sold or fattened for beef and their places taken by others. Only the calves from the best milkers should be retained for future additions to the herd. In this way the strain of the herd will be strengthened from year to year. The record should enlighten the dairyman concerning two points: the average daily quantity of milk given by each cow and the length of time from calving before the quantity of milk begins to diminish. The most profitable animals are good milkers for a long time. They may not produce such large quantities of milk while fresh as some others, but their record for six months or a year shows them to be far more profitable. It costs no more to keep a good cow than a poor one, and the first is kept at a profit, while the second is kept at a loss.

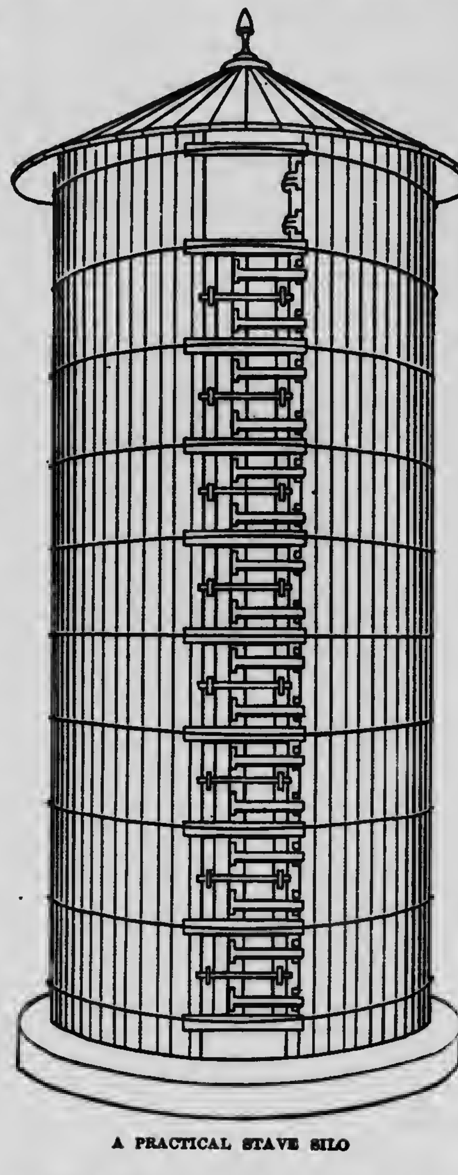
The next thing necessary is a milk test which will show the amount of butter fat as well as the quantity of cream. This test should be made by an expert in a creamery or butter factory if possible, because in these places the necessary apparatus is at hand and an expert is usually in charge. If, however, the farmer is so situated that he must make his own test for milk, hy sending to his experiment station for directions, he will receive such assistance and guidance as will enable him to make the test successfully.

The Stable. Milk can be produced only from healthy cows, and in most regions where dairying is carried on, proper housing of the herd is the important factor in preserving the health of the animals. Disease, especially tuherculosis, is frequently contracted because the stable is poorly ventilated and because it is kept in a filthy condition. The stable should be well-ventilated and well-lighted. The walls should be kept free from dust and should be frequently whitewashed. Above all, the floors should be kept free from filth and plenty of fresh, clean litter should be spread daily. Open feed troughs and partitions made of piping or iron railing, which will not collect the dust, are the most desirable.

The yard and grounds about the barn should also be free from weeds, manure and rubbish.

Feed. Fresh grass is the most desirahle feed for milch cows, hut suitahle pasturage for a large herd requires so much land that some other source of food supply availahle all the year is necessary. During the months when pastures are not in grass, the cows must be fed entirely from this other source. The right sort of ration must be determined and the most economic means of supplying it be provided. Many farmers use ensilage, or silage, as it is commonly called.

The Silo. The silo has become a fixed part of the equipment of nearly all dairy farms. It enahles the farmer to preserve a larger quantity of fodder than is possihle hy any other system of preservation known. Moreover, it preserves the fodder in nearly as natural a state as possible. While a good silo is somewhat expensive, on the other hand it soon pays for the outlay by the beneficial results which it yields. Silos are con-



A PRACTICAL STAVE SILO

structed of various materials. Doubtless those built of concrete are the best, as they are certainly the most durahle. On the other hand, they are the most expensive and beyond the

 Agriculture

reach of many farmers who can afford to build only a wooden structure. For this reason stave silos are more commonly seen than any others. Various forms of these silos are in use, and a farmer desiring to construct one should consult firms which make a business of putting up buildings of this sort. While by doing work himself the farmer might save a little expense at the outset, yet the risk of making an imperfect structure is too great to warrant attempting to save the slight difference in expense. A cylindrical silo 20 feet in diameter and 20 feet high will contain 105 tons of silage and one of the same diameter 25 feet high, will contain 143 tons; while a silo 25 feet high and 25 feet in diameter will contain 224 tons. These figures enable a farmer to judge quite accurately as to the size of a silo which he wishes to build, and the work should be done by one experienced in constructing buildings of this sort. All things being equal, the cylindrical silo is the best. It contains no angles, it is more easily kept tight and is easily cleaned when emptied. Moreover, the cylindrical silo is the strongest form for a structure of this sort, and it is not easily pressed out of shape by the pressure from within.

In locating the silo the farmer should carefully consider two things: first, convenience in handling the silage, which must be done at least twice a day; and secondly, the position of the silo with reference to the stable, so that odors arising from it will not penetrate the stable, at least during milking time, since milk readily absorbs odors of this sort. The silo should be as near the stable as possible without danger of contaminating the milk. If the cows are fed after milking time and the stable is thoroughly aired before milking time, there is but little danger from these odors.

The bottom of the silo should be cement or plank, but cement is preferable, since a plank bottom causes a loss of five or six inches of the silage next to it. The sides should be air-tight, but the roof should provide ample ventilation. With these points in view, the farmer desiring to construct a silo knows about what to require of the builders. Connected with this article is an illustration of a silo of a very satisfactory type.

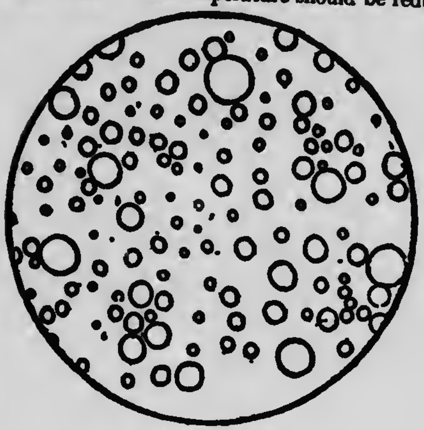
Various crops are suitable for silage, but experiment has shown that corn is the most desirable. Alfalfa and clover are also used to good advantage. Experiments have shown that the best results are obtained from corn silage when the crop is cut just as the ears are beginning to glaze. As the corn is cut in the field, it is hauled to the ensilage cutter, which cuts it into pieces about an inch in length, using the stalks and ears without separation. As the cut silage leaves the machine, it is carried by an endless belt containing buckets, or by a blower, to the silo. If the plant is dry it should be thoroughly wet after leaving the cutter, before it is packed. Otherwise it soon becomes mildewed. In case of dry crops it is the practice to run a stream of water over the silage as it leaves the cutter. The water tends to make the mass in the silo air-tight, and thus prevent fermentation and decay.

When the silo is filled, the ensilage should be covered by some preparation which will exclude the air. Local conditions determine what can be used to the best advantage. The doors in the side of the silo should, of course, be kept closed until the contents have been lowered to each succeeding door. Silage protected from the air will be kept fresh and succulent through the winter, and it is practically as nourishing and healthful as the grass obtained in the average pasture.

The silo combines the advantages of storing a large amount of feed in a small space and of keeping it in its natural state until used. Moreover, by this means of storage, the farmer can raise upon a few acres fodder, which, if raised under ordinary conditions, would require many times the acreage, and, in addition to this, the silage is much better adapted to the purpose of feeding milk cows than any other sort of dairy food.

Milk. Healthy cows, suitable feed and cleanliness are essential to the production of good milk. The first two of these conditions we have already discussed. The third is equally important. No farm product is so sensitive to its surroundings as freshly drawn milk. It absorbs particles from the air and odors from any substances in close proximity to it, or from the atmosphere impregnated with the odor of such substances. Moreover, the smallest particles of dirt may contain germs which multiply very rapidly and in a short time render the milk unfit for use, either because it is disagreeable to the palate or because it contains germs which will convey disease to the system.

Under cleanliness three things should be considered. The first of these is the condition of the stable. Before milking, the air in the stable should be changed, so that it will be pure and fresh. Sweeping or littering the cows before milking should be avoided, because these operations raise dust which it liable to contaminate the milk. The second point pertains to drawing the milk. The milkers should wear clean clothing and have their hands clean and dry. Previous to milking, the udders and flanks of the cow should be wiped with a damp cloth, so as to remove any particles of dirt or dust which might fall into the pails. Pails with small tops should be used. Those with the tops partially covered are preferred. The old-fashioned wide-top pail should in all cases be avoided. As soon as the milk is drawn it should be removed from the stable, strained and cooled. However, if the milk is to be used at once, or in a few hours, the cooling is not essential. In small dairies milk is usually strained into cans which are placed in cold water. The temperature should be reduced



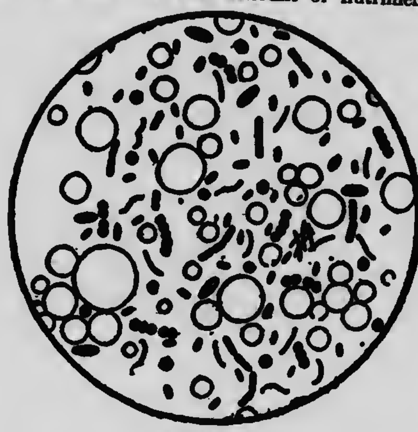
PURE MILK

to 40°, or at least 45°. If the cans are covered so that the air is excluded, under these conditions milk will keep sweet from 24 to 36 hours, sometimes longer. Milk designed for butter and cheese should be taken to the creamery at the earliest opportunity, for there suitable facilities are provided for storing it under proper conditions and temperature. Milk designed for shipment to a city should be stored in receptacles that are kept in ice.

All utensils employed in the reception or storage of milk should be thoroughly cleaned immediately after using, and scalded with boiling water, or, what is better, placed in a vat and steamed for several minutes. This will kill all germs that may adhere to the surface.

Sour milk is caused by the growth of bacteria which convert the sugar in the milk into acid. These bacteria are not active at a low temperature. Therefore warm milk sours much more quickly than cold. The following illustration, taken from "Farmers' Bulletin No. 63," United States Department of Agriculture, shows the contents of pure milk freshly drawn, and of milk which has stood in a warm room in a dirty dish for a few hours.

Good milk contains about 87% water, 3.6% fat and 4.8% sugar, besides a number of other ingredients. Under normal conditions it is the most healthful and perfect food provided. However, it does not contain sufficient nutriment to supply the demands of the adult human system, but it is an important factor in that supply. Milk should never be considered as a beverage, and when it forms a part of one's diet, the other portions of the diet should be regulated in accordnace with the kind and amount of nutriment



INFECTED MILK

which the milk contains. See *Bacteria; Animal Husbandry; Milk.*

Agriculture in Rural Schools

Opportunities in Agriculture. There are no more promising opportunities presented to young men than those offered in the field of agriculture. The demand for trained agriculturists is greater than the agricultural colleges can supply. Notwithstanding their strenuous efforts, this demand is constantly increasing. The young man who takes a thorough course in agriculture in any institution offering such course is sure to find a good position awaiting him upon his graduation. But what is of greater importance still is the demand, now becoming general, that the elements of agriculture be taught in the public schools, especially in the schools of rural communities. The time is at hand when the teachers of these schools must be prepared to teach this subject. Realizing this, the Dominion Department of Agriculture and the agricultural colleges in the various provinces are doing all in their power to prepare teachers for this work. However, the demand is increasing so rapidly that they are unable to meet it. See *Agricultural Education*, page 227.

Explanatory Work for the School Year. For the purpose of assisting teachers and parents, we herewith give an outline of what can be attempted in a year in the average rural school. The work is arranged by months, beginning with September, but the work of any month can be taken up without that of the preceding month, except that the necessary material must be provided. Better results, however, will be secured if the work can be taken regularly through the year in the order in which it is given.

The lessons should be graded and the older pupils given such exercises as will tax their capacity and lead to practical and interesting results. The lessons for the primary and intermediate divisions should be included in the nature study work, which as far as possible should be directed along the lines of agriculture. Practically every rural school now has a prepared course of study in which the nature study work is given, and the lessons as they are outlined should be followed to prevent confusion. If a school garden can be maintained, much can be accomplished in connection with it, and it should be made the most of, assisting both the lessons in nature study and in agriculture.

Too much should not be attempted, especially if the subject is new to the school. The work with the primary and intermediate divisions should be of such a nature that it is applicable wherever the school is located. That with the grammar divisions should deal chiefly with the agricultural interests that are most prominent in the locality; as corn in the corn belt, wheat in the wheat belt and the prevailing sorts of fruit in a fruit region. One, and at the most two, lessons a week are all that can be devoted to this subject; yet if these lessons are carefully planned much can be accomplished.

The outline which follows is confined to those lines of work especially suited to agriculture, and it is designed for the grammar divisions of the school. The reason for this is readily seen when we understand, as before stated, that the more elementary lessons must in practically all cases be included in the nature study work.

SEPTEMBER—This is the month when many plants mature. The study of the seed vessels and seeds of these plants should be taken up during the month. Have the pupils bring to class specimens of all the grains and grasses grown in the neighborhood, such as corn, oats, peas, beans, etc. In the case of the smaller grains, several stalks of each should be brought by each pupil. But one or two stalks of corn with the ears in place will probably answer for the entire class. Pea vines and bean stalks with the pods in position should also form part of the collection.

Have the pupils study the heads of the different grains and note how the seed is arranged upon each.

Notice the different coverings, as the hulls on wheat, husks on corn and pods which enclose the peas and beans.

What grains are threshed?

What does the threshing machine do to them?

Compare heads of the same grain as to fruitfulness by counting the kernels of wheat and oats on different heads. Send the pupils to the corn field to count the number of ears on different stalks. Have them count the number of peas and beans in different pods. In connection with this counting, ask the pupils to compare the ears of the plants and their general appearance of thriftiness. The difference in stalks of corn in regard to these peculiarities is more easily traced than in the wheat and oats and smaller grains, so it is well to begin this exercise with the corn plant.

The remaining lessons of the month should be devoted to the collection and study of seeds. Each pupil should have his own collection arranged in bottles or small boxes which are labeled. These collections should be stored for use in the spring.

OCTOBER—Numerous insects deposit eggs which form chrysalides which remain through the winter, and upon hatching form the early brood of these insects the next spring. Very effective field work can be done by the pupils by making collections of these egg clusters and chrysalides. If they are found on the twigs of trees or shrubbery, cut off the twig and pin to it a slip of paper bearing the name of the plant from which it is taken. If the egg cluster or chrysalid is taken from any other object, make a record of the place in which it was found. Keep these collections in a cool place through the winter. They will form material for future lessons.

The nature and composition of soil can be studied this month with profit. See page 16.

November—As the winter approaches, attention should be called to the care and feeding of stock. What constitutes a proper ration for milk cows, horses, swine and other domestic animals will be of sufficient importance to employ the attention of the class during the month. Ask each pupil to give an account of the kind and quantity of fodder used for the different animals of the farm where he lives. This will lead to the discussion of the quality of different kinds of feed and best methods of curing, storage and preparation for the stock.

Are there any silos in the neighborhood?

Of what advantage is the silo?

Why would you feed a dairy cow a ration different from that fed a draft horse?

What are the best feeds for fattening cattle? For fattening pigs?

The observations necessary to answer these questions should be carried through the winter months and the points brought out as occasion may require.

December—Continue the lessons on live stock. Discuss the construction of stables and other buildings for shelter.

What are the essentials for a sanitary stable?

What defects are common in the construction of stables?

Does it pay to shelter stock in regions where the animals will survive the winter without shelter? Why?

The discussion of these questions will lead the class to give attention to the construction of stables for dairy cows and probably will lead them to notice the good and bad points about the barns and the other out-buildings on the various farms in the neighborhood. The lessons can be made very interesting and profitable if the pupils are led to observe, to glean information from their farmer friends and then to compare notes and discuss in class the results of their efforts.

January. This is a good month in which to study the branching and the bark and wood of trees. For outlines of these studies, see *Nature Study*, in this volume. Some birds remain through the winter. Lead the class to discover all the birds they can and learn what they feed upon and where they find shelter.

Are these birds of any benefit to the farmer during the winter? Why?

What can be done to entice the birds to remain about the buildings?

For a plan of the study of birds, see *Nature Study*, in this volume. Review from time to time the observations on feeding stock.

February. The older pupils will be interested in a simple but effective system of accounts that enable the farmer to keep a record of each portion of work carried on, as with the different crops, the dairy, the poultry, swine, beef cattle, etc. In keeping these accounts, the crop or other industry should be charged with everything expended for it and credited with everything it returns. To illustrate: in the account with the corn field, the field should be charged with whatever is expended for labor in preparing the ground for the seed, with the fertilizer used and with the seed and seeding. Later it should be charged with the expense of tillage, and when the crop is ripe, with the expense of harvesting and marketing. To these charges should be added the use of the land at a fair valuation and at the rate of interest which that amount of money would receive if loaned.

The field should be credited with the corn produced. This credit will usually be divided into several items, such as seed corn, corn sold and corn retained for use on the farm. If the stalks are used for feed or in any other way that yields an income, either directly or indirectly, this income should also be credited to the field. The balance of the account will show the actual gain or loss on the crop.

Several lessons can very profitably be devoted to these accounts. Lead the pupils to see what should be charged to such accounts as poultry, dairy, beef and pork. Make model forms and prepare exercises for practice, so that the pupils will become accustomed to the form of an account. It will then be an easy matter to keep such accounts with the enterprises carried on on their own farms. Their ability to do this will usually be very gratifying to the parents. Any teacher familiar with the elements of bookkeeping can easily arrange such a system of accounts, and an elementary text on bookkeeping should constitute a part of every teacher's equipment.

Train the pupils to be systematic and regular in keeping these accounts. At the close of each day on the farm, memoranda of the day's business should be entered in the book used for this purpose. These items should be entered in their respective accounts at regular intervals. If the farmer's accounts are to be of value they must be kept as systematically as are those of the merchant. The farmer not accustomed to keeping a system of accounts may at first think it a waste of time. Therefore the teacher must thoroughly impress the importance of this practice upon the pupils. The accounts with the crops should begin with the preparation of the ground for planting and close with the marketing of the crop. Accounts with industries from which a constant return is received can be opened at any time. It is well to balance such accounts every month, and they should never be allowed to run over three months without balancing.

MARCH. This is the month in which preparations for planting are begun in many localities, but in the colder sections of the country these preparations are necessarily deferred until later. Three lines of work demand attention this month:

1. Testing seeds (see page 15). In addition to the test given in the school, have each pupil prepare a testing apparatus and test the seed to be used on his own farm.

2. The cocoons and eggs collected in the fall will need attention. They should now be brought into the schoolroom and placed in cages to prevent the escape of any insects which may hatch from them. To make the insect cage, take a small box, such as a cigar box, or one of similar size made of cardboard. Cut out a portion of one side and fasten over this space some wire screen. Place in the box one or two supports and place the eggs and cocoons within.

Under natural conditions the eggs and cocoons will hatch at about the time when the leaves upon which the larvae feed appear. They may not hatch for some weeks after placing them in the schoolroom, but they should be cared for in order that none of the specimens may be lost. As soon as the insect hatches, place in the box leaves from the tree or shrub upon which the eggs or cocoons were found.

3. Birds will begin to return and a practical field study of them should begin. Much of this can be done incidentally by pupils on their way to and from school and as other opportunities offer. However, in order that this study may be successful, the teacher should enter into it with the pupils and give specific directions as to what to look for and how to conduct the observations. The important fact to be brought out in this study is the relation of the bird to the farmer. Many birds are of greatest benefit to the farmer in destroying insects, and they should be protected. Too often the farmers consider the birds as enemies, because they eat berries and other fruit; but the insects they destroy far more than repay for these small depredations. Every school library should be provided with books giving descriptions of our common birds and directions for observing them. The following are inexpensive and will be found very useful. They are given in the order of their preference:

Bird Guide. Reed.

Color Key to North American Birds. Chapman and Reed. Doubleday, Page & Co.

Bird Life. Chapman. D. Appleton & Co.

Handbook of Birds of Eastern North America. Chapman. D. Appleton & Co.

Popular Handbook of the Birds of the United States and Canada. Nuttall.

Check List of Canadian Birds. Macoun.

Birds of Ontario. McIlwraith.

Bird Homes. Dugmore. Doubleday, Page & Co.

The swelling of buds, coursing of sap and general awakening of vegetation to life will involuntarily attract the attention and arouse the interest of the pupils, and from their observations numerous valuable hints can be derived.

APRIL. The study of the soils, preparation of the seed bed and planting, wherever these activities occur on the farm, should take the time of the regular lessons in agriculture for April. So far as possible obtain specimens of the different kinds of soil in the school district. If these are placed in glass cans, their differences in color and structure can be seen as they appear in mass. Study the soils according to the plan given on page 16. Have the pupils study the methods used in preparing the ground for the crops.

Is the same method used for corn, potatoes, wheat or oats? If not, how do these methods differ?

Try experiments in planting. Fill small boxes or glass fruit jars with soil. In each, plant several kinds of corn, wheat, oats, cucumbers and other seeds. Place some of these seeds one inch below the surface, some two inches and others to a depth of three inches. Which seeds grow the best?

If you can have a school garden, begin working upon it as soon as the weather and condition of the soil will permit. In this and all other work on the garden, strive to put into practice the plans and methods discussed in class. If you do not have a school garden, induce the pupils to plant plots at home. Encourage the care of these through the summer by the promise of a school exhibit of what they raise, at the beginning of the fall term. At this exhibit the products should be judged by the most experienced farmers in the district and first, second and third mention given pupils securing the best results. A contest in raising corn, potatoes or some other crop can be so managed that it will awaken lively interest throughout the district. If the school is in a county which has a school exhibit at the county fair, the exhibits receiving the first and possibly the second mention should be placed in the county exhibit.

Begin the study of insects with those hatching from your collection of eggs and cocoons. As fast as the young insects appear, place them on the leaves of the plant which they feed upon. Make a record of the date upon which the eggs hatch. Then record the date when the larva spins its cocoon or makes its chrysalis.

How long do the insects live in the larva state?

Within a short period the perfect insect will appear from the cocoon. How long did it remain in the pupal state?

Secure specimens of eggs from each kind of insect and note the time required to hatch. At this rate how many broods of these insects will appear during the summer?

Some of these observations may extend beyond the school term, but their completion is profitable work for the summer vacation.

May—Tillage should receive first attention this month, and the experiments begun in April should be continued. Lead the pupils to see that the different crops require different degrees of moisture. Have them investigate the relation of tillage to the conservation of moisture in the soil.

Why should a fine mulch be maintained in the corn field or potato field?

What effect does rolling have upon moisture?
What effect does rolling have upon planting?
What effect upon conserving moisture?
How do you explain this?

The number of plants in a stand should be noted. What number produces the best results?

The garden plots should receive careful attention. Keep the soil loose and free from weeds, that the young plants may get a good start. So far as possible, let the dew and rain supply the moisture, but use the watering pot when necessary.

Project the work for the summer. Many rural schools close in May. We have given several hints as to what should be done during the summer, such as care of the garden, following the life history of insects and continuing th[e] study of birds. In addition to these lines o[f] work, a systematic study of weeds common t[o] the locality should be made. Procure *Farm Weeds*, a bulletin published by the government by writing to the Secretary of Agriculture Ottawa, Ontario

Encourage the pupils to study the growth and maturing of the crops.

How many days between planting and harvest?
What was the yield per acre?
Was the crop reasonably profitable?
What insects damage the crops?
Have any plant diseases appeared?
If so, what are they?

Question likes these kept before the pupils during the summer will lead to much careful observation. The results of this observation will constitute valuable material with which to begin the work the second year. See that the school library contains a few books on elementary agriculture. Many of the publications of the Department of Agriculture will be found of great value in this work. Write to the Department of Agriculture, Ottawa, for a list of those on any subject of interest to you.

General Suggestions. 1. From the beginning have the pupils use note books in which to record their observations. These books should be systematically arranged and neatly kept. The records will be useful for future reference.

2. Place the burden of the work upon the pupils, by asking them to examine objects which you wish to discuss. Tell only what you must, but do not fail to give information beyond the reach of the pupil when it is necessary. Work with the pupils as their director in research.

3. Have occasional written reviews. These should be given when a subject has been completed. Many excellent and interesting papers can be obtained by the pupils in agricultural topics. The essays on corn on the following pages show what can be accomplished. The preparation of such papers affords excellent exercises in language and also leads the pupils to see the necessity of language study.

Practical School Work in Rotation of Crops

The subject of agriculture in the public schools is one to which more and more importance is attached every year. In some counties each teacher is furnished with a tentative course in agriculture for all grades, and while it is not compulsory usually to follow such an outline, it is always strongly recommended.

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LUTHER BURBANK

If in any school there is sufficient interest in the matter and enough time can be given to it, a form of work in agriculture after the following outline may well be adopted.

A field seventy-two feet by one hundred eight feet, not counting spaces for walks, should be provided. A diagram of such a plot offered by County Superintendent George W. Brown of Paris, Illinois, is used by permission. It is a modification of a plan suggested by officials in the Western Illinois State Normal School.

10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45

DIAGRAM OF EXPERIMENTAL FIELD

Every boundary line should be a grass or gravel walk three feet wide. Every square should be eighteen by eighteen feet. Before harvesting a crop on any square each plot or square should be cut down to the dimensions of the square rod for purposes of easy computation and record. Having determined the yield in one square rod, multiply by 160 to determine the yield per acre. On such a plot it is possible to study with excellent results rotation of crops. Rotations should be conducted as follows:

Plots 10, 11, 12, 13, 14, 15—Continuous corn crops.

Plots 20, 21, 22, 23, 24, 25—Corn and oats rotation.

Plots 30, 31, 32, 33, 34, 35—Corn, oats and clover rotation.

Plots 40, 41, 42, 43, 44, 45—Corn, oats, clover and wheat rotation.

The experiments in the value of standard fertilizers could be tested in this way:

Plots 10, 20, 30, 40—Nothing.

Plots 11, 21, 31, 41—Apply manure.

Plots 12, 22, 32, 42—Manure and lime.

Plots 13, 23, 33, 43—Manure, lime and phosphorus.

Plots 14, 24, 34, 44—Manure, lime, phosphorus and potassium.

Plots 15, 25, 35, 45—Nothing, and, in addition, permit no vegetable matter to decay. Remove it.

All work can be done with hands and primitive tools. These experiments can be directed upon about thirty-five square rods or about one-fifth of an acre. This small tract of land will answer the same questions, in the same way, as the larger fields. The agricultural college in your province will doubtless be very glad to co-operate with you in connection with your experiments along the above lines.

The Work of Luther Burbank

"And he gave it as his opinion that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together."

So wrote Jonathan Swift, over one hundred fifty years ago. The statement lived; it is an imperishable truth. The twentieth century recognizes a man who is the full measure of Swift's eulogy, and vastly more. This man has so far surpassed every other worker of his kind, in the benefits he has conferred on the race, and has such wonderful, almost miraculous, results to his credit, that his fame has spread through all the world. The man is Luther Burbank.

A Plant Breeder. He is a plant breeder. The outline of his activities could be extended to fill many pages of this book, but no better definition of his work could be suggested—a sympathetic, tender, ambitious plant breeder; a man who has developed amazingly beautiful flowers, and improved already hardy fruits; who has enriched the world merely in dollars to the amount of millions every year, and who has given to all men freely and unselfishly the benefits of his experiments in many directions.

What Plant Breeding Means. Before considering particularly what Mr. Burbank has accomplished it should be shown what plant-breeding, even on a moderately successful scale, means to the world. Very many men can breed a new wheat, rye, or oats which will produce a grain more to each head, and as easily develop an ear of corn with an added kernel to each ear, or a potato with one more tuber to each hill.

If every crop raiser would do this, what would be the result? In such staple articles alone the United States, not considering the rest of the world, would produce each year without extra cost 5,000,000 more bushels of corn, 15,000,000 extra bushels of wheat, 20,000,000 extra bushels of oats, 21,000,000 more bushels of potatoes. Results for Canada would be in like proportion. Some may say these figures are fanciful. Mr. Burbank proves their reasonableness, and he does more: he has shown how even greater results are reached through intelligent effort.

Mr. Burbank is a scientist; with scientific faith he sees for the future still better grains, fruits, nuts and vegetables than he has yet produced, in new forms, larger sizes and improved flavors; under his experimental eye these useful plants have now been given greater power to resist wind, sun, rain and frost. Already there has been produced fruit without stones or seeds, better hardwoods, better coffee, tea, spices; such things already accomplished only indicate what some of the remarkable advancement of the future is to be. We shall aim not to speak in scientific terms in this article, but to tell in simple manner how Mr. Burbank has worked to reach the results which are very properly credited to him.

The Law of Natural Selection. In noting the ways of Nature we know that more seeds are produced and more children are born than can possibly survive; plant nurture and child nurture are along lines not at all dissimilar, or should be; we sometimes fear the zealous gardener is more intent on the growth of his plants than upon the proper development of his children. Which seeds and which children live depends upon the conditions which give life and also upon the particular qualities possessed by competing seeds and competing children. Little in the economy of Nature is left to chance, although chance certainly appears arbitrarily to decide some cases. The race of men has been advanced from lowest states to its present development not by chance but by constant choice of the individuals best fitted to advance it. The powers controlling this choice are unseen and the compelling forces are hidden; scientists call the phenomena the *principle of natural selection*. Its laws apply equally to plant life and animal life.

Not to carry the analogy further, it will be admitted that plants are influenced by their surroundings and by their associates. A better quality of seed and soil and constant cultivation will produce improved vegetation; nothing else will. Scientists know that some wild plants have existed in the same form since long before the dawn of history, having their habits and character fixed by ages and ages of unchanging environment. A better specimen accidentally introduced could only by merest chance affect the quality of the common lot; the typical quality would reduce all to its level.

Surroundings are vital. There is no possible room for doubt or argument to the contrary. When man takes advantage of these facts and changes all conditions, affords plenty of room for growth and special cultivation and adds chemical elements which intensify fertility, it is reasonable to expect changes in the product of the soil. It becomes a great fact that the opportunity to improve is then practically without limit.

Some Important Definitions. Luther Burbank has labored since he was less than twenty years of age to improve our useful and ornamental plants. Early he knew that a better plant demanded selection and segregation. *Selection* means guiding the changes in plant life by cutting off all those parts which are changing in undesirable ways, and reserving for reproduction only those which are better than the average. With these finer specimens the processes of planting and developing are continued. *Segregation* means keeping these more desirable plants away from the poorer specimens, so the latter may not influence the better specimens in their natural processes of reproduction. "Like produces like;" man never will be able entirely to change this man-made definition of Nature's laws, but by intelligent plant breeding we have already modified it to "Like produces like, or nearly alike." Burbank does things according to the ways of Nature; he has taken things as he found them and at the end of patient years has yet the same thing, only larger, more beautiful, of greater value and utility, made so by the simple process of working with Nature.

The chief means by which Mr. Burbank reaches the results he seeks consists in producing new varieties by *crossing*. By crossing is meant a mixing of races or kinds, or a mingling of the characteristics of different organisms. The resulting organism is called a cross, or, more commonly speaking, a *hybrid*. The general reader sees the word hybrid very frequently; it is easily understood in any connection in which it may be found if one simply remembers that a hybrid is a crossbred animal or plant—the offspring of the male of one variety or species with the female of another. Another word we must understand at this point is *strain*. A strain is a group of plants of the same variety which differs from the race to which it belongs, but differs only in improved physiological tendency, and not by any apparent characteristics.

Mr. Burbank's aim in crossing plants is to secure the combination of desirable qualities into one strain, and in the process eliminate undesirable characteristics. Many times only one crossing is necessary; in other instances many crosses are needed, during which processes many progeny appear which are valueless and must be destroyed It is here that one must exercise great care in selection. Crossing is only one of the means of producing better varieties and species. Long continued and patient selection of the plants which nearest approach the quality desired must be continued until such quality is found in some individual plant. Then it is thereafter reproduced from seed, and all future growths which show a tendency to revert to inferior quality must be rigidly excluded until none but the type desired shall remain.

The Beginning. What of the beginning of Mr. Burbank's career? Did he do something accidentally that no other man could do and did it lead naturally to the great things he has accomplished? There is nothing accidental in the greatness of this man. His methods are not protected by patent; they are as open as the day. Thousands will follow in his footsteps. Where most of the others have failed and will fail is in lack of enough thoroughness and skill, united with natures which will not be sufficiently patient It takes time, and while most of us have time enough it is hard to be convinced that we have sufficient to spare in which to accomplish some far-reaching good. Compounds of patience and brains have done the work thus far, and these will be demanded of those who follow. Phrase makers have called Mr. Burbank a wizard, but what he has done has been wrought by no magic save that of logic and waiting.

The Burbank Potato. At the age of nineteen in his home in Massachusetts, Luther Burbank heard the complaints of farmers who were unable to raise more than 200 bushels of potatoes to the acre. They clamored for a variety which would yield a larger acreage and enable them to make a little money from their labor. This young man began his experiments in crossing and development and the fourth year produced a potato so much improved in size and quality that an eastern seed house gave him $125 for the sole right to use and produce the better variety. They named this the Burbank potato. At once this variety began to yield 435 bushels to the acre and since that time has produced 525 bushels. The United States Department of Agriculture, in a bulletin, gives credit to Mr. Burbank for adding $17,000,000 a year to the agricultural output of the country, due solely to the development of the Burbank potato.

With the $125 realized from this sale, Mr. Burbank went to California determined to devote his life to plant breeding. He chose that state because the climate was better adapted to his purposes than any other portion of the United States; then ensued a time of privation, during which he was obliged to seek work of every description in order to live. Within four years he was able to buy on contract purchase a few acres of ground, and in ten years had greatly enlarged his holdings so that soon he was able to sell his small farm for enough to enable him to start his experimental farm, where he could thereafter devote himself solely to the one object he had in view.

So important does the United States government consider the experimental work of Mr. Burbank that through government sources his experimental farm is given the sum of $10,000 per year with which to further investigations.

Horticulturists and seed houses vie with each other in their efforts to secure from Mr. Burbank his perfected specimens. He will not part with one until he has developed it to a point where he is satisfied that the product is about as good as it can be made.

Blackberries. In 1880 Mr. Burbank began crossing blackberries. In four years he had sixty hybrids, the first ever produced. From hybrid seeds of the third generation he grew black, red, and yellow raspberries, white, black, red, and pink blackberries, widely varying in sizes, flavors and qualities. One of the most interesting specimens of berries is the white blackberry, a hybrid with abundant clusters of most delicious fruit, perfectly white in color. He found in the eastern states a bramble with an insignificant variety of small, whitish berries; he secured some of these, introduced the type into his blackberry culture, and the result was a combination of the white color with the excellent qualities of the other parent.

Seedless Apples. Another instance of his genius is the seedless apple, which is now being introduced into the general horticultural trade as young grafted trees, which, when fully grown, are practically sure to exercise a large influence on the culture of apples and on the entire apple market. The seedless apple is not entirely new; it has been found in different varieties but always combined with some defect which made those varieties useless. Nobody but Mr. Burbank ever conceived the idea of combining with this seedless quality the characteristics of other best varieties.

Plums. One of the most celebrated of Mr. Burbank's crossings is in connection with the culture of plums. In no other department of his work has there been shown more patient development of a fruit or flower. One of his favorite plums is a combination of seven distinct parents, some of which are of American, some of Japanese, and some of European origin. Each generation required about three years, the seedlings being grafted in their first summer on old trees and thereby blossoming early in life. By this process the whole pedigree included only thirteen years. It is impossible to state what Mr. Burbank's development of the plum has meant to California. In 1904 the plum and prune crop of the state amounted to 65,000,000 pounds; at present there are almost 200,000,000 pounds, and there are 10,000,000 plum trees in California alone. The success of the industry dates from the introduction of the Burbank plum, since which time he has made several thousand new prune and plum combinations; plums that will grow in almost any soil, of a size and quality superior to those produced in any other country, plums that will grow in drought as well as in rain, and that thrive in frost-belts as well as in warm regions. From six hundred varieties of his new plums he has removed the pit or stone and has created the stoneless plum.

Shasta Daisies. In one of the illustrations accompanying this article is an exact-size picture of the Shasta daisy, and by its side daisies of the size of its original parents. His achievement with this flower is as fascinating as a fairy story. From all over the world where daisies grew he secured seeds of the best varieties—not simply a few, but thousands. These were planted under best conditions and watched with closest care. They were all destroyed except the best specimens, but from their death there came a new daisy larger and more beautiful and of a hardier variety, one that would flower in every climate. More than ten thousand seeds were required for this one experiment. Sometimes in the work of developing a flower or plant one hundred th[ou]sand or more seeds have been used before [Mr.] Burbank secured what he wanted.

Spineless Cactus. Travelers in the sou[th]western part of the United States find nev[er]ending cause for remark in the millions [of] acres of land which appear absolutely worthle[ss] without water furnished by irrigation systems, [where] only sage brush and cactus can be made to gr[ow] there. A number of varieties of cactus flouri[sh] in the semi-arid regions of the West. The[ir] stems consist of flat pods, very large and joine[d] together in strange manner. The plants ofte[n] reach a height of six feet, and their branche[s] are wide-spreading. The fruit of the cactus i[s] relished by cattle when it is not too spiny, fo[r] it is juicy and nutritious. Realizing that no other discovery could be of greater benefit to mankind, Mr. Burbank set about converting the cactus into a food plant for man and animals, and he finally accomplished a task which doubtless will rank among the greatest achievements of all times because of its prospective influence upon economic conditions in semi-arid lands.

In the process of the development of the cactus Mr. Burbank first removed the thorns which covered the entire plant, then by processes of patient development converted a thorny, worthless plant thriving upon non-productive land, into a plant the leaves of which are nutritious food for all kinds of stock; the joints of which make excellent pickles; a wholesome food, when fried; a sweetmeat, when preserved. The fruit combines the flavor of the pear and the banana, sells for a price equal to the value of oranges, and is produced at one-half the expense. It is believed there never can be a failure in the cactus crop. The fruit is made into jams, jellies and syrups. Respecting the development of the cactus, we quote from Mr. Burbank. "The population of the globe may be doubled, and yet in the immediate food of the cactus plant itself, and in the food-animals which may be raised upon it, there would still be enough for all."

A cactus plant six months after planting will produce ninety tons of food to the acre; after the second year it will produce two hundred tons to the acre. A cactus leaf twelve inches across will develop thirty-six full sized cactus pears, exactly like the fruit shown in the lower figure of the cactus illustration shown in this article. From one acre of the average yield of corn $35 worth of denatured alcohol can be produced. The Burbank cactus is producing

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From original drawings, courtesy of Oscar E. Binner Co., Chicago, Luther Burbank's publishers.

LUTHER BURBANK'S DEVELOPMENT OF THE CACTUS

1—Useless, thorny growth. 2—Thornless cactus and fruit. 3—Section of 2, enlarged, showing fruit, natural size.

From ... courtesy of Os... F. ...ner Co., Chicago, Luther B...

SOME RESULTS OF L[illegible]THER BURBANK'S EXPERIMENTS

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From orig[illegible] drawings, courtesy of [illegible] Co., [illegible] and Luther Burbank's pub[illegible]

BU[illegible]K'S DEVELOPMENT [illegible] THE CACTUS

[illegible] Thornless [illegible] 3. Section of a [illegible]

From original drawings, co[illegible]esy of Oscar E. Binner Co., Chicago, Luther Burbank's publishers.

SOME RESULTS OF LUTHER BURBANK'S EXPERIMENTS

1—Cobless corn. 2—Wonderful hybrid plum and its tiny parent: both natural size. 3—Shasta daisy and its parents: all natural size.

$1200 worth of denatured alcohol to each acre.

Cobless Corn. Not a great deal of attention has been given to the feat of producing corn without the cob on which we have thought Nature intended it to grow. It has been accomplished by Mr. Burbank, although he doubts that practical results will be reached. He believes a small cob will be better than entire elimination of the cob. A stalk of cobless corn is shown in one of our illustrations.

It is believed that the earliest corn was cobless. Mr. Burbank's present cobless corn illustrates the steps backward in evolution towards its original form. The decrease in size of the cob increases the quantity of kernels. It is expected of this corn that instead of merely adding one kernel to the ear it will untimately double the number of kernels to the ear, for the energy now going to waste in the large cob will be transferred into the production of more kernels. Practically cobless corn offers a great benefit to the farmers, for if there is even one kernel increase to each ear this would mean a total crop increase of 5,000,000 bushels per annum in the United States alone.

A World Benefactor. The average reader has doubtless considered Luther Burbank to be a theorist, a man lacking in practical lines of endeavor; but the foregoing brief account of his work should fully convince one that here is doubtless the most practical man who lives in the world today. It would be utterly impossible to estimate the added wealth which flows into the pockets of the farmers and fruit growers every year as a result of this patient man's development of our fruits and plants. Had he produced nothing during his whole lifetime of experiments other than the Burbank potato and the edible cactus, he would deserve an exceedingly high place in the memory of generations to come.

Consider the lowly potato, the drowsy poppy, the succulent plum, and the delicate blackberry; give thought to the cactus, the rose, the lily, all of which he has developed in directions that are marvelous—consider, in brief, almost any plant you choose, and if you follow the investigation carefully enough your study will lead you invariably to the door of a rose-covered cottage in Santa Rosa, California, Mr. Luther Burbank's home.

Raise a Child Like a Rare Plant

In addressing a convention of teachers Luther Burbank summed up admirably the proper care of children, using as illustration plant life, which he knows so thoroughly. He said:

"Raise the child like a plant, care for it as you do for the rarest specimen of vegetation, bring it up in an atmosphere of love.

"If the child has but the smallest trace of some characteristic you desire to develop, take hold of it, care for it, surround it with proper conditions and it will change more certainly and readily than any plant quality," he declared with a fervor which left no room to doubt that from the fulness of his knowledge he knew what he said was true. This possibly is the keynote in the whole system of proper child rearing. Plant life is improved and quality is bettered by careful cultivation of desired characteristics. The same rule applies in training the child.

Mr. Burbank adds emphasis in the following lines, which serve to explain his last statement above:

"The child in nature and processes of growth is essentially the same as the plant, only the child has a thousand strings instead of but a few, as has the plant.

"Where one can produce one change for the betterment of the plant one can produce a thousand changes for the betterment of the child.

"Surround the child with the proper environment to bring out certain qualities and the results must come.

"Work in the same way as I do with the plant, and you will find the developemnt of the individual is practically unlimited.

"I have taken the common daisy and trained it and cultivated it by proper selection and environment until it has been increased in size, beauty and productiveness at least four hundred fold.

"Do our educational methods do as much for our children? If not, where is the weakness.

"Not only would I have the child reared for the first ten years of its life in the open, in close touch with nature, a barefoot boy with all that implies for physical stamina, but should have him reared in love.

"I have taken the little yellow California poppy and by selecting over and over again the qualities I wished to develop have brought forth an orange poppy, a crimson poppy, a blue poppy. Cannot the same results be accomplished with the human? Is not the child as responsive?

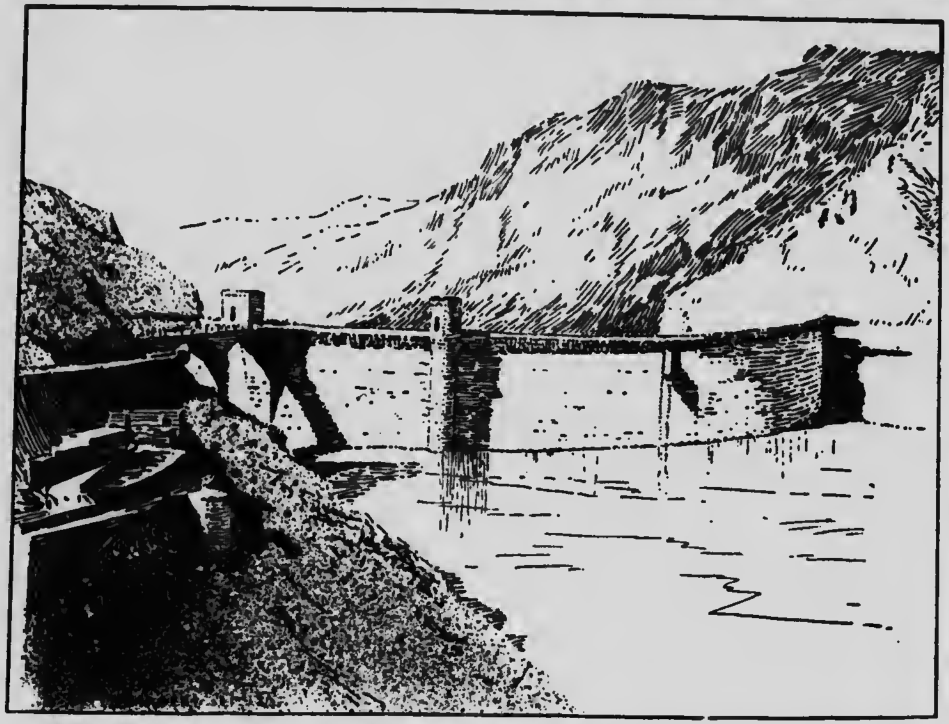
"If the child has but the smallest trace of some characteristic you desire to develop, take hold of it, care for it, surround it with proper conditions and it will change more certainly and readily than any plant quality."

Irrigation

Land Values and Moisture. In semi-arid sections land values are closely related to the water supply which a land owner can be certain of securing. Some people consider irrigation to be more or less of a makeshift, resorted to because of insufficient rainfall, but, as it happens, irrigation may be needed because of imperfect distribution of moisture, though the total rainfall in a year may be more than is theoretically needed. The farmer who tills his soil under frequent rainy skies is never sure of rain when he needs it; under irrigation, with a properly constructed irrigation system to provide him with moisture, his work becomes a science. He gets moisture when it is wanted, and is sure of it when his crops must have it.

Every agricultural industry that can be made profitable where there is plenty of rainfall can likewise be turned to profit in irrigated sections. On irrigated land one can fatten beef cattle; he can engage in dairying and cheese-making; poultry and ostrich farming, and sheep raising are possible; while wheat, barley, oats, corn, sugar beets, cotton, potatoes and fruits of all kinds grow as well on such soil as elsewhere. Only two things are required to produce bountiful crops. These are a warm season, long enough to mature the crop, and sufficient moisture. A proper irrigation system will fully supply the latter.

One of the greatest irrigation projects of all times is that referred to in Volume III, under the article *Irrigation*, as the Salt River Project in Arizona. It has become more popularly known as the Roosevelt Dam and Irrigation Project, named after Theodore Roosevelt and dedicated by him in March, 1911. The accompanying illustration will give the reader an accurate idea of the location and magnitude of the dam. The height of the dam above the surface of the water is 50 feet and the water is 230 feet deep. Behind the dam will be stored 1,300,000 acre-feet of water, or water enough to cover that number of acres one foot deep. This means a



THE ROOSEVELT DAM

supply of three years for Salt River Valley. Below the dam about fifty miles is a diversion dam, by means of which the water is turned into the various canals. The body of water stored thus by the dam is the largest artificial lake in the world. If spread out a foot deep it would cover the entire province of Prince Edward Island.

British Columbia. Great engineering works, such as the Roosevelt Dam, are found in many parts of the world, on the Nile, in India, in Mexico. There is only a difference of degree between these and the most primitive ditches and flumes. In recent years irrigation in British Columbia has taken enormous strides. In the southeastern part of the province are great areas which produce a good quality and large quantity of fruit when properly irrigated. It is here—in the Okanagan, Thompson and Columbia valleys—that irrigation is being extensively carried on. The district embraced in the valleys of the Okanagan and Thompson rivers, with their tributaries, contains 500,000 acres. It is claimed that 10 acres of good irrigated fruit land here are equal in producing value to 160 acres of wheat land. A respectable beginning has been made in reclaiming this area, about 100,000 acres being covered by various systems now in operation or in course of construction. The provincial government has done much by revising the water laws, reserving the watersheds, protecting the forests from destruction by fire, providing survey for water measurements, etc. Two municipalities, Summerland and Penticton, have acquired and are administering the irrigation systems for all land within their boundaries. With these exceptions, the various irrigation enterprises are carried on by private land companies, who look to the higher prices obtainable for irrigated lands to return their expenditure on irrigation works. The Central-Okanagan and Belgo-Canadian Companies at Kelowna, the White Valley Company farther north, Fruitlands at Kamloops and the British Columbia Horticultural Estates at Wallachin are examples of companies who are putting in permanent modern systems of steel and concrete. One of the chief factors in extending the areas of irrigated land is the utilization of natural storage basins; for instance, the water stored in Lake Aberdeen, the reservoir at the head of the White Valley, cost 60 cents per acre-foot, while at Penticton the reservoir cost $17 per acre-foot. In this district the average cost of reclaiming lands by irrigation has been from $30 to $80 per acre, according to the character of the works. The average annual cost to the user varies from $5 to $8, while the average difference in value due to irrigation is about $100 an acre.

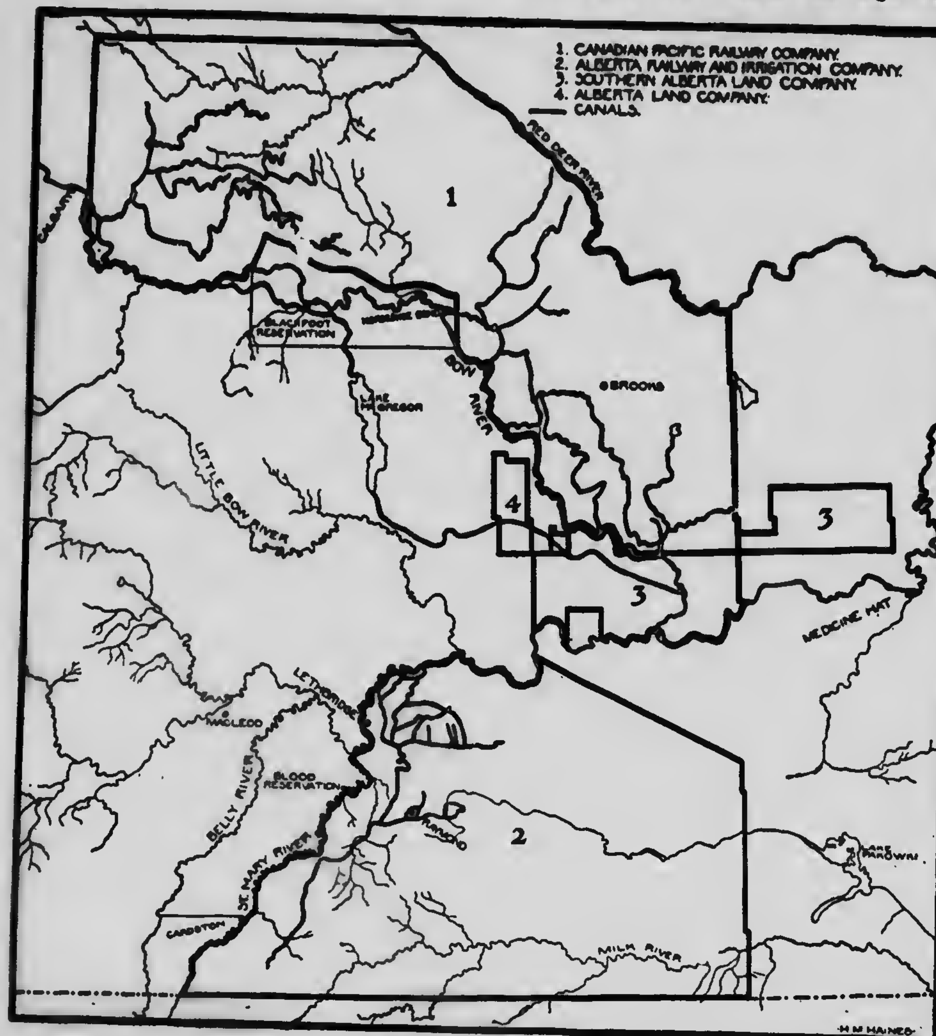
Alberta and Saskatchewan. Irrigation in Alberta and Saskatchewan presents problems different from those in British Columbia. The extent of land under irrigation is much greater, the average value per acre is much less and the supply of water available for irrigation is also proportionately less. Irrigation has been practiced to some extent in the southern part of these provinces since these districts were first settled, but the irrigated tracts were small and the works were crude. As a result of the enactment of the first irrigation law in 1894 and of later hydrographic surveys, there was considerable development of irrigated farming for a few years, particularly in the district between Calgary and Lethbridge. Within the past three or four years, there has been a noteworthy development of irrigated farming in the Cypress Hills country, south of the main line of the Canadian Pacific, between Moose Jaw and Medicine Hat. There are many small streams in this district and the irrigated tracts are usually small areas in the valleys. Some cereals have been grown by irrigation, but water has generally been used only for hay and pasturage. The results have been good, particularly so where the works have been substantially constructed and the ditches well laid out. Mr. E. F. Drake, of the irrigation branch of the department of the interior, Ottawa, estimates that there are about 400 separate irrigation schemes in Alberta and Saskatchewan, with a total area irrigable of 130,000 acres. About half of this area is actually under irrigation now.

In addition to these small schemes there are four larger projects now under construction and in partial operation.

Canadian Pacific Railway Project. This project has been so widely advertised that it is probably better known than any other irrigation scheme on the continent to-day. This tract consists of about 3,000,000 acres along the main line of the railway, between Calgary and Medicine Hat. It has been divided into three sections, known as the western, central and eastern. The Bow River furnishes water for all three sections; for the western and central sections it is taken near Calgary; and for the eastern section near Bassano, at the Horse Shoe Bend, where a great dam has been built.

The western section has been covered by a complete system of canals and reservoirs and the remaining areas are being rapidly supplied with excellent works.

present only about 75,000 acres are actually under irrigation, but when fully developed, the system will provide for the irrigation of about 150,000 acres more. Alfalfa and sugar beets



IRRIGATION IN ALBERTA

Alberta Railway and Irrigation Company. The lands of this company, which have recently been acquired by the Canadian Pacific, lie between the line of the company's railroad and the St. Mary, Belly and Milk rivers. Its system of canals and ditches is about 250 miles long and the main canal has a maximum flow capacity of 800 cubic feet per second. At have proved very profitable, especially in the vicinity of Lethbridge and Raymond.

The Southern Alberta Land Company. This company also uses water from the Bow River. Its main canal begins about thirty-five miles southeast of Calgary and runs in a north-easterly direction for fifty miles, where it empties into a large reservoir known as Lake McGregor.

This reservoir covers 18,000 acres and holds about 360,000 acre-feet of water. At the north end of the reservoir is an earth dam 3,600 feet long, 173 feet wide at the base, 53 feet wide at the high water mark and 48 feet high; the dam has an eight inch reinforced concrete face on the reservoir side. The dam at the southern end is 2,100 feet long and 46 feet high. From the southern end of the reservoir a canal runs in an easterly direction to the tract irrigated. The company owns over 400,000 acres, probably half of which can be easily irrigated.

The Aylwin Project. This was formerly a private enterprise including about 70,000 acres of irrigable land just west of the eastern section of the Canadian Pacific project, but it is now a part of the Southern Alberta Land Company's project.

Future of Irrigation. Though the amount of water applied seems to bear no direct relation to the resultant crop, it is universally admitted that without water there would be no crop at all. That irrigation systems will spread as far as possible and that they will become a permanent feature of agriculture cannot be doubted. The development of the dry belt depends almost exclusively on irrigation.

Too many people think that the irrigated land in Alberta and Saskatchewan will yield nothing but wheat. Not only will it yield other crops but the fact seems to be that continued planting of wheat impoverishes the soil. In an address before the convention of the Western Canada Irrigation Association at Calgary, in August, 1911, Prof. W. J. Elliott, superintendent of agriculture for the Canadian Pacific Railway, said of the true significance of irrigation that it must "inevitably lead up to the small farm, every acre of which is used, and every acre of which will produce more dollars than by any other system." At the demonstration farms at Strathmore, Alberta, under practical farming conditions, one acre in 1911 yielded $500 worth of strawberries and a net profit of $300. At the same time one acre of green garden peas yielded a net profit of $260, and half an acre of turnips a net profit of $140. It is in the fact that irrigation will make possible diversified farming and rotation of crops that the true significance of irrigation lies.

Outline for Study. The student of the subject and the teacher who wishes a general view in brief space will find the following outline helpful:

Outline on Irrigation

I. Definition
  (1) Conserving the rainfall
  (2) Reservoirs
  (3) Distribution of water

II. Irrigation is necessary
  (1) In desert areas
  (2) Where rainfall is insufficient
  (3) Where rainfall is unevenly distributed
  (4) For crops requiring unusual moisture

III. History
  (1) Ancient
    (a) Egypt
    (b) China
    (c) India
  (2) Modern
    (a) In North America
      (1) Among Indians
      (2) By Spanish Missionaries
      (3) By the Mormons
    (b) Egypt
      (1) Dam across the Nile
    (c) Other countries

IV. In Canada
  (1) The Dominion Irrigation Act
    (a) Water in streams and lakes the property of the Government
    (b) The right to use this water on compliance with the law
    (c) Uses for which water rights may be so acquired
      (1) Domestic, that is, household and sanitary purposes
      (2) Industrial, that is, business operations by steam
    (d) Title to use of the water so long as it is applied to beneficial use
  (2) British Columbia
    (a) Okanagan Valley
    (b) Columbia Valley
    (c) Thompson Valley
  (3) Alberta and Saskatchewan
    (a) Canadian Pacific Railway's project
    (b) Alberta Railway and Irrigation Company
    (c) Southern Alberta Land Company
    (d) The Aylwin Project

V. In the United States
  (1) The Carey Act
  (2) The Reclamation Act
  (3) Results so far accomplished
  (4) Future plans

Essays on Corn

Practical Essay Work. The reason that composition work is often so unsatisfactory, and that pupils consider it the worst kind of drudgery, is because they are assigned themes which they do not understand and upon which they can obtain little or no information. The exhaustive treatment of school subjects in THE NEW PRACTICAL REFERENCE LIBRARY makes it an invaluable aid to the teacher who wishes to make her work interesting and successful.

Below are given a few essays on corn, prepared after a study of articles and illustrations in THE NEW PRACTICAL REFERENCE LIBRARY pertaining to this subject. These essays are given to show teachers how the subjects presented in this work can be used to advantage, and as illustrations of what may be done in other subjects.

The illustrations are simple and such as any pupil will delight in drawing. If, however, the teacher feels unable to supervise work of this kind, very interesting illustrations can be found in catalogues of farm implements and articles in agricultural journals and other periodicals. These can be cut out and pasted on the pages of the essay.

On this and the eight pages following we have endeavored to present these essays in form not more artistic than the work of the average boy and girl can be made. If the student sees that he can write and draw as well as the writing and the illustrations shown herewith, it is a matter of encouragement to him.

By way of special emphasis we would like to state that in a great number of instances the boys and girls are easily discouraged in their attempts at drawing because their efforts fall immeasurably short of the perfection seen in the copy. It is true that a perfect copy leaves no room for doubt as to exact form and detail but for all practical purposes of these essays there is much encouragement lent to the exercise if the students can see in the copy from which they work that which has actually been produced by boys and girls with no better preparation than their own. It is therefore with pleasure that we offer such results in the next eight pages as may be achieved by every average pupil.

Description of the Corn Plant

Carolyn Ives

Corn is a sort of grass, that is, like wheat, barley, rye and oats, it belongs to the grass family. It is raised in almost every country having a warm or temperate climate.

The plant grows from four to twelve feet high, according to the variety. The stalks are jointed, dark green and purple in color, and are concave on one side. The leaves appear at the joints and partially enclose the stalk where they seem to grow from it. They are long, slender and pointed and when fully grown bend over so as to give the plant a very graceful and beautiful appearance.

Corn has two kinds of flowers: those growing at the top of the stalk and forming the tassel, and those found in the ears. The first kind is called staminate flowers because they bear only stamens. The second kind consist of the silk and constitute the pistilate flowers, because the silk is nothing more nor less than a cluster of pistils, each of which ends in a kernel of corn on the ear.

The ears appear in the axils of the leaves at the joints. They are covered with a kind of leaf called husks. As the corn begins to ripen, the husks open at the top, showing the yellow kernels beneath, and the larger ears because of their weight, bend over so that by the time they are fully ripe they hang downward. The ears begin to form at the lower joints on the stalk, and the lowest ears are the oldest and the highest the youngest.

The roots extend far into the ground for the purpose of obtaining moisture and food from the soil. Could a corn plant be removed from the earth so as to have all of its roots joined to it, their number and length would surprise us.

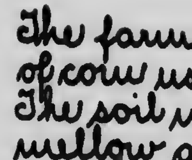
When growing, the corn plant is of a deep green color with a brownish or purplish tassel at the top, and stalks that are purple on one side. The early frosts tend to turn the tips of the leaves and some of the husks a yellowish-brown; this color deepens and increases in extent as the corn becomes ripe. At any season of the year a field of corn is a beautiful sight.

Preparation of the Ground.

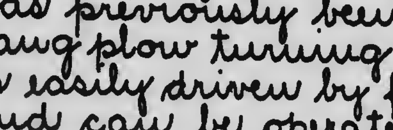
Mary Martin

The farmer who looks forward to a good crop of corn uses great care in preparing the ground. The soil must be made mellow and fine so that the roots of the corn can penetrate it and absorb nourishment.

The ground is first plowed to a depth of seven or eight inches. On small farms, where but little corn is raised, the old-fashioned plow, turning but one furrow, is used, but on the large farms in the corn belt, gang plows turning two, three and sometimes more furrows are employed. On ground that has previously been plowed, a gang plow turning three furrows is easily driven by four horses, and can be operated with three horses. The driver rides and controls the team and plow from his seat. Some very large gang plows are hauled by steam engines



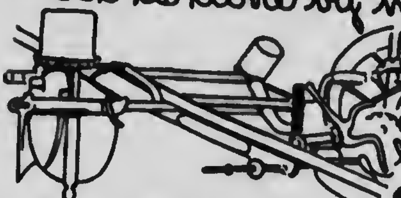
After plowing, the ground is harrowed. If the ground is old and mellow, only a toothed harrow is needed, but on new ground and ground where the soil is hard and lumpy, the disk harrow is used first and is followed by the common harrow. The harrowing is continued until the soil is made fine and smooth for planting.



Planting and Cultivating Corn.

Mary N. Everts

On the small farms in New England and other Eastern states, much of the work is done by hand labor. On the



large farms in the corn belt, however nearly all of this work is done by machinery. The corn planter generally used has two wheels and two sharp runners. These runners make a small furrow, into which the seed is dropped from boxes connected with a device known as a checkerboard. These machines are drawn by horses, and the best of them plant four rows at once, and with a good team, a machine will seed about ten acres in a day. For the large dent corn, the rows are four feet apart each way. This gives each hill of corn 16 square feet of ground. Sometimes another kind of planter is used, in which disks take the place of runners, as shown in the picture. In both kinds of planters, the wheels press the soil over the corn in the furrow.

Soon after the corn comes up, cultivating or plowing as it is usually

called, begins, and continues every few days until the corn is so large that further cultivation is liable to injure the plants by breaking the stalks and disturbing the roots. The corn is then laid by until the harvest.

A cultivator is used in plowing corn. It destroys the weeds, and stirs the soil. The cultivator has two wheels supporting a framework, to which beams bearing hoe shaped teeth are attached. The cultivator is drawn by horses and guided by two handles, which extend back from the frame. One or two rows are plowed at a time. After the field is plowed one way it is usually plowed the other way so that the second plowing crosses the first.

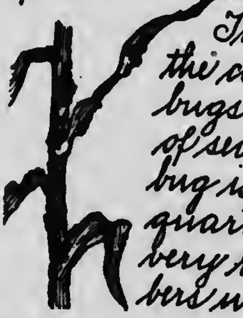
The old way of cultivating corn was far different. A cultivator was used to plow between the rows one way; then this left a good part of the work to be done with the hoe. The work was slow and tiresome. If two men hoed an acre of corn in a day they called it a good day's work. Later a small cultivator was used, and this removed the weeds between the rows. This method is still used in regions where only small fields of corn are planted.

Enemies of the Corn Plant

Henry Andrews

The corn plant has many enemies, and from the time the plants appear above the ground until the crop is harvested, the farmer must be on the watch for them. Among these pests are caterpillars, bugs, bettes and root worms. The root worm bores its way into the root from the end, and soon kills the plant. Soil which has produced corn for a number of years is usually full of these worms. They shorten the roots and destroy their power to nourish the plant. Root worms can be destroyed by planting the ground with other crops for two or three seasons.

The cut worm is the caterpillar of a small moth. It works in the night. When numerous, these worms do much damage because they eat the plant off just below the surface of the ground, thus destroying much more than they eat. Cut worms are small jointed worms about an inch long and having a shining, dark brown color. They are difficult to destroy because they feed upon so many different plants.



The chinch bug is the worst enemy of the corn plant. In some seasons these bugs damage the corn crop to the extent of several millions of dollars. The chinch-bug is a small insect, being less than a quarter of an inch long, but it multiplies very rapidly so that it makes up in numbers what it lacks in size. The bugs gather in masses on the stem and leaves of the plants and soon destroy them.

When they have destroyed the plants in one field, they move to another, sometimes going as far as a quarter of a mile. Since the bugs do not

fly on these journeys, fields that are free from them can be protected by plowing a deep furrow around the field. When the bugs reach this furrow they can be killed by scattering straw in the furrow, sprinkling it with kerosene and burning. The bugs pass the winter in the roots and stubble of grass and plants that grow around fences. If these places are burned over in the fall most of the bugs will be destroyed.

Though it is not an insect, smut may be considered an enemy of the corn plant for it sometimes causes much damage to the crop.

Smut is a sort of plant which lives and grows in the corn plant. It starts from a little body called a spore, and is so small it can be seen only with a microscope. The spores fall upon the young plants, work their way into the leaves and stalks and grow there. They send out little threads which enter every branch and ear of the corn. These threads form new spores in the kernels, and before the corn is ripe they burst through the kernels and give off a quantity of spores which look like fine black powder.

Harvesting Corn

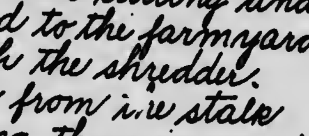
Thomas Martin

Until within a few years corn was harvested and husked entirely by hand. The ears were broken off and the stalks left standing and were considered worthless. Now, by the use of the corn harvester, the corn is cut and the stalks are pushed under a binding frame, bound and raised on a platform from which the shock is set upon the ground.

The corn harvester is similar to the reaping machine, but it works with a slower motion.

Husking or shredding follows cutting and binding. The shocks are hauled to the farmyard, and the stalks are run through the shredder. This machine breaks the ears from the stalk and removes the husks, dropping them in one place and the clean ears in another.

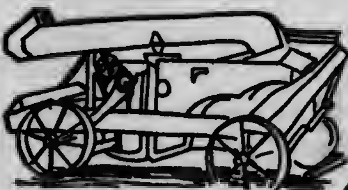
The part of the machine which does this work so neatly is made up of a frame which has from two to six steel rollers, containing flanges, and so geared that the rollers in each pair turn towards each other. The rollers are about four feet long, and the frame has one end lower than the other, so that the ears, as they are husked, can slide down the incline and drop out. Some shredders have a sheller attached to them, but in order to have this work successfully, the corn must be thoroughly dried before shredding. Usually the farmer prefers to store the corn in the ear in cribs until it is thoroughly dry.



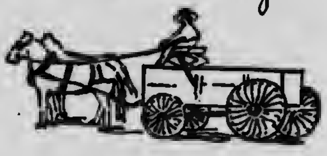
Marketing the Corn Crop

Arthur Clark

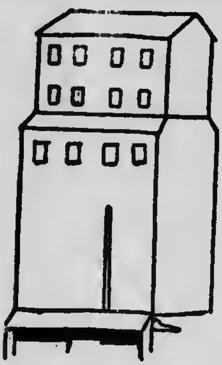
After the corn is husked, it is stored in long narrow buildings called cribs. The sides of the crib are made of narrow boards nailed to uprights so as to leave a space about an inch wide between the boards This allows the air to circulate through the crib and dry the corn.

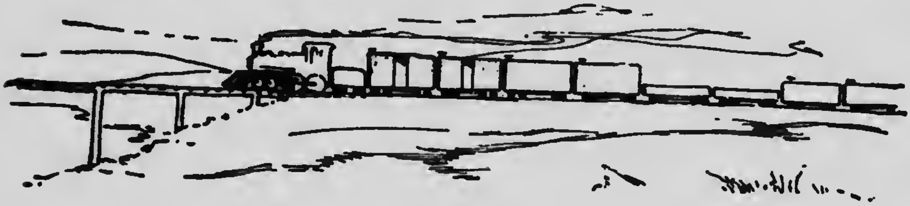


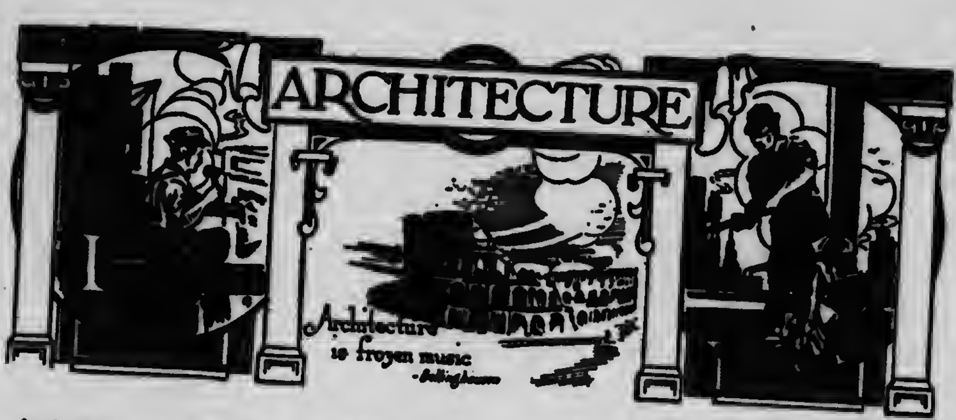
After the corn is dry, it is shelled by a sheller operated by steam or horse power The corn is then hauled in wagons to the nearest elevator, from which it is loaded into cars and shipped to large cities From these centers it is distributed to the mills and manufactories which make the various corn products.



Poor roads are a great hindrance in marketing the corn, and every movement to secure better country roads, and to reduce freight rates is a movement towards giving the farmer greater profits on his crop.







Architecture a Fine Art. If buildings were meant to serve but one purpose, and that utility; if a house were only a shelter; if a capitol were only a place where government business might be transacted; then architecture would have no place among the fine arts. But the purpose of architecture is the production of beautiful and harmonious, as well as strong and convenient, buildings; and thus the good architect must be not only a practical man who understands the use of building materials and the mechanical problems of construction, but an artist with imagination and a knowledge of the beautiful.

The most primitive peoples paid no attention to the beauty of their buildings; a dwelling was a place into which to crawl at night or during bad weather; if it answered that one demand it did all that was required of it. But gradually as men had a little leisure for other things than the protection of themselves from enemies and the procuring of food, crude ideas of ornamentation sprang up; and as man became more and more civilized he paid more and more attention to the erection of buildings which would please the eye. By the time we come to the dawn of authentic history we find a well-developed architecture. No one can read of the pyramids of Egypt and fail to be impressed with the ability and skill displayed in the raising, moving and adjusting of the huge blocks of marble and granite, weighing hundreds of tons, of which those structures are composed. Even today, with all the mechanical equipment which we have at our command, the building of such structures would be a tremendous task; and it seems incredible that the ancients, with their simple machinery, could have accomplished it.

Every age, and to a certain extent every country, has had its own particular architectural problems to solve and difficulties to meet. The overcoming of these difficulties has in a measure determined the style of architecture of each period and people; although of course the varying ideas as to beauty have had much to do with the subject.

One can enjoy looking at a beautiful, symmetrical building without knowing anything whatever about its architectural style or about the history of architecture in general, but the interest and enjoyment are greatly increased by some knowledge of the subject. In looking perhaps at a wonderful old-world cathedral or at a comparatively prosaic modern office-building, certain questions naturally arise. Why was this building made in this particular style? Would any other style have answered just as well? What were the difficulties the architect encountered? Was it a new style of architecture which he evolved for himself or did it grow naturally out of something which preceded? The ability to answer these and like questions will make the sight of buildings, new and old, much less commonplace than it is likely to be when we give no particular thought to the subject. Under the heading *Architecture* in THE NEW PRACTICAL REFERENCE LIBRARY there is a discussion, with illustrations, of the various styles of architecture.

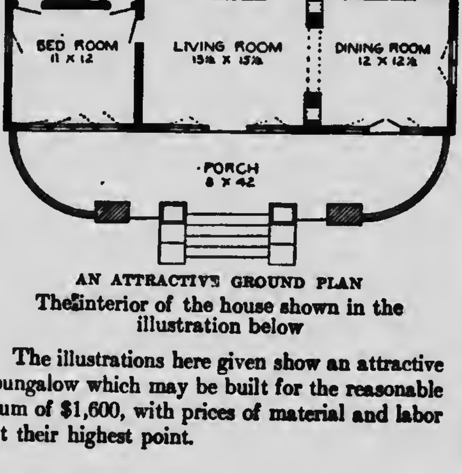
Home-Building. There can be no phase of the subject of architecture more interesting to the general student than that of home-building. This means the erection not of a many-roomed palace in which some wealthy family passes a few months of the year, but of a home in which a family of moderate means has its whole life. A man in the city is likely to live in a building which some one else has erected; he has had no part in choosing the type of building, the ornamentation, even the arrangement of the rooms. His family must have some place to live, and a certain house or apartment building appeals to him as, all things considered, more desirable than its neighbors. The majority of city people have little chance to display any individuality or originality in the exterior of their dwellings.

But in the country and in small towns, conditions are different. A man is much more likely to build his own home than he is to rent one. And it is in this connection that the subject of the proper style of architecture for a home assumes importance. Perhaps a man in a small town has what he realizes is a very limited amount with which to build a home. There is one easy thing to do. The neighbors on both sides and farther up the street have built houses which have cost no more than he plans to spend on his: he may make his like theirs. With this idea, he erects the conventional small-town house, with its stiff, straight lines, its pointed roof, its wing to one side or the other, and its small porch. Perhaps the new home is gray and has its front door on the left hand side, while its neighbor is green and has its front door in the center; but in all essential respects the house is like three-quarters of the houses in town. It has little individuality, little distinction; nothing has gone into it to make the owner feel that it is really *his* except his money.

The necessity of building a house for little money does not make such a state of things unalterable. Architects, even good architects, do not always confine themselves to designing elaborate homes that demand a great outlay of money. There has been, particularly within the last few years, much attention given to the planning of inexpensive but attractive homes, and other people besides those who paid for the original plans have had the benefit of them. For many of the magazines publish from month to month pictures and plans of houses, describing materials and giving prices. Of course in choosing a home from a pictured design, care is necessary, and many things must be taken into consideration. The size and shape of the lot, the direction in which the house is to face, the style of the neighboring buildings must all influence the choice.

A MODERN HOME OF ARTISTIC DESIGN

Costs little, if any, more than the plainest structure along old-time lines



AN ATTRACTIVE GROUND PLAN

The interior of the house shown in the illustration below

The illustrations here given show an attractive bungalow which may be built for the reasonable sum of $1,600, with prices of material and labor at their highest point.

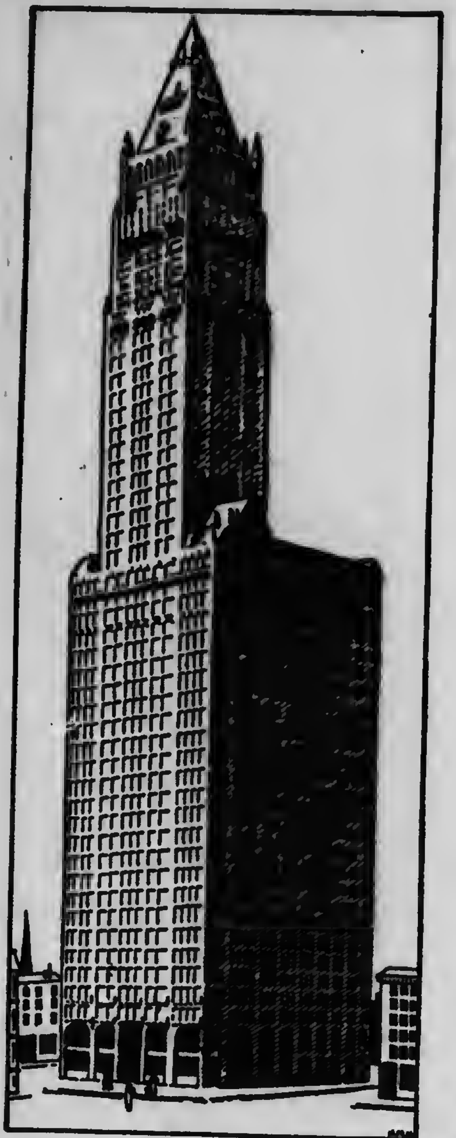
The "Sky-Scraper." American architects have not invented "styles," in the sense in which we speak of Greek or Roman architecture; but they have modified other styles. More especially of late this modification has taken the particular turn of making the style of architecture fit the type of building. There was a time when if a building was beautiful in itself there was little attention paid to the question as to whether or not it looked like that for which it was intended. A schoolhouse might look like a Greek temple; a residence might resemble a jail, or a church might look like an office-building. Today, however, a building to be considered artistic must like look what it is.

But the most thoroughly modern type of building which has ever been developed is the huge office-building which is known as the "sky-scraper." As land in the down-town portion of the big cities became more and more expensive it became more and more necessary to make every square foot of it count for as much as possible. The erection of office-buildings several stories in height was the simplest way of solving this question. However, people were not willing to walk up more than three or four flights of stairs to reach their offices, and this fact naturally limited the height of the buildings. Then, too, the methods of construction in use in the middle of the nineteenth century would not have made a very tall building safe. The invention of steel beams for construction work about the middle of the last century made possible taller buildings, and the invention of the elevator in the sixties increased almost indefinitely the possible height of buildings. The Tacoma Building in Chicago was the first steel-construction "sky-scraper." Today that building can scarcely rank with the "sky-scrapers." The cuts given here show the Tacoma Building and the Woolworth Building in New York, with its forty-six stories, which is to date the tallest office-building ever erected in the world.

We need not think just because the "sky-scraper" had its origin in purposes of utility that it is a prosaic structure, unfit to rank with great architectural achievements of the past. True, it is not grand as a Greek temple is grand, or beautiful as a Gothic cathedral is beautiful, but it is very wonderful, nevertheless. Of course it must be fire-proof, and, consequently, little wood goes into the making of it, but it contains steel enough to build over one hundred locomotives; literally miles of metal piping; acres and acres of terra cotta blocks; millions of bricks; thousands of tons of mortar; hundreds of tons of paint; almost one hundred thousand square feet of glass, and miles of elevator cables. All in all, perhaps nothing represents so well the crowding of people in our Canadian cities, together with their ideals of utility combined with beauty, as does the modern "sky-scraper."

TACOMA BUILDING, CHICAGO
The first steel-construction building ever erected

A Method for the Study of Architecture. THE NEW PRACTICAL REFERENCE LIBRARY has numerous articles on subjects connected with architecture, all of which are listed under the heading *Architecture* in the Classified Index. For thoroughly intelligent study, however, a further classification may be helpful. The following outline divides the articles into related departments, and makes possible a systematic investigation of the subject. Under *Building and Building Material* in the Classified Index



WOOLWORTH BUILDING, NEW YORK

The tallest building in the world, up to 1912

there are listed a number of topics which are of interest in connection with the subject of architecture:

I. Historical Development, and Styles of Architecture—

- Architecture
  - Egyptian
  - Chaldean-Assyrian
  - Other Ancient
  - Greek
  - Roman
  - Byzantine
  - Romanesque
  - Gothic
  - Renaissance
  - Recent
- Decorated Style
- Elizabethan Architecture
- Flamboyant
- Indian Architecture
- Mohammedan Architecture
- Norman Architecture
- Perpendicular
- Tudor Style

II. Kinds of Buildings—

- Baptistry
- Basilica
- Bungalow
- Campanile
- Castle
- Cathedral
- Mosque
- Pagoda
- Round Towers
- Temple
- Tower

III. Parts of Buildings—

- Apse
- Arcade
- Arch
- Attrium
- Attic
- Baluster
- Bay Window
- Beam
- Bracket
- Buttress
- Chancel
- Chimney
- Cloister
- Column
- Console
- Crypt
- Cupola
- Dome
- Dormer Window
- Entablature
- Façade
- Gable
- Hall
- Loggia
- Mansard Roof
- Minaret
- Nave
- Oriel Window
- Parapet
- Pediment
- Pier
- Propylea
- Rib
- Roof
- Rose Window
- Spire
- Transept
- Vault
- Window

IV. Ornamentation—

- Arabesque
- Caryatides
- Corbel
- Corbie
- Crocket
- Cyma
- Fan Tracery
- Fillet
- Finial
- Fluting
- Gargoyle
- Moldings
- Pendant
- Tracery

V. Famous Buildings—

A list of these is given under the heading *Famous Buildings and Monuments*, in the Classified Index.

Questions

What is architecture? To what remote period can we trace it?

In what style of architecture is your church built? Your schoolhouse? Your county courthouse? Your city hall? Your provincial capitol? The Parliament Buildings at Ottawa?

For how many years did Cheops employ men to erect the great pyramid? How many acres does it cover?

What is the height of the great pyramid? What does its interior contain?

What special claim have the Egyptians to distinctive architecture? Was architecture their supreme art?

With what were the temples, tombs, and statues of Egypt decorated?

What place in Egypt because of its many pyramids is called the "Westminster Abbey of Egypt"?

What is the generally accepted belief as to the construction of the pyramids? How did the length of a king's reign affect the size of the monument?

How were the Buddhist temples built out of solid rock?

What characterised the early Greek architecture? Who were the three great architects of Greece?

How would the seating capacity of the larger Greek theaters compare with those of today?

The Parthenon in the Acropolis at Athens is said to be the most perfect building ever erected. When was it built? Of what material? How long is it? How broad? How high? How many pillars did it originally have?

How did the Roman amphitheater differ from the Grecian theater?

What were the thermae? What have the excavations at Pompeii revealed as regards the arrangements of the Roman dwelling-house?

Describe the Pantheon at Rome.

Are we justified in classing architecture as one of the arts? Why?

What particular type of building have American architects developed in recent years?

Why were such buildings not possible a half-century ago?

What is the tallest building in the United States at the present time?

What is a mosque? What is considered the most perfect mosque in the world?

What people developed the arch to its highest type? Had the arch been known at all before their time?

What is the longest stone span in the United States?

What are Caryatides? What are Cleopatra's Needles? Where are they now?

What are the distinguishing features of Gothic architecture? Of the Renaissance style? Of the Elizabethan style?

In what countries is Mohammedan architecture chiefly represented? What are its most prominent features?

When was Norman architecture introduced into England? What are its specific characteristics?

What are pagodas? Round Towers? Campaniles?

Of what did the Chaldeans make their buildings? Why did they not use stone?

What were the three styles of Grecian architecture? Characterize each style.

BY JESSIE ELIZABETH BLACK, OF THE UNIVERSITY OF CHICAGO

Definition of Number. "Number is a product of the mind's action," says Dr. Dewey, the psychologist, "in making a vague thing *definite.*"

The late United States Commissioner of Education, W. T. Harris, said: "The idea of number will at first be grasped by the pupil imperfectly. He can see only some phases of it. Later he will arrive at operations which demand a view of all that number implies."

Subject-Matter. The subject matter of arithmetic is of two kinds—*abstract* processes and *concrete* problems, or, pure arithmetic and applied arithmetic. The processes may be thought of as instruments to work with; the problems as the real life-questions that the children must solve.

Outlines. The outlines of work have varied greatly in the past, and are not exactly the same now in any two localities; but the variations are slighter. For instance, we no longer find "long division" placed where very young children would be forced to do it. The outlines appended here are based on what is generally conceded to be the proper work in each grade in the best schools all over the country. They represent, fairly, the consensus of opinion of Canadian educators.

Order of Topics. One topic need not be finished before another is begun. In real life all sorts of experiences come to the child in one day. The idea of the work should be "spiral," that is, the same main topics should be carried on from year to year. As the child develops, so should the topics. At certain ages special attention should be paid to certain topics, and a definite and thorough study must be given them; but never should all the other topics be dropped in favor of the one under immediate study. For example, simple fractional relations, as $\frac{1}{2}$, $\frac{1}{4}$, etc., should be used from the very first, although the topic of fractions is dealt with most thoroughly in about the fifth grade. In the fifth grade, however, denominate numbers, which are emphasized before that grade, must not be dropped, but must rather be used in the fractional work itself. In this way arithmetic appears as a unity, not as a patchwork.

Methods. General Suggestions—1. Do not be deceived: the mind of your pupil acquires knowledge only by its *own* activity. You may talk till doomsday; you may "explain" until you are gray; the child learns to do by doing. The degree in which you have awakened his self-activity is the measure of your success. Even an ordinary teacher, if she works with this in mind, will find her pupils "just love arithmetic."

2. Send for, or borrow, no matter what grade you may be teaching, some of the modern standard arithmetics, such as Meyer's, Southworth-Stone's, Smith's or the standard for your province. They are full of valuable suggestions.

3. Always teach the process first, carefully, even slowly; then drill for facility. Do not think you can teach by drill. Drill, or training, comes after the process is understood thoroughly.

4. Arithmetic is truly practical when it deals with real things, with living problems. The child, for instance, should actually weigh and measure. How often we find children, or grown people, reciting glibly, 12 inches make 1 foot; 3 feet make 1 yard, without really having a definite idea of the distances. Let the child use his ruler constantly. He should estimate measurements and then verify his judgment by using his 12-inch ruler or his yard stick. Take the children on imaginary trips with friends, paying fares, for lunches, etc. Make market lists for

provisions, clothing worn by children, and the like. Have the children who are old enough find the prices at first hand, and insist on accuracy. Place these lists on the blackboard for use in both oral and written work; they may be a basis for invention problems and for making many an arithmetic principle clear.

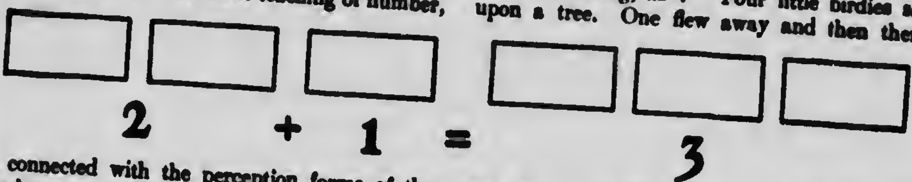
Number Lessons. In the home and in the kindergarten the little child is slowly emerging from the vague and indefinite in number relations to the exact and definite. Quite informally, but none the less surely, the mother or the kindergarten teacher may aid in directing this growth. Size—large and small; measurements—long, short, thick, thin, wide and narrow; weight—heavy or light; position, direction, etc., are all basic in number. As Froebel says, "The whole of arithmetic, and the whole teaching of number, is connected with the perception forms of the kindergarten." It is the business of those in charge of young children to present conditions that will appeal to and encourage the desire to count or measure or limit, in some way, and thus aid in the child's early development along number lines.

The home and the kindergarten teaching of number should be as follows:

(a) Rational counting—counting so that the number of objects is separate from the objects themselves in the child's mind.

(b) Ready recognition of number in groups of objects variously arranged.

(c) Number pictures, e.g., blocks, sticks, fingers, arranged to make it easy for the child to picture through sight, for instance, certain easy number facts, as



SUGGESTIONS. 1. When the mother takes her little one upon her lap, and plays baby finger-games, counting, as: "Four little birdies sat upon a tree. One flew away and then there were three," suiting the action to the word, she is teaching number. To help the child in his learning to count, let the mother or the kindergartner give such exercises as the following:

EXERCISES FOR HOME OR KINDERGARTEN

How many fingers have you on one hand?

Shut one finger. How many are open?

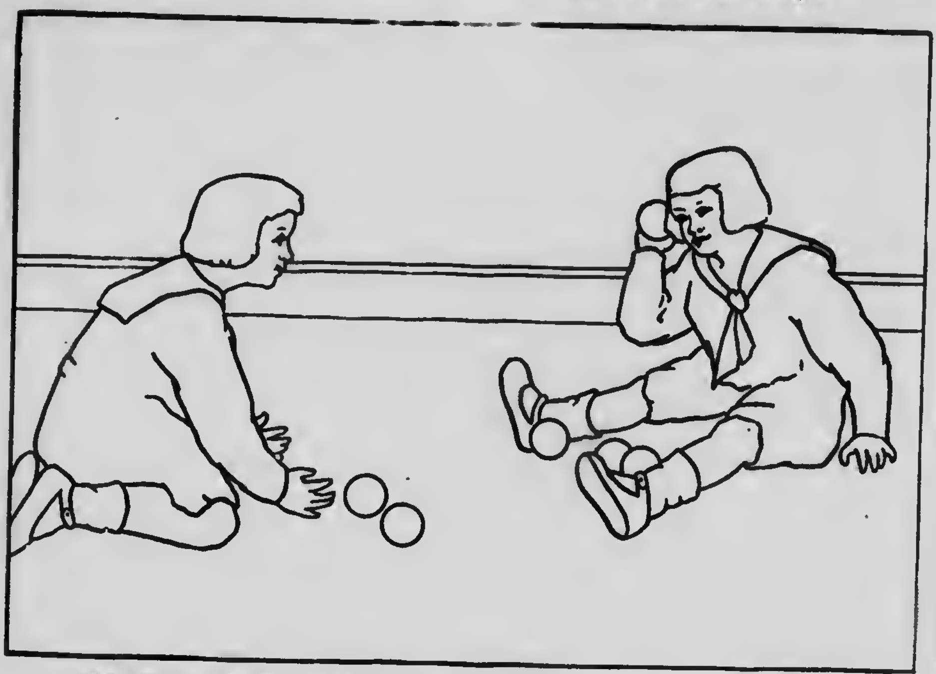
Shut another. How many are open? How many are shut?

2. The mother, even without adding to her many duties, may be of service in her child's development, if she will frequently call attention to the number element in things. She may ask, "How many chairs do we set at our table?" or, "Pick out the largest buttons and put them into one pile, and the smallest into another, for mother," or "Give sister one of your three pennies; now how many have you left?"

3. The making of chains, stringing of beads, grouping of objects, all add to the growing number ideas. Encouraging the child to place his soldiers in two or three straight rows, or directing him to put the clothespins into the bag two at a time, are ways of strengthening his number sense. When the father plays at dominoes with his little one in the evening, "matching" ends, he is not only entertaining but teaching the child.

4. In the study of the gift-plays there are *number* opportunities at every turn. Tablets, point work, and especially the third, fourth and fifth gifts, lead directly to truths in number. The fifth gift is especially fitted for the very beginning work in fractions. The division of the tiny cube into one-half, or half of a half, makes it possible for the little child to see these relations. He plays he is a mason with four entire cubes to place as a foundation for his house, then builds more; perhaps he slips a rubber band about this group and places it as "one four" instead of four blocks. Then a rubber band (a rope to him) fastens *one* block with *one more*, and he hoists this until "the two" rest upon "the four." He is really, without forcing, *seeing* that four and two are six, although he may not be able to say this. And so the building proceeds; in the taking apart of the blocks, more number relations are naturally discovered.

It would be a great mistake to force arithmetic at this point. It is only the recognition of the points where arithmetic naturally appears and should be emphasized that is urged.



JOHN AND TOM ARE ROLLING BALLS.

WHEN TOM GETS THE BALL THAT JOHN IS ABOUT TO ROLL, HOW MANY WILL HE HAVE?

HOW MANY WILL JOHN HAVE?

HOW MANY DO THEY BOTH HAVE?

First Year

General Suggestions. In this year, number activities begun at home or in the kindergarten, such as (1) counting, (2) recognizing number in groups of objects, and (3) forming number-pictures, are continued and developed. Beside this, number relations are shown through the measuring and making of simple things with the hands, by presenting little problems well within the interest and grasp of young children, and by teaching and training in the beginning of reading and writing numbers.

Outline of Work. 1. Expression. The reading and writing of Arabic numbers to 100; Roman numerals to XII; fractional parts ½, ⅓, ¼; signs +, —, =.

2. Notation and Numeration. Processes. Numbers from 1 to 10, inclusive. The four operations should be taught through the use of objects; counting by ones and tens to 100; recognizing groups of objects without counting.

3. Fractions. Halves, fourths, thirds. ½ of 2, 4, 6, 8, 10; ⅓ of 3, 6, 9; ¼ of 4, 8.

4. Denominate Numbers. Cent, nickel, dime; inch, foot; pint, quart; day, week.

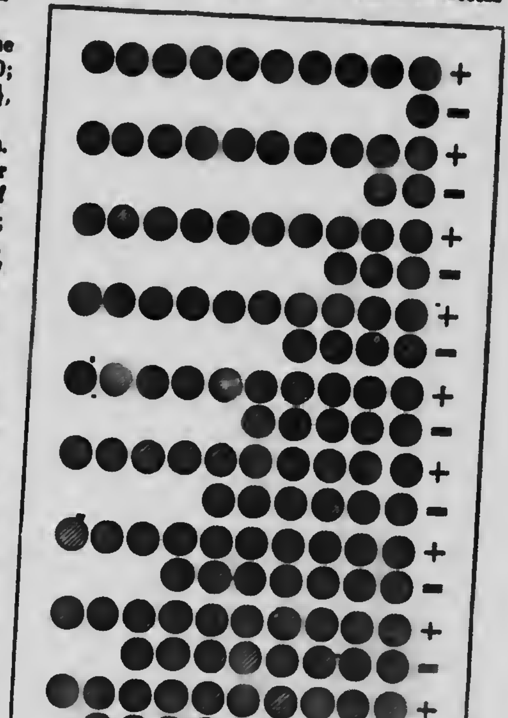
5. Measuring. This is really the basis of the year's work. Ideas of direction, size, form should be continued and developed from the home or kindergarten work.

6. Living Problems. The problems in this grade, as in the later grades, should be based on the child's interests and experiences. Problems relating to the cost of *two* tons of hay may be apparently simpler but are farther from the child's real comprehension than the cost of *five* toy balloons.

Exercise in Addition. In presenting arithmetic to the primary class, it is easier for the child's mind to grasp the addition of objects or pictured objects rather than written figures, and for that reason a chart developed for drill work, like the one given, should be in the possession of every teacher who realizes the importance of the first steps in arithmetic. In developing a large chart for class use, pictures of objects can be drawn or pasted on the chart and a similar device used in subtraction, multiplication and division.

In the first two lines we give the simplest combinations, and for the first lesson in addition, by covering with a sheet of paper nine of the circles, the pupil can tell without hesitation that one circle and one circle are two circles; and by continuing to uncover one circle at a time in the first row, the class may be made perfectly familiar with the addition by 1 up to 10.

For kindergarten work this chart can be produced in colors or developed into pictures of apples, oranges or other interesting and easily represented objects, and insure the interest of the pupil. Color work and grouping will be combined in the one exercise, and many interesting lessons will be the result. The essential to success



in this work is a constant drill, and the drill, to be effective, must not become monotonous. The many variations here suggested avoid this monotony and their adaptation insures success.

Suggestions. *a.* The teacher or mother must be sure that the little ones in her care understand the meanings of the figures and signs before she requires their use.

Let the numeration come before the notation. Let the pupils see who can find and read the page numbers in their First Readers, first, as a game. Afterwards the figures should be used.

b. Train children to see instantly how many objects there are in a group of objects on the desk or table; in a group of marks on the blackboard, or on cards held up for the purpose.

Let the children, for busy work, make great numbers of inch squares, 2×4 rectangles, etc. They are useful as counters, as material to use in objectifying the four operations, etc. Skill, exactness in measuring, and neatness are all gained in this training work. Scraps of colored paper from the printer or stationer add to the interest in this work.

c. The simple fractional relations must be taught through the use of objects. Here is the place for quantities of simple paper-folding and cutting, preceded by measuring.

d. Make the denominate number work objective. Make many, many opportunities for actually measuring the inches in the foot on the board, or in construction; counting out the five cents, in toy money, that make the nickel. Remember that much repetition is needed in this basic work.

e. Such terms as square inch, rectangle, triangle, circle, cubic inch, in connection with the form as it is used in class, should be used freely by the teacher, as the *definite* idea of form is growing in the child's mind.

Let children measure, measure, measure.

Problems for Solution. 1. How long do you think your desk is? Use your ruler to measure.

2. How wide do you think the window pane is? Measure.

3. Show me a block this size; one twice as large. Find one only one-half as large.

4. Measure, fold, and tear this piece of wrapping paper into three-inch squares for paste dishes.

5. Cut these half-inch strips into 3-inch lengths for paste sticks.

6. Mother gave you a dime. You spent 5 cents for candy. What change did you get back?

7. The milkman left 1 quart of milk at your house this morning. The baby will drink a pint. How much is left?

8. Six inches melted from an icicle that was 1 foot long. Show with your ruler how many inches were left.

9. Begin at 10 and count backward by 2's to 0.

10. Mary paid 16 cents for some ribbon, and for a collar she paid 7 cents less. How much did the collar cost? How much did both cost?

11. Lester gave Charles 5 cents for a ball and had 4 cents left. How much had he at first?

12. How many fingers have you; how many thumbs? How many fingers and thumbs together have you?

13. Three spools of thread cost 12 cents; one spool will cost one-third as much as three spools. What is the cost of one spool?

14. Alice bought some oranges for 8 cents and some nuts for 3 cents and gave the storekeeper a 10-cent piece and a 5-cent piece. How much change was given back to her?

15. Tommy had two 5-cent pieces and 4 cents more. How much more must he receive to have 20 cents?

16. How many cents in four 2-cent pieces and a 5-cent piece?

17. A little girl bought 8 pears and had 5 more given her. How many more than a dozen had she then?

18. If two gallons of milk were spilled out of a 10-quart pail full, how many quarts would be left?

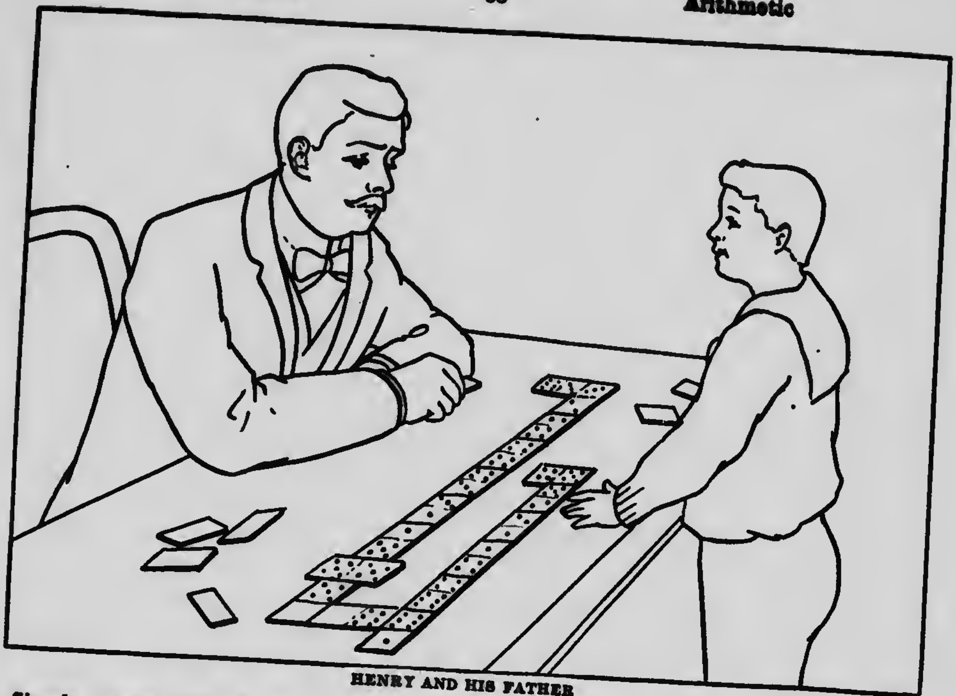
19. A room is 5 yards and 1 foot long; how many feet long is it?

20. If you drink 1 pint of milk every day for two weeks, how many pints will you drink? Can you tell how much it costs at 5 cents a quart?

A Variety of Materials. As the work of the young child must be objective, a great variety and a great number of usable objects must be provided. Foot rulers, splints, counters, such as shoe-pegs, corn, squares and oblongs (made for seat-work by you or by older children); one-inch cubes; toy or "made" money; sets of cards for quick work and (perhaps borrowed) a pint and a peck measure are among the materials needed.

Make a set of pasteboard cards, about 6×5 inches, for teacher's use in quick work with children. On one card make a group of 3, on another of 4 large dots or solid squares that may easily be seen as the teacher holds the card before the class.

A set of scissors, or old scissors brought from home, together with flour paste kept fresh with a few drops of carbolic acid, have become a necessary part of the first-grade class equipment. They make possible much seat-work in making things explained in class, as boxes, envelopes, etc.



HENRY AND HIS FATHER

Simple Instruction Helps. Besides the above suggested material at the disposal of teachers and parents, many other materials close at hand may be utilized. For instance, a picture such as the one shown below may be made the basis of a lesson in arithmetic, and, indeed, of a language lesson, for here the two

COLORED CARDBOARD COUNTERS

subjects can be nicely correlated. We may imagine an arithmetic lesson proceeding along somewhat the following lines:

Henry and his father are playing dominoes.
Do you think the game is about finished?
Why do you think so?
Who is going to win?
Find a domino with 7 spots.
Find one with 10 spots.
How many are there with more than 10 spots?
Add the spots on the domino nearest you in the picture.

How many spots on the one Henry is touching with his finger?

How many on the domino nearest Henry's father?

Which domino seems to have the greatest number of spots?

Without expense it is possible for the teacher or the mother to secure groups of colored disks, splints, paper dominoes, and the like. A dialogue may ensue, beginning quite like the following:

Teacher: Tell me quickly, how many in this group of counters, Edwin.

Pupil: Three.

Teacher: How many in this, Nora?

Pupil: Three; no, four.

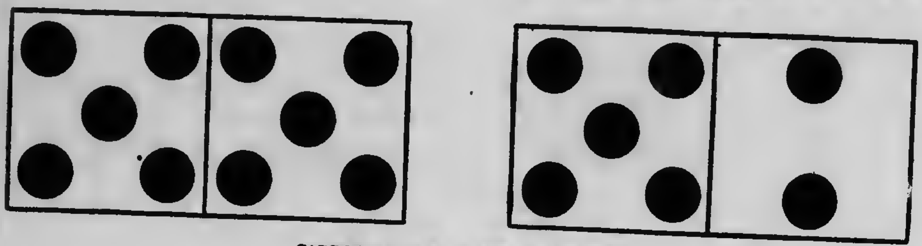
Teacher: In this other group, Nora?

Pupil: Four.

Teacher: Make groups of five of these pegs, Edwin; of four, Nora; of three, John, etc.

inch spaces. Divide each short end into two equal parts with a mark. Connect the marks. The circle-maker is then made.

Stick the point of a pin through the circle-maker any place on the long central line where the short lines cross. Stick firmly into the paper on which the circles are to be made.



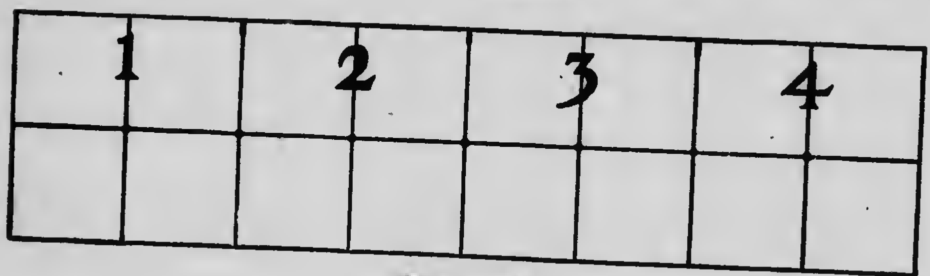
CARDBOARD OR PAPER DOMINOES

DOMINOES FOR ARITHMETIC. Paper dominoes cut in large quantities from paper or cardboard by children, and dotted with brush and ink by the teacher, make good material for many number games.

1. Let the pupils "match" ends.
2. Select all alike.

Stick the point of a pencil through the circle-maker on the long central line just one inch from the pin. Make the circle.

Ask the children what is its diameter. Then ask what shall be the diameter of the colored circles they expect to make for valentines.



CIRCLE MAKER

3. Place in rows with a given number in each row.
4. Find one with $\frac{1}{2}$, or $\frac{1}{3}$, or $\frac{1}{4}$ as many dots as another.
5. Write on the board or on paper the number of dots on the dominoes.

CIRCLE-MAKER. With this simple tool young children can make circles of different diameters for various uses.

Have the children cut a piece of thin cardboard 4 inches long and 1 inch wide. Using your ruler, mark off each long edge in inches; then in half inches; then in quarter inches. Connect the marks. Write 1, 2, 3 and 4 in the

BOXES FOR STONES, SEEDS, COUNTERS, ETC. The material needed for this exercise will be thin cardboard or heavy wrapping paper.

The children should take the cardboard and draw a 4-inch square on it, then cut this out. Then have them place a dot 1 inch from each corner on each edge. Connect the opposite dots. Cut out the 1-inch square in each corner. Find the four little rectangles. Fold them inward. Take the little squares cut out and paste them across the open edges of the box. Then ask the children how long, wide and high the box is, and how many cubic inches it will hold.

Second Year

Suggestions to the Teacher or Parent. In this grade the children are really beginning, consciously, to form estimates and judgments of relative magnitudes.

There should be much oral work—work in which the child must first image the conditions, however simple, and then reason out the result, before putting the pencil to paper.

Outline of Work. 1. EXPRESSION. Reading and writing Arabic numerals to 1,000; Roman numerals to L, if used in the Second Reader; reading and writing time from the clock; easy work in dollars and cents; signs, +, −, ×, ÷, =, $, c.

2. NOTATION AND NUMERATION. PROCESSES. (a) Simple addition and subtraction; numbers to be of not more than three orders.

(b) Tables through the 5's. Counting by 2's, 3's, 4's and 5's, using the tables stated.

(c) Simple multiplication and division. Use tables learned; numbers to be of not more than three orders, each digit less than 6. Comparisons of numbers.

3. FRACTIONS. Halves, fourths, thirds and sixths.

4. DENOMINATE NUMBERS. Cent, nickel, dime, quarter, half-dollar and dollar; inch, foot, yard; pint, quart, peck; time in hours, half- and quarter-hours, using clock; degrees, using thermometer.

5. MEASURING. Free measuring (using foot rule and yard stick) of parts of and entire objects in the room; elementary work in area, using rectangles made by pupils. Triangle changed to rectangle.

6. LIVING PROBLEMS. In this grade children are much interested in each other; comparative height and weight mean much to them.

We measured Minna, Carl and Anna. Minna was 3 feet 6 inches high, Carl was 4 feet 1 inch high, and Anna 3 feet 9 inches high. Who is the tallest? How much taller is Anna than Minna?

Encourage the making of original problems like the above, involving one step only.

Often a problem of considerable difficulty is easily solved by pupils if connected with the work they love, as the following, correlated with nature work:

We find that the twig we measured grew $1\frac{1}{2}$ inches last year, and that this year it grew $2\frac{1}{4}$ inches. How much more did it grow this year than last?

7. TYPE OF ORAL PROBLEMS. I know how many pounds of candy I have and how many boxes I wish to put it in. How shall I find how much I should put into each box?

You know the length of one side of a square. How can you find the distance around it? Make a picture and explain.

Helps on the Outline. PLAYING STORE. Playing store is a delightful occupation at this age. Almost every bit of formal grade work can be done through this medium. With toy money or money made by the children themselves, interesting things may be bought and sold, United States money read and written, bills for goods added, change made, ribbon measured by the inch and yard, nuts measured by the quart and peck; also problems may be suggested by the children themselves. In playing store many mothers will find an easy solution of rainy-day problems when the children are kept inside and are inclined to be restless. The regular schoolwork can be kept up in this way. Below are several store problems appropriate to this grade:

1. Yesterday Carrie bought a dozen eggs for 20 cents. Two of them were bad. How much money did Carrie's parents lose?

2. You buy a piece of ribbon for 18 cents, some calico for 15 cents and 2 yards of muslin at 8 cents per yard. How much did they all cost?

3. The storekeeper charged 6 cents for half a pint of nuts. I bought a quart and gave him 50 cents. How much money did I get back?

4. Berries cost 8 cents a quart today. If your mother gave you 40 cents, how many quarts could you buy? Would you have any of the money left?

5. There are 18 buttons on one card and 24 on another. What will both cards of buttons cost you at 10 cents a dozen?

ADDITION AT SIGHT. In adding columns of three or more figures, do not allow the pupil to add one figure at a time, especially after he has acquired a little experience. He should combine two consecutive figures and should finally give the result of three at sight. For example:

5
3 } He should think first, 7; then 12, and,
4 } after training, should say 12 at sight.

The teacher may place on the board a column of figures, as (a), on next page, then may use the same column in combinations or groupings, as (b), (c), (d) and (e). By adding another

(a)	(b)	(c)	(d)	(e)
4	4	4	4	4
2	2	2	2	2
5	5	5	5	5
6	6	6	6	6
4	4	4	4	4
3	3	3	3	3
7	7	7	7	7
4	4	4	4	4
8	8	8	8	8

number at the top or bottom of the column, still other combinations are available.

There is nothing more helpful in later school life than a quick, active mind. Rapid calculations have been frequently termed mental gymnastics and are advised for frequent exercises. Herewith is an illustration of a chart which can be very easily prepared by using an ordinary window shade roller and slated cloth. The figures can be put on the cloth permanently with chalk, or pasted on with mucilage, and for the pupil beginning addition the shade should be drawn so it will show but two rows of figures. As soon as two rows can be handled effectively the shade can be pulled lower and the third number may be presented. Such a combination of figures has been used in these two rows that no "carrying" is required. Therefore the work is kept in elementary form. The mother or teacher can hear the recitation or drill the pupil from the combination of these figures simply by the use of the pointer, and may save the time and avoid the diversion which would attend writing a series of figures on the blackboard.

THE FACE OF THE CLOCK. The teacher or the mother can make excellent use of the clock face with pupils of this grade. In absence of a large clock in the room, you may use a piece of string and crayon and with these draw a large circle on the blackboard, which may represent the clock face. Put in the Arabic rather than the Roman numerals at first, later changing them. Mark the hours, half-hours and quarter-hours. Draw and erase the hands as they change positions. The same drawing may be made for permanent use on a large sheet of cardboard. The hands may be loosely attached by tacks or by a paper-fastener. Questions may be asked as follows:

1. Show how far the hands travel in one hour; in ½ hour; in ¼ hour. If it takes you 15 minutes to walk to school, point out on the clock how far the minute hand goes in that time.

2. What is the sum of the 12 numbers on the face or the dial of the clock?

3. How much faster does the minute hand travel than the hour hand?

4. While the hour hand travels from XII to XII, how many times has the minute hand gone around the dial?

5. Add the numbers on the dial, I, III, V, VII, IX, XI, and subtract your result from the sum of the numbers II, IV, VI, VIII, X, XII.

6. You should be at your uncle's house, one mile north of your home, at nine o'clock. You can walk four miles an hour; it is now a quarter after eight. How long before you must start if you will reach there promptly at nine?

Let the smaller children move the hands to time for school to begin, for noon, for school to close, etc.

When problems in time are given, or pupils are learning to tell time, have the little ones actually work with the thing; having the teacher point is not enough.

The clock device is an excellent one for illustrating points on simple fractional relations, comparisons of size, for pointing to in quick work in tables, etc. Once the principles are fixed, the object may be removed and used only in cases of doubt.

DENOMINATE NUMBERS. The subject of denominate numbers should all be learned by means of actual objects at hand, so far as is possible. If there may be before a class liquid and dry measures, measures of length and weights, and imitation money in all small denominations, a vast amount of interest is added to the recitation and the work is made so real that it is easily understood. Sometimes real things do not seem real to the child because of his inability to grasp facts. When he can visualize things he understands them. When a fact has been presented there should be drill relating to it. Below are a few problems which will be helpful in this connection and which may offer suggestions for many others of like nature:

1. Into how many yard-sticks can a stick be cut which is 36 feet long?

2. Into how many foot rules can you cut a stick 45 inches long? Would you have a short piece of stick left less than a foot long?

3. How many days in November, December and January?

4. How many sheets of paper are there in 1½ quires? How many quires and sheets are there in 54 sheets?

5. In the above problem, what is the value of the 54 sheets at 12 cents a quire?

6. Tommy played one hour and a half. How many minutes did he play?

7. A gallon measure holds 4 quarts. How many quarts will 9 gallons hold?

Actual measuring of things in the room and making problems from the measurements, cutting and tearing pieces of paper to a given size for a given purpose, etc., form a basis of work in measurement such as can be done later without using the rule, for the thing is understood.

QUICK WORK GAMES. The second, third and fourth grade teachers can use a set of number cards in a great variety of ways. Let the children make, of odd bits of cardboard, cards about

NUMBER CARDS

3×5 inches, as seat-work. These the teacher may make into sets of number cards by writing numbers on them in a bold, clear hand, in ink. They may be used for drills, as follows:

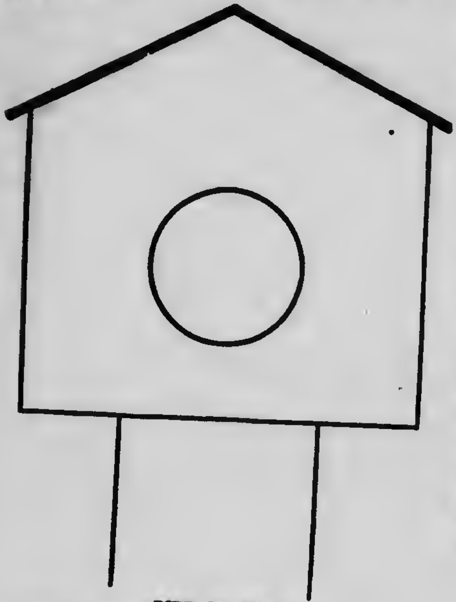
(1) The teacher holds up one before the class, so that all may see for an instant, then takes it down. She then calls on some pupil for the sum, difference, or whatever process was decided upon before showing the card. This must be done rapidly.

(2) The card may be given to the child who gives the answer correctly first, each child trying to get as many cards as possible.

(3) Score may be kept by a monitor of the number each "side" has given correctly.

BIRD HOUSE. This should be drawn, enlarged, on the blackboard for work in measuring. Pupils who estimate height, measure, width, etc., correctly may aid in coloring "our bird house," while attention is given by the teacher to those weaker in ability to measure. (See next page.)

NUMERATION. Have on hand sets of splints or toothpicks bound with rubber bands, one in one group, ten in the next, one hundred in the next, etc., besides many loose splints for children to group.



BIRD HOUSE

Teacher: Show me one splint. (Write "1" on the board.)

Show me ten splints. (Write "10" on the board.)

Write the number that stands for them, etc.

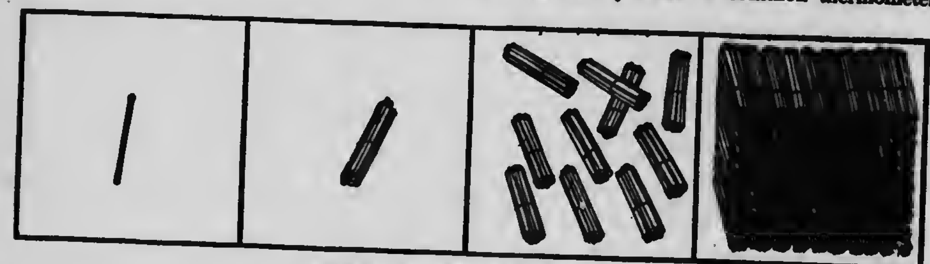
DIRECTIONS FOR MAKING AN ENVELOPE. This may be made to hold language words, seeds, a letter, valentine, etc. The material needed is manila paper.

The children may cut (or tear) a six-inch square. Fold the square so that the two opposite corners will meet. With the base of the triangle toward you, fold the right-hand corner to the middle of the base. Paste. In the same way fold the left-hand corner. Paste. Fold the apex of the triangle to meet the middle of the base. Open. Then fold and paste the inner triangle to the middle of the base. Now tell them that since they have made this envelope so well with help, they may make one without assistance for seat-work.

Such directions as the above may be written on the board with each step numbered as the children proceed. It may be left for the pupils to follow, by themselves, as soon as they are skilful enough to be left alone to carry out directions. The values in the work will appeal at once to the thoughtful teacher.

A Type Lesson for Second Grade

Reading the Thermometer. This lesson is based on the use of the thermometer and is for the purpose of training the children in counting by 2's and by 10's. A common thermometer,



SETS OF TOOTHPICKS OR SPLINTS

How many times as many in the second bundle as in the first?

Show me ten of the bundles of ten. (Write "100" on the board.)

This place (units) is for the ones; this place (tens) is for the tens; this place (hundreds) is for the hundreds.

Write the number that means 1 unit, 1 ten and 1 hundred.

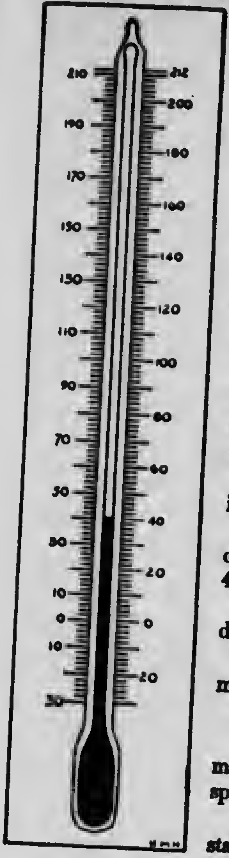
Pick out 2 units, 2 tens and 2 hundreds from the bundles.

which the children have been watching, may be used. Draw a diagram of a thermometer on the board, showing the degrees and spacing.

Teacher: All find the figure 0 on the drawing of the thermometer on the board. Jane, find it on the real thermometer, or heat measurer. Ralph, show with your finger how far the mercury rises when there is one degree of heat to measure.

Pupil: This is one degree.

Teacher: Show how high it rises to measure 10°, 20°, 30°, 40°, Lena.



Pupil: This is 10°; this is 20°, etc.

Teacher: To what point has it risen today?

Pupil: To here, between 30° and 40°.

Teacher: How many spaces are there between the marks 30° and 40°?

Pupil: There are five spaces.

Teacher: Mark off on the blackboard drawing the space between 30° and 40°. Into how many spaces are you dividing it?

Pupil: I'm dividing it into five spaces.

Teacher: How many degrees between 30° and 40°?

Pupil: There are ten degrees.

Teacher: And how many spaces did we say?

Pupil: Five spaces.

Teacher: Then how many degrees must each space stand for?

Pupil: Each space stands for two degrees.

Teacher: Count by two's.

Pupil: Two, four, six, eight, ten.

Teacher: Call the first space 32°, the second 34°, and so on.

Pupil: 32°, 34°, 36°, 38°.

Teacher: Now read the temperature for today, exactly.

Pupil: 34°.

Teacher: Count aloud and show the spaces from forty to fifty in the same way.

Pupil: Forty, forty-two, forty-four, etc.

Teacher: Now we have all counted by two's in pretty large numbers. Read the large spaces on the drawing of the thermometer, Cora.

Pupil: 0, 10, 20, etc.

Teacher: You have been counting by ten's. This is the way to write them:

$10 \times 2 = 20$
$10 \times 3 = 30$
$10 \times 4 = 40$
$10 \times 5 = 50$
$10 \times 6 = 60$
$10 \times 7 = 70$
$10 \times 8 = 80$
$10 \times 9 = 90$
$10 \times 10 = 100$

They mean 2 tens are 20; 3 tens are 30; 4 tens are 40, and so on. All read them. Now write them on paper at your seats.

Quite aside from work with the class, it may be stated here that the teacher or parent would do well to consult authorities and learn how a thermometer is made. Much of this information will not be too difficult to impart to some of the older pupils, and will enliven any session devoted to a study of the thermometer.

Third Year

General Suggestions. In this grade the child should be taught to keep before him these three questions that arise in solving every problem: What is given? What is required? What shall I do to get it?

Outline of Work. 1. Expression. Reading and writing Arabic numbers of five orders; Roman numerals to C; fluent reading and also writing of fractions and of dollars and cents as used in this grade.

2. Notation and Numeration. Processes. (a) Rapid and correct adding and subtracting of easy numbers.

(b) Tables through the 12's. Counting forward and backward by 2's, 3's, 4's and 5's.

(c) Multiplication and division. Multiplier and divisor to be 10 or less. Written seat-work emphasized. Comparison of quantities continued.

3. Fractions. Halves, fourths, eights, thirds and sixths.

4. Denominate Numbers. Emphasize and continue denominate numbers as presented in grades one and two. Change denominate numbers to the next larger or smaller unit. Tell time by the clock to minutes.

5. Measuring. Make still further use of measuring of all kinds.

6. Living Problems. Let the problems be *children's* problems, interesting and full of meaning for them, not the problems of a grown-up.

Real problems in comparison arise, as: If 3 sheets of cardboard cost 5 cents, what is the cost of 6 sheets? Let the comparison of 6 with 3 precede the second step of the problem.

Jim and Harold kept a lemonade stand at a picnic. At 5 cents a quart, what did it cost to make 2 gallons of lemonade? What was their gain if they sold it at 4 cents a pint glass?

Helps on the Outline. VARIOUS SUGGESTIONS. (a) In this grade especial attention should be given to neatness and accuracy in written work, as well as to the more exact oral expression of number facts. Make a point of praising attempts to shape figures well and to give results rapidly and accurately.

(b) There is great delight at this age in "numbers." Make great use of number games in fixing number facts, especially the tables.

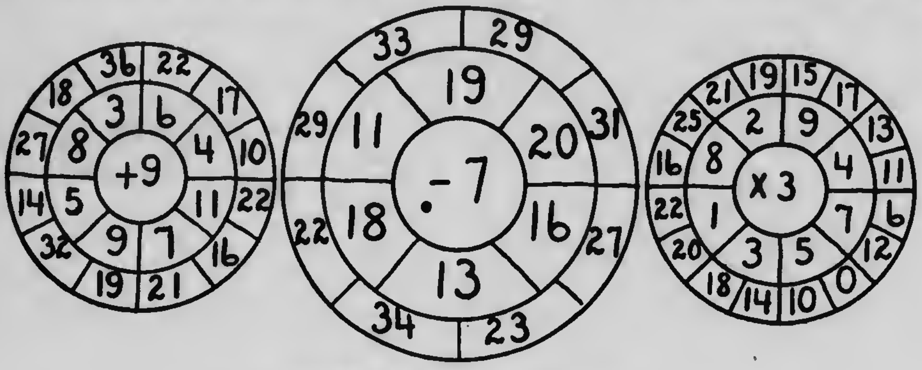
two inches long and two inches wide can you cut it?

4. You take to the store 30 eggs, which the merchant buys at 12 cents per dozen. You buy one-quarter pound of tea at 40 cents per pound and a package of starch for 10 cents. How much money does the merchant then owe you?

5. If a domino is 2 inches long, how many placed in a row will reach one yard?

6. If Willie can walk one mile from his home to his uncle's house in 30 minutes, how long will it take to walk to town, which is one and one-half miles farther than his uncle's?

7. Subtract the following columns of figures at sight:



ADDITION AND SUBTRACTION WHEELS

As suggested later, great enthusiasm may be maintained, and drudgery forgotten, if the teacher will but enter, with the spirit of fun, into the work on tables, as games in which all may compete. However, before rapidity or fluency in them is demanded, the number facts must be well taught.

(c) Make use of the chart given and use the counters freely, allowing the pupils to show the relations in as many ways as possible. Encourage little original "number pictures" made by the pupils to illustrate problems.

(d) Make use of many problems. The following are suggested as typical of such as may be employed:

1. We have been in school, now, $1\frac{1}{2}$ hours. How many minutes is that?

2. Fred is exactly 4 feet high. How many yards high is he?

3. A piece of paper is 12 inches long and four inches wide. Into how many smaller pieces

9	7	11	12	13	14	13	14
2	3	2	3	2	2	3	3
—	—	—	—	—	—	—	—
6	9	11	12	11	13	12	14
4	4	4	4	3	4	3	4
—	—	—	—	—	—	—	—
8	7	9	10	12	9	11	8
5	5	5	6	5	6	6	6
—	—	—	—	—	—	—	—

(e) Always follow this plan in measuring: (1) Let pupils estimate the distance or the quantity. (2) Measure, exactly. (3) Compare the measure with the estimate of it.

Special Inexpensive Devices. We hope you have not failed to note that in the work for each grade up to this point there have been suggestions relating to inexpensive devices which may be employed by the teacher in school or by the parent at home to develop elementary mathematical truths. It is not enough for you to know the practicability of these things, but the devices themselves must be used if proper results are to be secured. But little time is required in making them, and there is little excuse for one who enters upon the work of the day with no illustrative material at hand with which to develop the lessons. Some of the devices which are particularly appropriate for third-grade pupils follow:

"Table" Wheel. Make a large copy of the "Number Wheel" on the board.

This is one of the most interesting devices for training in pure number. It may be used in varied ways, as follows:

1. The teacher, using the pointer, says, "Give table of sixes, rapidly."

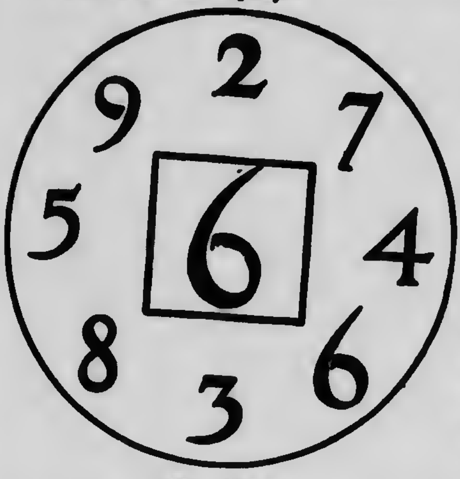


TABLE WHEEL

2. A pupil uses the pointer and chooses other pupils to answer.

3. Sides are chosen. The teacher, rapidly pointing, gives each side a turn in succession. One child may keep tally.

4. The central figure may be changed and the sign + placed on the board. Then tests may be given for correctness and rapidity. The pupils may write the results and rise when the work is finished.

Chart of Comparisons. An ingenious teacher will find such a diagram full of possibilities for training the eye to see, the mind to judge, etc. Comparisons are easily taught by its use. She may ask such questions, at last, as the following:

Which line is twice B? Which two added make H? Which line is the difference between F and D? Call A 5; name the others. Call A 6, and name the others.

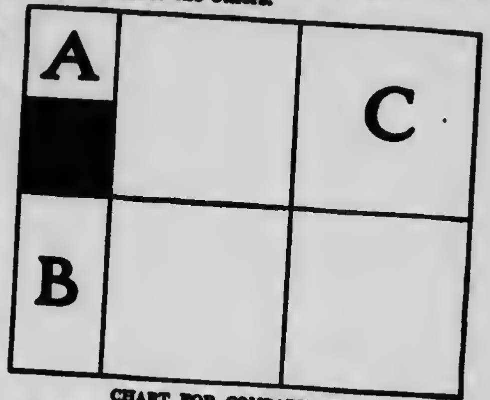


CHART FOR COMPARISONS

Fraction Chart. The teacher or parent may make a large drawing of the accompanying fraction chart, about 2½ feet by 2 feet in size, and may direct the children to reproduce it on paper reduced to a size of 2½ inches by 2 inches. This small chart may then be used for illustrating problems involving fractions and proportionate dimensions.

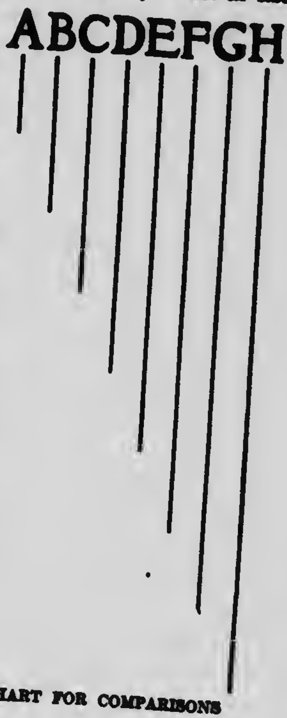


CHART FOR COMPARISONS

Such questions as the following will be of special value here, and each is applied to the small drawing in the hands of the pupils:

How many square inches in the entire figure?

How many square inches in C?

What part of a square inch is B?

How large is A when compared to C?

How large is B when compared to A?

Into how many quarter-inch squares could you divide the whole figure?

Take one-half of A; how many times larger is B?

Primary Combinations of Numbers. We give you herewith every combination in the addition table up to 10.

1	1	1	1	1	1	1	1	1
1	2	3	4	5	6	7	8	9
2	2	2	2	2	2	2	2	
2	3	4	5	6	7	8	9	
3	3	3	3	3	3	3		
3	4	5	6	7	8	9		
4	4	4	4	4	4			
4	5	6	7	8	9			
5	5	5	5	5				
5	6	7	8	9				
6	6	6	6					
6	7	8	9					
7	7	7						
7	8	9						
8	8							
8	9							
9								
9								

This table is known as the list of forty-five combinations of numbers. It will be noticed that combinations of 1 with all digits are represented in the first line, that there will be one less combination for the 2's, 2+1 being represented in the first line, and for this reason each succeeding table would necessitate one less combination, until in the table of 9's, only 9+9 would not have been learned in a previous table. Use this table for testing, or for home-work for backward pupils.

Oral drill from this table, arranged in chart form or placed upon a blackboard, must be continued until the pupils are thoroughly familiar with these problems.

It is hardly necessary for us to suggest that the bright pupil and wide-awake teacher will prepare similar exercises for subtraction, multiplication and division.

By placing any figure desired before those given, a great many pure number problems may be easily contrived by teacher or mother.

Combination of Addends. There are two words with which you should be acquainted, although you may have little occasion to use them in your daily work. They are mathematical terms, not only in arithmetic, but in higher mathematics as well. They are *addend* and *augend*. An addend is a number or quantity to be added to another number, called the

4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2	3	4	5	6	7	8	9	9	9	9	9	9	9	9
2	2	2	2	2	2	2	2	3	4	5	6	7	8	9
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		3	4	5	6	7	8	8	8	8	8	8		
		3	3	3	3	3	3	4	5	6	7	8		
		6	7	8	9	10	11	12	13	14	15	16		
				4	5	6	7	7	7	7				
				4	4	4	4	5	6	7				
				8	9	10	11	12	13	14				
						5	6	6						
						5	5	6						
						10	11	12						

TABLE OF COMBINATIONS OF ADDENDS

augend; thus, in the statement, $7+5=12$, 5 is the number to be added and is the addend. The augend is the number to which another is to be added, and in the above, 7 is the augend. In common usage, the term addend is given to both the numbers whose sum is to be found, and we will so use it here.

The design on the preceding page shows the combinations of augends and addends, other than 1, which will produce as sums any numbers from 4 to 18. An examination of the table will show that only 2 and 2 will produce 4, and that no other combination except 9 and 8 equals 17, while we have four combinations equaling 11 and a like number for 10 and 12. Many questions can be asked the pupil from a chart of this kind and we merely suggest a few, leaving the rest to the student:

What addends in 7? In 9? In 13?

One of the addends in 11 is 9. What is the other?

One of the addends in 11 is 7. What is the other?

Make a list of addends which give 1 for units figure.

Make a list of addends that exceed 10 and give a 2 for the units figure. (Similar lists can be made for each figure in the units' place.)

What addend with 6 gives a number whose right-hand figure is 2? 4? 5?

What addend with 9 gives a number whose right-hand figure is 7? 6? 8? 4? 3?

Addends that exceed 10 and give a 2 for units:

3+9 4+8

5+7 6+6

Addends that exceed 10 and give a 4 for units:

5+9 6+8 7+7

Addends that exceed 10 and give a 6 for units:

7+9 8+8

Addends that exceed 10 and give a 3 for units:

4+9 5+8 6+7

Addends that exceed 10 and give a 5 for units:

6+9 7+8

Addends that exceed 10 and give a 7 for units:

8+9

Fourth Year

General Suggestions. At the age of pupils in the fourth grade there is great interest in "team" work. The arithmetic teacher may take advantage of this by frequent "choosing up" for arithmetic matches for review work. Pupils will work, because of this social instinct, for their "side" in a number game, when the same material, presented as *drill* by the teacher, would awaken little interest.

Outline of Work. 1. Expression. Reading and writing Arabic numbers to seven orders; Roman numerals to M; two orders of decimals, including the reading and writing of dollars and cents, decimally.

2. Notation and Numeration. Processes. (a) Work for exactness and rapidity in the four operations.

(b) Written words using the four operations with multipliers and divisors of two orders. "Long" division and "long" multiplication well begun. Comparisons extended.

3. Fractions. Further use of fractions learned in previous grades. Changing from fractions to whole or to mixed numbers and back again. Addition, subtraction and comparison of fractions.

4. Denominate Numbers. All denominate number tables used in other grades completed and learned. Much work on problems involving denominate numbers.

5. Measuring. Measuring as noted in grades two and three should be extended. Application in drawing, making, etc., should be continued.

6. Living Problems. What are the dimensions of this room in yards? Find the area of the space on which your seat and desk stand.

Correlating this work with nature study, such questions as the following might be asked: Our weather chart shows that 15 of the 20 days were sunny and 5 were cloudy; what proportion of the days were cloudy? What proportion were sunny?

Helps on the Outline. 1. Give much training in the application of our current money, after showing that the business way of writing is merely a grouping of dollars, dimes and cents separately, *e. g.*, \$50.73 means a group of fifty dollars, a group of seven dimes and a group of three cents.

2. It is a great stimulus to test each child by the clock for rapidity in performing certain operations. At the end of a week, test again to find improvement. During the study period occasionally ask the pupils, as part of the work, to watch the clock and test themselves for rapidity

on the work you expect to require orally of the class.

Distinguish with children of this age between *division* and *partition;* that is, lead them to see the difference between

$.15÷$.05= ? 1/5 of $.15= ?

Easy examples involving the four operations may be written on the board for the sake of training, then erased rapidly one at a time. The children should put down the answers only, exchange papers and correct.

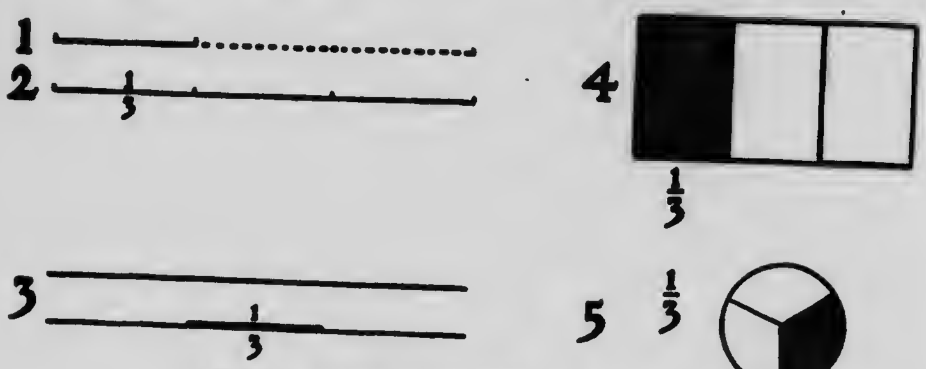
Examples:

88+ 22= ?	60+17= ?
500−250= ?	50× 5= ?

3. Make sure that the child really grasps fractional relations by asking him, for instance, to show ⅓ in five different ways; variations of the following suggestions are recommended:

Helpful Devices. As the pupils grow older the number and complexity of the devices which may be employed in connection with arithmetic are found to increase. Those which are presented here are typical of a great number which the ingenuity of teacher or parent can suggest. For instance, in the above five diagrams which show how to explain the relation of ⅓ to 1, there is all the suggestion which one should require to enable her to adapt the same thought to fourths, fifths, sixths, etc.

Illustration of Original Problems. By this time pupils ought to be able to handle with ease examples with pure numbers. Yet illustrations can well be used by them to aid in explaining their own original problems. For written work, ask the class to write out and to illustrate problems involving some point you have just



SHOWING RELATION OF ONE-THIRD TO THE WHOLE

4. Have a square yard measured off on the floor by the children and used for comparison.

5. Let the children estimate the number of quires of paper used by all the members of the room in the year, and the price of it.

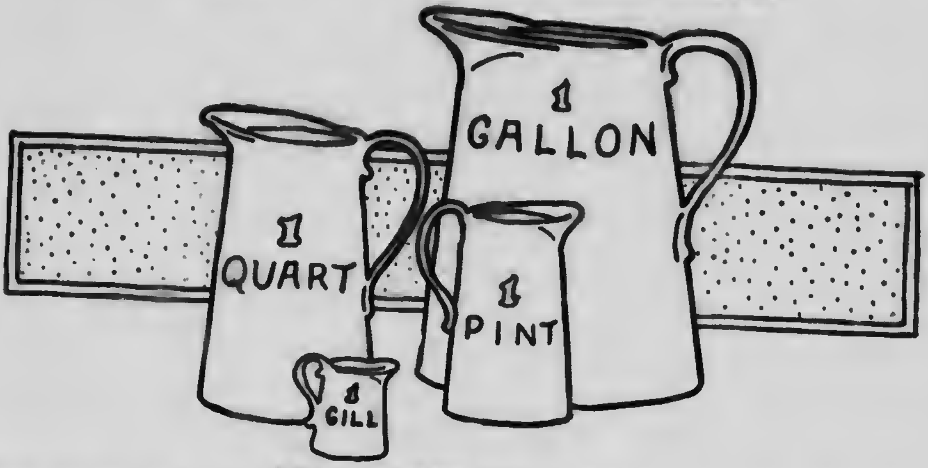
Let them figure on such problems as the length of a rectangular pane of glass in a school door if it is 19 inches wide and contains 665 square inches.

made plain. For example, you have just reviewed certain work on fractions and wish the class to illustrate it by original problems.

Illustration by pupil: I spent $4 of the $12 I had. What part of my money did I spend?

Denominate Numbers. Children should use the actual measures when dealing with denominate numbers. Much handling of the quart, peck or bushel is needed before the teacher can

ANOTHER ILLUSTRATION OF ONE-THIRD

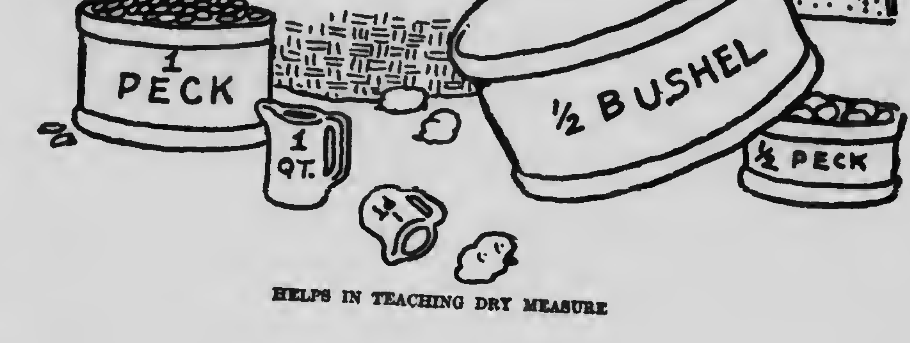


HELPS IN TEACHING LIQUID MEASURE

depend upon it that the glib reciter of the "table of dry measure" really images and understands what he is saying. Later, the objects should be removed, but if there is uncertainty, use the measures again.

THE DIVISION TABLE. This may be used for home-work, or for review work in school. It frequently happens that pupils in this grade have partially forgotten or are weak on their division tables. The teacher or parent will find here the principal points in division required. Where the child cannot give the result instantly, use toothpicks, marks, etc., and ask the child to divide the objects into groups.

2)4	2)6	3)6	2)8	4)8	3)9	5)10
2)10	2)12	3)12	4)12	6)12	2)14	7)14
5)15	3)15	2)16	4)16	8)16	2)18	3)18
6)18	9)18	5)20	4)20	3)21	7)21	3)24
4)24	6)24	8)24	5)25	3)27	9)27	4)28
7)28	5)30	6)30	4)32	8)32	5)35	7)35
4)36	6)36	9)36				



HELPS IN TEACHING DRY MEASURE

Adaptability of Outlines. The outlines presented in the foregoing pages are not offered with the expectation that they shall be applied in every school or home always in the exact way suggested. What is best for pupils in a given grade in one locality may be better for the grade higher or the grade lower in a different locality, or where students work under different conditions. Topics set down for the work of one grade may be begun one grade earlier and continued into the succeeding one, or, as in case of such topics as fractions, mensuration, etc., may be used in all grades. Where textbooks are used by regular adoption the suggestions in the outlines may be advantageously used to supplement the books. Parents of children who need special aid in mathematics will find the outlines we offer will be very acceptable and practical helps.

Analysis of Problems

Analysis. The successful teacher is the one who can get down to the plane of the child, who can see what he sees and can think as he thinks.

Teachers sometimes fail to see the necessity of very detailed explanation of problems, because they appear really so simple that even the slowest minds among her pupils should readily comprehend them. The mind of the child is not trained to logical processes, and the steps in the unfolding of a proposition are difficult for him. Proceeding from the known to the unknown must be by slow degrees and accomplished by elaborate illustration and explanation; each new fact developed must be accepted by the pupil as naturally following that preceding principle he has come to understand. Until you are conscious that this condition exists, painstaking analysis must continue. Choose different ways of making your explanations; a statement one pupil understands will fail to reach the understanding of another, but there is some form your effort may take that will dispel the last lingering doubt.

A problem is presented below, with such analysis as is always to be desired. In the second solution note the repetitions which connect the known and the unknown, and how these fail in the first solution.

Problem. Charles had sixty cents, and his mother had ninety cents which she divided equally between Charles and his brother William. Charles bought two packages of candy at five cents each and five oranges at three cents each. He then kept the remainder for Sunday School, giving ten cents each week. How many weeks did the money last.

The simplest form of solution, as given below, is objectionable, since it states no reasons for any of the processes employed; and the child may not be able to understand the steps:

$$\tfrac{1}{2} \text{ of } 90¢ = 45¢$$
$$60¢ + 45¢ = 105¢$$
$$2 \times 5¢ = 10¢$$
$$5 \times 3¢ = 15¢$$
$$10¢ + 15¢ = 25¢$$
$$105¢ - 25¢ = 80¢$$
$$80 \div 10 = 8$$

A form which may be employed with splendid results simply states in words what is in the mind when solution is progressing. It follows:

60 cents = the money Charles had at first.

90 cents = the money given to the two boys.

½ of 90 cents = 45 cents, Charles's portion of his mother's gift.

60 cents + 45 cents = 105 cents, the amount of money he then had.

2 × 5 cents = 10 cents, the sum spent for candy.

5 × 3 cents = 15 cents, the sum spent for oranges.

10 cents + 15 cents = 25 cents, the total sum Charles spent.

105 cents − 25 cents = 80 cents, the amount he had left.

80 ÷ 10 = 8, the number of weeks his money would last for Sunday School.

There is not always the necessity of oral analysis as detailed as the one below, yet it is recommended; if used in its completeness by the teacher in illustrating a special kind of problem for next day's work she may be sure of fairly good results on the morrow. If a pupil gives such an analysis in the course of a recitation no one can doubt his full understanding of the problem:

(a) Charles had 60 cents, before receiving his portion of his mother's gift.

(b) The sum divided between Charles and William was 90 cents; of this Charles received one-half of 90 cents, which is 45 cents.

(c) Since Charles already had 60 cents, he now has 60 cents plus 45 cents, which is 105 cents.

(d) He purchased two packages of candy. If one package cost 5 cents, two packages cost 2 times 5 cents, which is 10 cents.

(e) He also purchased five oranges. If one orange cost 3 cents, 5 oranges cost 5 times 3 cents, which is 15 cents.

(f) The two purchases cost the sum of 10 cents, for the candy, and 15 cents, for the oranges, or 25 cents for both.

(g) He had 105 cents, out of which 25 cents was spent. There remained the difference between 105 cents and 25 cents, or 80 cents.

(h) The 80 cents is given to the Sunday School, at the rate of 10 cents each week. The sum would last as many weeks for this purpose as 10 is contained times in 80, which is 8.

(i) Therefore, the money remaining after the gift from his mother and after making his purchases would provide money for Sunday School for 8 weeks.

Problems for Analysis. Following the second analysis above, for blackboard work, and the third, for oral presentation of a problem, the examples below are recommended for practice. In each there is opportunity for careful analysis, and the teacher may well remember that in training her pupils to be analytical she is instructing in the rudiments of logic:

1. Harry wished to buy a sled for one dollar and a half. He had only 55 cents. His father gave him 50 cents, and his mother sold 3 dozen eggs at 20 cents per dozen and gave him half the money received for them. He then agreed to saw wood for his uncle at ten cents per hour until he had earned what he yet needed for the purchase of the sled. How many hours was he engaged at this work?

2. A man buys sugar at the rate of 12 pounds for 72 cents and sells it at the rate of 6 pounds for 60 cents. If he sells in all 24 pounds, how much does he gain or lose?

3. How many handkerchiefs can be bought for 84 cents, if the merchant asks 72 cents for one-half dozen?

4. Mary poured a gallon of milk into bowls, and each bowl held one pint. She sold the bowls of milk for 2 cents each. How many cents did she receive for the whole gallon?

Taking up a New Subject. The great educator Pestalozzi laid down the principle that "All mathematical knowledge is founded upon immediate observation, and therefore must proceed from the *concrete* to the *general* or abstract by means of innumerable examples." So, in beginning a new subject in mathematics, "make haste slowly" if you would really teach it. Let the lesson be lively and stimulating, but give the pupils plenty of time to think when you are developing a new idea. Go over it in different ways; present it in as varied forms as possible. That is teaching. Representing the work in exactly the same form many times does not serve when a point is being developed. Remember, the new ideas have to break out, as it were, a path for themselves through the brain, and the better the path in the beginning, the greater the speed in the end. Encourage the pupils to suggest different ways of doing a problem, especially when the subject is new and before you have decided with the class how a" should do the work. Thus you encourage real thinking.

Reviews. The reviews of a portion of a topic in Mathematics may be either *direct* or *incidental*.

Direct review need not be a retracing of the course followed in teaching a given topic; rather it should be a going over the fundamental points from different points of view. Miscellaneous exercises should be given out, made up of the material already presented, but under a new form and in an order so mixed as to make the pupils consider what processes to use. Thus they must apply independently what they have learned.

Incidental reviews are used when a process learned is needed in building up a new subject. In this way many processes may be kept fresh in the mind while new work is progressing and the teacher does not wish to stop to give a more formal direct review.

Home-Work. The chief purposes of work assigned for study at home are:

1. Drill on operations whose theory is understood.

2. To impress on the memory the things which need most to be memorized.

3. To give a chance for the slower pupils to think out things, undisturbed by those about them.

Never give out work to be done at home that has not been developed far enough in class to give even the dull boy a fair chance of getting it properly done. Review work, or work the principles and operations of which are familiar to the child, is the best material to assign for work apart from the teacher. There is little gain to the child in making him struggle through half-understood operations without the aid of the teacher. There is great gain, however, in repeating work as home effort, when it is of a type that is better mastered by repetition.

Fifth Year

General Suggestions. Fractions constitute the special work of this year, ordinarily.

Aim to increase the pupil's insight into number through the demands: "Answer all you can orally"; "Use the pencil only when you must"; and "State first what you think the answer might reasonably be." The child is at an age when he should begin to use and to trust his mathematical judgment. This should increase through the succeeding grades.

Outline of Work. 1. Varied Processes. Oral and written review and practice in the four fundamental operations: addition, subtraction, multiplication and division. How to read and write nine-digit whole numbers; how to interpret numbers in Roman numerals. Simple factoring by sight. Ratio comparison of numbers continued.

2. Fractions. *Common Fractions.* Addition, subtraction, multiplication and division of common fractions with *small* fractional numbers.

Intelligent use of cancellation in the multiplying and reducing of fractions.

Decimal Fractions. Addition, subtraction, multiplication and division of decimals to hundredths. Multiplying or dividing by 10, or 100, or 1000, by shifting the decimal place.

3. Denominate Numbers. Application of measures of length, surface, volume, time, capacity and weight.

4. Mensuration. Areas and perimeters of rectangles; surface and volume of right prisms. This work to be used, as well, in picturing operations with fractional numbers.

5. Living Problems. Many real problems using the processes emphasized under the fundamental operations, fractions and work in denominate numbers. Problems in which the pupils state merely how the problems may be solved; others in which they think problems through and give approximate answers before solving. How to make, foot and balance simple bills.

Help on Outline. 1. In the reviews on the four operations make a point of teaching how to "check" addition by adding in a changed order; how to "check" subtraction by addition, division by multiplication and multiplication by division, if these proofs have not been fully taught. Make this "checking," or "proving," part of the solving of the problem in upper-grade work.

It may be well in simplest form to show that "checking" by reversing operations is not a matter of play with figures, or a trick, or the result of "catch" problems, but that the check is a sane proving process. Apply the checking rules to a problem in the following manner:

(a) In multiplication: The multiplicand multiplied by the multiplier equals the product:

```
Multiplicand = 117
Multiplier   =   5
               ---
Product      = 585
```

By division, we prove the correctness of the work. The product divided by the multiplier equals the multiplicand; or, the product divided by the multiplicand equals the multiplier:

```
5)585        117)585
  117              5
```

(b) In division: The dividend divided by the divisor equals the quotient:

```
divisor dividend quotient
   144) 1728 (12
        144
        ---
         288
         288
         ---
```

By multiplication and by division the correctness of the operation is proved. Multiply the divisor by the quotient and the product is the dividend; divide the dividend by the quotient and the divisor is found:

```
 144          12) 1728 (144
  12              12
 ---              --
 288               52
144                48
----               --
1728                48
                    48
                    --
```

2. It is a well-established fact that seeing is to most minds more effective than hearing in mathematics, and so it is better to make frequent appeals to the eye, in figures, diagrams and the like, when attempting to build in such ideas as those comprised in the subject of "Fractions." Be patient in giving such concrete illustrations frequently at the start; the formulas should come later.

3. If sets of papers dealing with denominate numbers may be exchanged either with a fifth grade in another school or with a higher grade in your own school it will give an impetus toward exact work and neat papers.

4. A square foot and a square yard chalked off on the floor of the schoolroom often are of practical aid as objective units to use in problems in surface mensuration.

5. Seldom give long and complicated problems, especially in a new subject. The principle is illustrated by a short problem just as clearly as in a long one. Indeed, when the numbers are large and the operations many, the child loses or forgets what he started out to find.

6. Train the pupils to be sure they know the conditions of a problem before they begin to solve it. Often read a simple problem from an arithmetic not used by your pupils and ask them to estimate quickly what the result will be. Then give the correct answer and commend those who have estimated fairly well. Remember that arithmetic is, largely, "the art of computation."

Devices for the Teacher. Problems like the following will help to pin pupils down to reasoning out problems instead of "fooling with figures." They are especially helpful in any grade where the children are given to working mostly to get an "answer," and are equally willing, for instance, to find a pound of sugar cost $5.00, or 1 cent.

1. I know how much one book costs and how many books I am going to buy; how am I to find what amount I must pay for them?

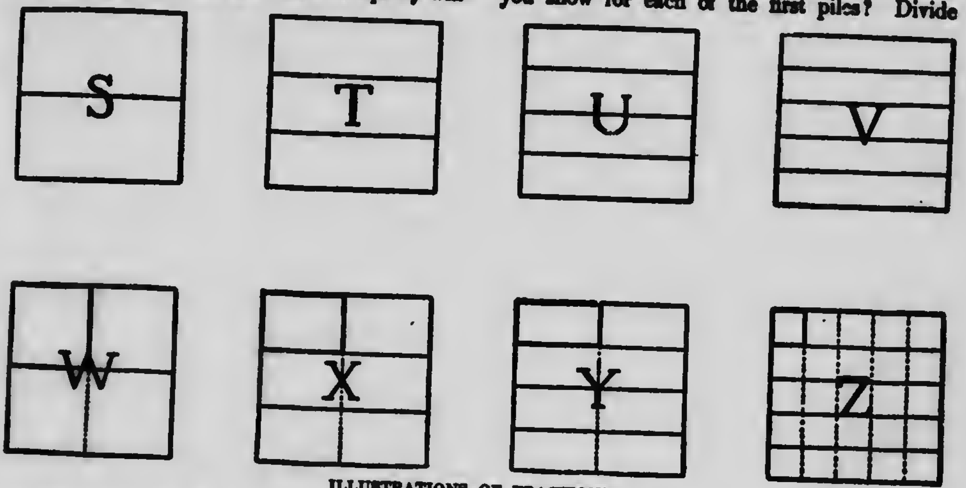
2. I know how many miles a boat goes in an hour; how shall I find the distance it goes in a quarter-hour? In fifteen minutes?

3. John knows the area of a rectangle and also how wide it is. How can he find its length?

4. A girl's weight was taken in 1910 and also in 1911. How may her gain in weight be found?

5. Ella knows the quotient and dividend; how can she find the divisor?

1. How many rectangles in S? Give the name of each part. In W, find 1/2 of one of these parts. Tell how you find a name for this half of a half. Divide the other part in the same way and count the parts. Now how many parts are there? Then what is the name of each part? Give a new name to each of the parts in S.



ILLUSTRATIONS OF FRACTIONS

2. How many times more parts have you in W than in S? In X than in T? In Y than in U? V, as you see, is divided into five parts. Without dividing up the whole figure tell the name of ½ of one of these parts. Use Z and get a new name for each part of V. What is the name of 1/2 of 1/3; 1/3 of 1/3; 1/5 of 1/5? Tell how you get the name.

Work with Counters. 1. Place on your desk 12 counters or slips of paper of the same size in 2 equal piles. What part of the whole will each pile be? Divide them into twice as many piles. How many of the new piles must you show for each of the first piles? Divide them into three times as many piles as you had at first. How many of these piles must you show for each of the first piles?

2. Place on your desk 30 counters in 3 equal piles. How many piles of counters and how many in a pile would you show me if you divided them into 2 times as many piles? 5 times as many piles? What part of all the counters did you show first; next; last? In which pile was the largest number of counters?

3. With your counters show me that 1/2 may be shown as 2/4, 3/6, 4/8.

That 1/3 may be shown as 2/6, 3/9.

That 2/3 may be shown as 4/6, 6/9,

You have found that when any fractional part is divided up into smaller parts, a greater number of these smaller parts must be taken to equal that first part. Show this with your counters.

When you multiply or make the denominator larger, but want to keep your fraction just as large, what must you do to the numerator?

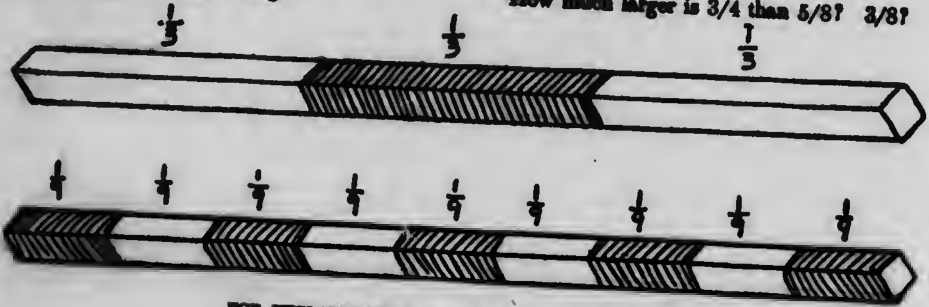
Show with your counters that you must multiply numerator and denominator by the same number if you wish the fraction to keep the same value.

4. Take 8 counters. Show 4/8 of them. What would the denominator be if divided by 2? To show that same number of counters as asked for, what would you have to do to the numerator? Show 2/4 of the counters. Divide the numerator by 2. To show the same number of counters as asked for, what must you do to the denominator?

Then whenever you divide the denominator, to keep the fraction just as large, what must you do to the numerator? If you divide the numerator, what must you do to the denominator to keep the fraction just as large?

Pupils may readily be impressed with the comparative size of the different fractions by exercises as suggested above. They can easily see that there are two halves in one; that it takes 4/4 to equal one and 8/8 and 16/16. Since the teacher understands these facts she should not pass over them too rapidly, but many easy exercises may be developed, showing just how many 16ths in 1/8, in 1/4, in 1/2.

How many 8ths in 1/4? In 1/2?
How many 4ths in 1/2?
Various other questions may be asked, such as:
How much larger is 1/2 than 1/4?
How much larger is 1/4 than 1/6?
How much larger is 3/4 than 5/8? 3/8?



FOR EXPLANATION OF ONE-THIRD AND ONE-NINTH

The above illustration can be used in developing the fractions 1/3 and 1/9 and shows, at the same time, their relative value to the whole number and to each other.

We give a few exercises of the many which can be developed by this device:

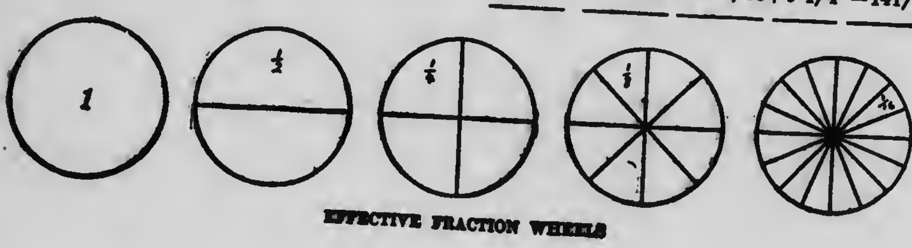
1/3 is equal to how many 9ths?
2/3 equals how many 9ths?
1/3+1/9 equals how many 9ths?
2/3 is how many more than 5/9?
Which is greater, 4/9 or 1/3?
2/3×7/9=how many 9ths?
6/9=how many 3rds?

6 5/9 1 1/3	26 8/9 − 7 2/3	6 1/3 2 2/9 1 4/9	30 − 7 4/5	14 2/9 6 2/3

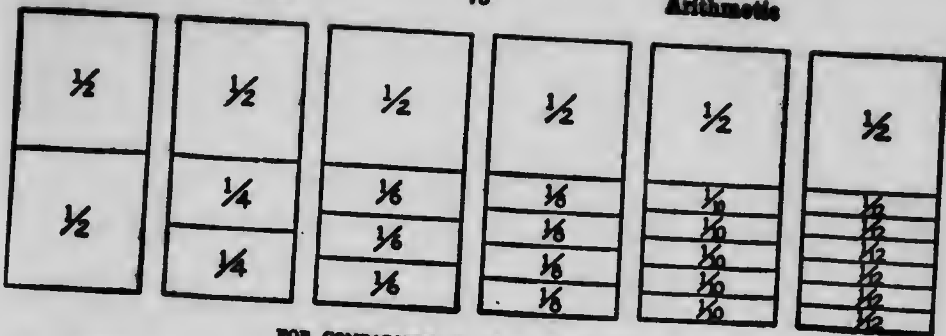
3/8 is equal to how many 16ths?
6/16 is how much larger than 1/4?
3/16 is contained in 6/8 how many times?

Easy Exercises

1/2 +1/4	1/4 −1/8	1 1/8 +2 1/4	1/2 −3/8	5 1/4 +2 5/8
7 1/2 −3 1/4	5/8 +1/4	3 1/16 −1 3/8	3/16 +5/8	4 3/4 +1 1/8
6 3/8 +2 5/16	9 1/2 −5 3/4	3 7/8 +1 13/16	15/16 +1/4	3 5/16 −1 1/4
27 +3 7/8	34 +7 11/16	57 5/8 −4 6/16	23 3/8 +9 1/4	21 3/4 −141/2



EFFECTIVE FRACTION WHEELS



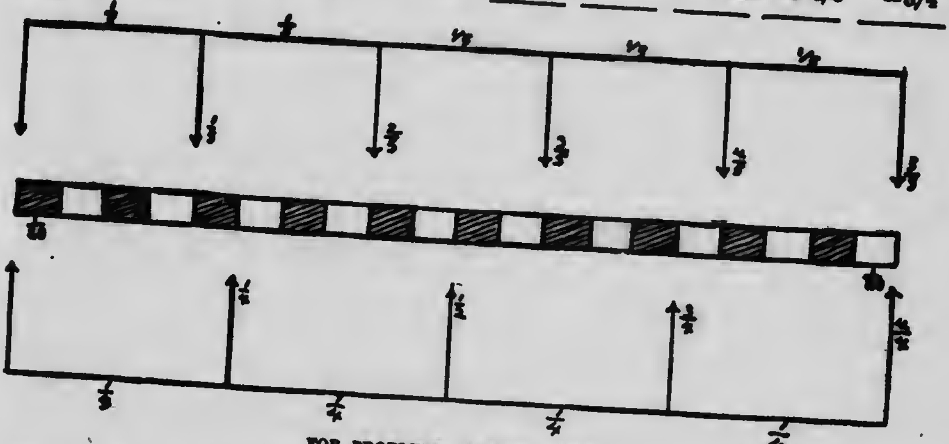
FOR COMPARISON OF FRACTION VALUES

Have fourths compared with thirds, eighths, tenths and twelfths.

Story problems should be used freely to illustrate and make plain.

Every step should be illustrated with objects or drawings. Cardboard disks can be easily supplied.

6 2/5 −4 1/2	9 1/4 −6 3/5	20 4/5 −7 1/4	39 −8 2/5	6 1/2 −3 3/4
14 1/5 −7 3/4	7 9/20 −4 3/4	13 3/5 −6 7/20	16 3/4 − 3 4/5	1 17/20 −3/4



FOR PROBLEMS IN REDUCTION

The above diagram is divided into 20ths and will be found useful in teaching fractions and reduction. We give the following suggestive examples and the teacher can develop any number of similar exercises:

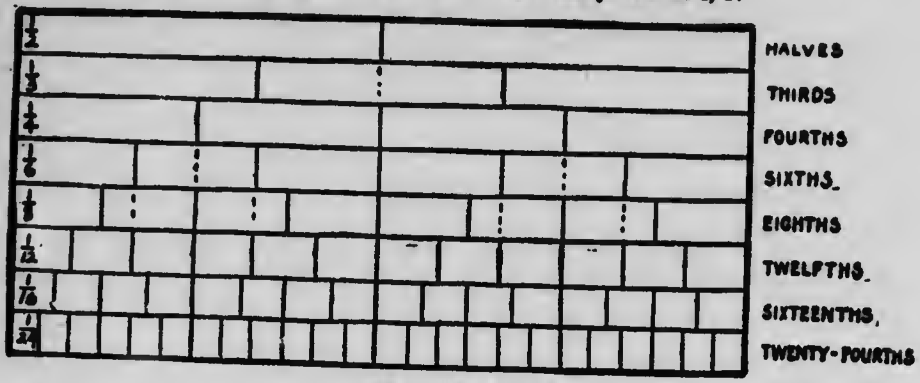
1/5 equals how many 20ths?
1/2 equals how many 20ths?
How many 5ths in 16/20?
3/5 equals how many 20ths?
1/4 equals how many 20ths?
1/4 is how much larger than 1/5?
3/5 is how many 20ths?.
How many more 20ths in 3/5 than in 1/2?
Which is greater, 4/5 or 3/4? How much?
Since 5 is larger than 4, why is not 1/5 larger than 1/4?

Graphic illustrations like the above are of assistance to the parent who is trying at home to assist the child who is behind in his class in fractions. Let the parent have the child point out 1/2, 2/4, 3/6, for instance, and see that they are identical. Let him give the same name (denominator) and add or subtract, etc., until the child becomes familiar with simple fractional relations.

The illustration given below gives the different stages in the reduction of fractions. This enables the pupil to tell at a glance how many twenty-fourths are equal to one-eighth; the number of sixteenths in one-half, etc., and from closer study to fix definitely the relative size and value of the fractions contained in the unit or whole number.

We suggest, in connection with this illustration, that the teacher write exercises on the board reducing to lowest terms such fractions as
72/128 63/90 96/144 90/105

What is the comparative value of 5/8 and 15/24?
How many 6ths in 1/2?
How many 16ths in 1/4?

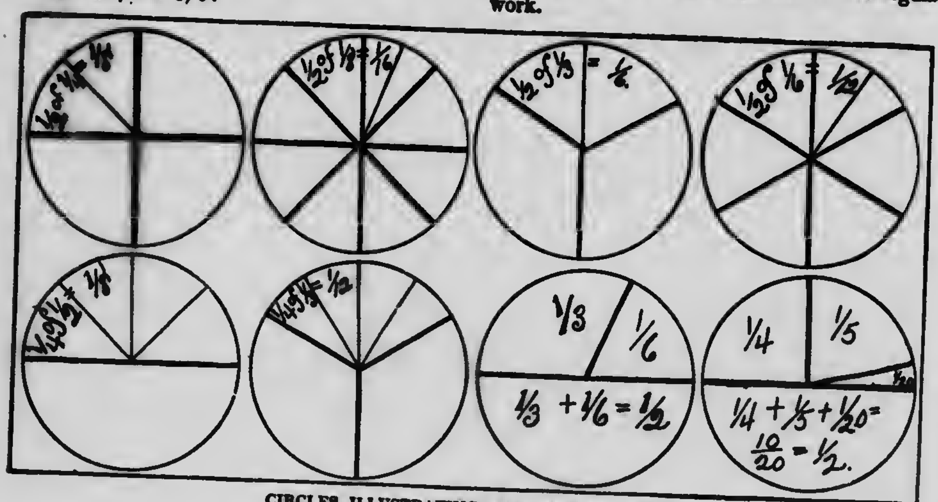


COMPARATIVE VALUES

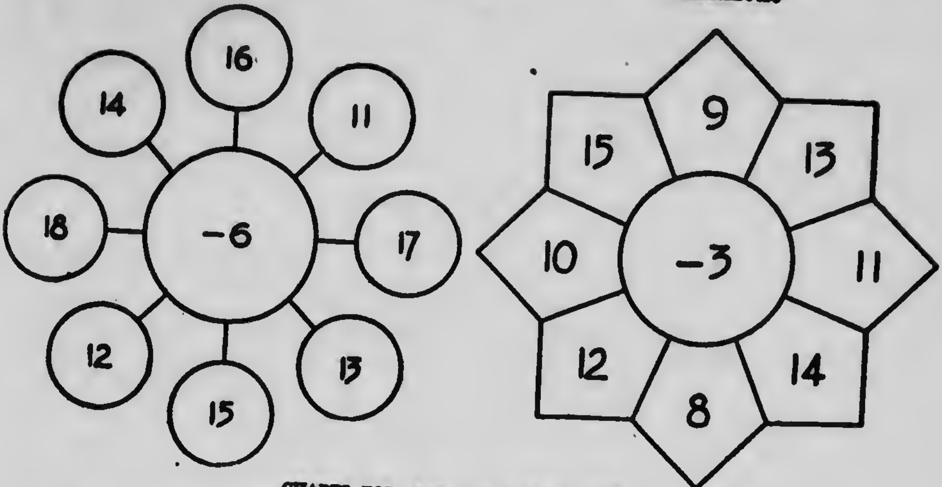
In the eight circles in the diagram below is material affording opportunity for many examples in fractions. These circle, with their subdivisions, will be of special help in comparing sizes and values of fractional parts found within them. A few problems typical of those which may be made from these diagrams are given below:

Change 3/6 to 8ths. 1/2 to 16ths.
Change 6/24 to 8ths.
What is 16 times the difference between 3/16 and 3/6?
What is 24 times the sum of 5/6 and 3/4?
What is 1/2 of 5/6?
How many 24ths in 2/3?
How many 4ths in 9/12?
1/2 is how much larger than 3/8?
2/3 is how much larger than 1/6?
How many 12ths in 1/3?
How many 24ths in 3/16?
How many 8ths in 3/4?
3/4 is how much larger than 10/24?
1/4 is how much larger than 3/16?

Rapid Work. Drill work should be continued in the upper grades, and, because quickness and accuracy must be insisted upon, should be of a simpler, easier nature than that of the regular work.



CIRCLES ILLUSTRATING FRACTION VALUES



CHARTS FOR WORK IN SUBTRACTION

If this chart is before the class, pupils may be called upon to recite as the teacher points to the different numbers on the outside row and pupils may recite in turn, or, as a mark of honor, those pupils who have made most effort may be "teacher" and use the pointer.

DRILLS FOR WRITTEN WORK. Write numbers that can be subtracted from 6 with remainders, as:

6−0=6	6−3=3
6−1=5	6−4=2
6−2=4	6−5=1

Write numbers that can be subtracted from 4 with remainders.

Write numbers that can be subtracted from 7 with remainders. From 5 with remainders. From 8 with remainders. From 9 with remainders.

Make a table of numbers above 7 which can be subtracted from 15 with remainders.

Of numbers above 8, from 16, with remainders.
Of numbers above 5, from 14, with remainders.
Of numbers above 9, from 17, with remainders.
Subtract by 3's from 21. From 35 to 20.
By 2's from 20.
By 2's from 27.
By 4's from 36. From 23 to 3.
By 5's from 50. From 31 to 1.

These drills will fix definitely in the pupils' minds that subtraction is counting one number from another and is, therefore, the opposite of addition.

Sixth Year

General Suggestions. In this grade, decimal fractions, percentage with its simpler applications, and simple business forms are usually the main topics chosen. Special emphasis is placed on a few topics and careful attention given to correctness and rapidity in all the work.

Outline of Work. 1. VARIED PROCESSES. Multiples and factors. Tests of divisibility. Interest by easy and current short methods. The equation.

2. FRACTIONS. Fractions, decimals and percentage used interchangeably and freely, both applied to business problems and as drill.

3. DENOMINATE NUMBERS. Oral and written exercises in changing denominate units in all tables used in previous grades.

Concrete work in the larger measures, as rod, mile, cord, etc.

4. MENSURATION. Measurement of rectangles, using larger units, triangles and rectangular solids as in lumber and wood.

5. LIVING PROBLEMS. Have pupils make up practical problems involving principles studied, and then solve them. Problems involving common and decimal fractions as used in business; problems in gain and loss and in interest.

Helps on Outline. 1. Show the pupils how to know whether a given number is divisible by 2, 3, 4, 5, 8, 9 and 10. Give plenty of rapid work on tests of divisibility. Pupils have a real sense of power when they can tell by inspection that a large number is divisible by certain numbers only.

2. In pursuing the more difficult work in fractions, make sure that your pupils really grasp what they are doing. Frequently ask them to show you the problem by using some concrete material, as paper squares, drawings, etc. The way into a subject is through the concrete. Begin with the use of things, but do not continue and end with things. Once the process you are trying to teach is grasped, drop the objects; they are only the means of reaching the process. It is not the perception of the objects that gives the idea; it is the using of those things in a constructive way.

3. Encourage pupils to solve these review problems in denominate numbers without the use of pencils, as far as possible. Do not scorn "number downs" because the children are "too old for games." They are not too old for spell downs, so how can they be too old for competitive "number downs"? Give a series of rapid written or oral review exercises involving changing denominate units from one form to another, as:

1 yd. = ? ft. ? in.

1 yr. = ? mo. ? wk. ? da.

4. Drawing to a scale should be done by the pupils on the blackboard or on paper, to illustrate many problems in the larger measures. Much training in computation, exactness, neatness, etc., is thus gained.

5. The occasional "making up" by the pupils of problems involving the principles the teacher is trying to make clear is of great aid in forcing the pupil out of his attitude of taking only what is handed to him. It increases his insight and his ability to know what to do, when to do it and how to do it.

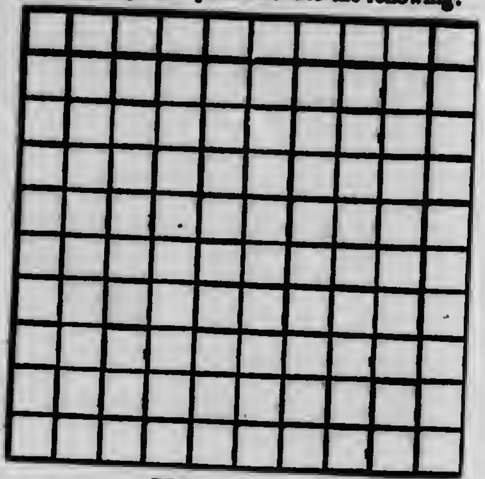
Devices for the Teacher. THE EQUATION. The idea of the "equation," which begins with the little ones as $1+1=2$, and should be pointed out and used as the main statement in *all* mathematics, on through high school, may be emphasized in or about this grade. Point out that an "equation," a "balance," or "statement" is being sought for in the problems; that it is the other side of the equation that constitutes the answer in all such statements as 6% of \$5000 = ? The foundations of "Proportion" and of much algebra are thus laid.

MULTIPLES AND FACTORS. Here is an excellent opportunity for reviewing "tables" (on which pupils of this age are often rusty), by building up and tearing down such quantities as 960, 448, 5760, etc., in as many ways as possible.

$$960\begin{cases}=10\times6\times8\times2.\\=10\times4\times4\times3\times2.\\=\ 5\times2\times2\times2\times2\times2\times2\times3.\end{cases}$$

Objects, as counters of sizes to typify 2, 3, 7, 9, etc., may be used at the start.

DECIMAL DEVICES. Before entering on the formal and extended study of decimal fractions, make sure that the pupils are free in the interchangeable use of fractions, simple decimals and per cents. For instance, using the 10×10 square drawn on the blackboard or on a large sheet of manila paper (also, when possible, by children using the cross-section paper, invaluable for showing mathematical relations), give a series of "quick" problems like the following:



DECIMAL SQUARES

I place a value of \$7 on the 100 squares; show me one row and give the value. Write the equation (1/10 of \$7=\$.70). Show me one of the squares and give its value. Write the equation (1/100 of \$7=\$.07). I place a value of \$.05 on 10 of these squares. Find the value of the 100, etc. Let the entire 100 squares represent a ton of coal. Show 5% of the squares and tell how many pounds are represented. Show 20%, 10%, etc., until the 100 squares have been used. Add the pounds (2000 lbs.). Add the rates (100%). Have equations written as pupils proceed, ending with the statement 100%=2000 lbs.

When taking up the formal side of decimal fractions, first call attention again to the relative values existing between the adjacent orders in integers. Help the pupils to see that the same relative value exists between adjacent orders to the *right* of the decimal point. Use the 10×10 square in objectively comparing values and the following "placing" device for setting them down.

Millions	Hundred-thous.	Ten-thousands	Thousands	Hundreds	Tens	*Units*	Decimal point	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thous.	Millionths
8	8	8	8	8	8	8	.	8	8	8	8	8	8

Confusion may be avoided by picturing the units order, instead of the decimal point, as the starting place; this causes the first, second, third, fourth, etc., orders to the right to compare respectively with the first, second, third, fourth, etc., orders to the left of units—a plan worth using.

Read the following in orders to the left, starting after units: 8888 (Ans. 8 tens, 8 hundreds, 8 thousands). Read the following in orders to the right, starting after units: .888. (Ans. 8 tenths, 8 hundredths, 8 thousandths.) In combination, the two numbers above make 8888.888. Read this. Use many exercises of this sort. Spend time on reading and writing decimals until the matter of relative position is mastered.

A common fraction whose denominator is in the table of tens is a decimal fraction. Ask for many illustrations. Now express .8 as a fraction (Ans. 8/10). .88 (Ans. 88/100). .888 (Ans. 888/1000). Give training at this stage in changing into series; e. g.,

$$\frac{888}{1000}=\frac{8}{10}+\frac{8}{100}+\frac{8}{1000}$$

.888=8 tenths, 8 hundredths, 8 thousandths. Note that a decimal is read just like a common fraction: first its numerator, then its denominator. In writing a decimal, write the numerator just as you would in a common fraction, then place the decimal point so as to make the name of the last order the name of the denominator. Illustration: Write 35 hundredths. We write the numerator as in common fractions, 35. Looking at 5 we think hundredths, at 3, tenths; then write the decimal point.

When teaching the multiplication of a decimal by a decimal, begin in the following way:

First reduce the decimals to common fractions and multiply. Then change to a decimal again. This will, if the teacher sets the pupils to looking for it, make plain, after many repetitions, the relations between the number of decimal places in the product as compared with the sum of such places in the multiplicand and multiplier. The child gradually discovers this "rule" of pointing off as a quick way of doing the longer process. Illustration: .25×.5=25/100×5/10=125/1000=.125. This will soon be shortened to .25×.5=.125, as the rule is formed.

When teaching division of decimals the rule of "pointing off" as many decimal places in the quotient as those in the dividend exceed those in the divisor may be seen as a "short cut" by changing the decimals to fractions as explained in multiplication of decimals and proceeding to divide. A "short cut" in mathematics is seldom a bug-bear; rules often are.

Decimal Test. This test may be written on the board, or, if teachers are supplied with some sort of a duplicating machine (which can be secured at a nominal price), a sufficient number of copies of this exercise can be prepared for class use. The teacher should prepare the answers before class time. The pupils may exchange papers and grade them while the teacher reads the answers. The entire exercise need not take ten minutes and will prove an eye opener to the class. It is suitable for any grade in which *decimals* have been taught as a subject.

Seventh Year

General Suggestions. Percentage and its applications, proportion, practical methods in business and analysis of problems are the main topics of the year.

Outline of Work. 1. Varied Processes. Percentage. Train in rapid combinations and in short methods. Give special attention to equations and to statements of problems.

2. Fractions. All forms and operations in fractions continued further, reviewed and applied.

3. Denominate Numbers. Comparison of foreign and Canadian money. Application of surface and cubic measures in mensuration.

4. Mensuration. Application of measurements of lines, triangles, various quadrilaterals,

circles, rectangular solids and cylinder to the measurement of surfaces, volumes, land, lumber, etc.

5. Living Problems. Practical problems connected with mensuration, application of percentage, business forms, etc.

Helps on Outline. 1. Percentage, so important in modern business, must be dealt with in sixth and in eighth grade as well as in seventh, where, perhaps, it is studied most fully. Among the large number of "cases" in percentage, let the teacher place emphasis on these two important matters: (1) to find some per cent of a given number, and (2) to find what per cent one number is of another. The following are the applications that may be made, some in sixth and a few reserved for eighth, but the majority in the seventh year: Gain and Loss, Commission, Discount, Insurance, Taxes, Interest and Discount, Stocks and Bonds, Exchange and Accounts.

Percentage is more fully treated later in this department of The Educator, in the last pages devoted to arithmetic. However, helps in teaching this subject are given their proportion of space here.

2. If, from the start, children understand that 6% is only another way of writing 6/100 and .06, there will be but little difficulty in understanding percentage. One very important feature is the interchange of the per cent forms, decimal fractions and common fractions, as, for example, in 1/4=25/100,=.25, = 25%. Ask in rapid succession "What part?" "How many hundredths?" "What per cent?" to impress the inter-dependence of percentage and common and decimal fractions.

3. To show the relations of the inch in the linear, the square and the cubic measure, and the relations of the foot in these same measures, the enterprising teacher should direct interested pupils to make, outside of school, a box, 12 in. by 12 in. by 12 in., of cardboard, having each of the six faces marked by lines into 144 inch-squares. A clear notion may be gained by using this cube, of the cubic foot, the cubic yard, and of how to find the contents of rectangular boxes of varying dimensions. This is useful, too, when teaching the dimensions of a cord of wood and of the number of cubic inches in a bushel and of a gallon. Teach that a bushel is nearly 1 1/4 cubic feet, and hence 4/5 of the number of cubic feet is very nearly the number of bushels.

4. Mensuration as suggested for the higher grades can be best done by using problems from the many similar forms to be found in the vicinity of every schoolhouse. Let the pupils find the lateral area of each of the type solids used, by having them make for class use a large one of stiff paper. Make constant reference to these made models when there is difficulty in grasping the problems in mensuration. In this way, too, the volume, for instance, of a cone can readily be found by comparing the capacity of a hollow cone with that of a hollow cylinder or prism having equal dimensions. This work can be further applied to practical problems, as in the amount of grain in piles or bins. The time used in this actual constructing is more than made up by the pupils' quicker and stronger grasp of the abstract problems based on measurements. Let the pupils once actually measure or make a thing and they understand problems related to it better than if the teacher had taken the time explaining the "rules."

5. Spend time on real and reasonable problems, as:

Dressmaking problems. Illustration: The dressmaker bought a 20-yd. silk dress pattern at $2.10 a yd., being allowed, as dressmaker, a discount of 5% and 6% off for cash. She charged her customer the marked price, $2.10. What was her per cent of profit.

Much valuable material may be gathered from government reports and statistics which may be secured for the asking, for various problems in upper-grade work. For example:

In 1910 the oat crop of Canada was 323,000,000 bushels, and the selling price thirty-five cents a bushel. In 1911 it was 350,000,000 bushels, at two cents a bushel more than in 1910. Find increase in value of the crop.

Problems involving trade discounts should be given also. One or two illustrations will make the application of these discounts clear to the pupils. Use problems like the following:

A wholesale dealer quotes broadcloth at $2.00 per yard, 20%, 15% and 5% off, or, as commercially expressed, $2.00, 20, 15 and 5 off. What would the retail merchant pay for 50 yards of the cloth?

Solution:

20% of $2.00=$.40.
$2.00−$ .40=$1.60.
15% of $1.60=$.24.
$1.60−$ .24=$1.36.
5% of $1.36=$.078 or practically $.08.
$1.36−$.08=−1.28.
$1.28×50=$64.00, cost of the cloth.

Encourage pupils to use brief, complete statements in their explanations. In oral reviews in Interest use simple problems, often, as:

What principal will gain $9.60 in 4 years at 6%?

Explanation: $1.00 in 4 years at 6% will gain $.24. It will take as many dollars to gain $9.60 as $.24 is contained times in $9.60, or 40. Therefore $40 is the principal.

In how many years will $50 gain $6.00 at 4%?

Explanation: In 1 year $50 at 4% will gain $2.00. It will take as many years to gain $6.00 as $2.00 is contained times in $6.00, or 3. Therefore it will take 3 years.

At what rate will $400 gain $50 in 2 years?

Explanation: At 1% $400 would gain $8.00 in 2 years. It will take as many per cent to gain $50 as $8.00 is contained times in $50, or $6\frac{1}{4}$. Therefore $6\frac{1}{4}$% is the rate.

Interest Methods. The method of computing interest that is most widely used is called the 6% method. Arithmetics usually explain in brief form the philosophy of this method, leaving more complete analysis for the instructor or teacher to impart.

SIX PER CENT METHOD. It may be well here to outline the philosophy of the 6% method step by step.

In all interest computations 360 days are assumed to be one year. If the interest on $1.00 for one year is $.06, it is clear that for one month the interest on $1.00 would be one-twelfth of $.06, or one-half cent, or $.005. If for one month or 30 days the interest on $1.00 at 6% is $.005, then it is clear that the interest for 6 days is $.001. If the interest is $.001 for 6 days, for 1 day it would be $.000$\frac{1}{6}$. Now, let us put the above analysis in tabular form for quick reference:

Interest on $1.00 for 1 year.............	.06
Interest on $1.00 for 1 month...........	.005
Interest on $1.00 for 6 days.............	.001
Interest on $1.00 for 1 day..............	.000$\frac{1}{6}$

Let us apply the above to the following problem: What is the interest for 2 years, 6 months, 24 days, on $500.00, at 6% per annum?

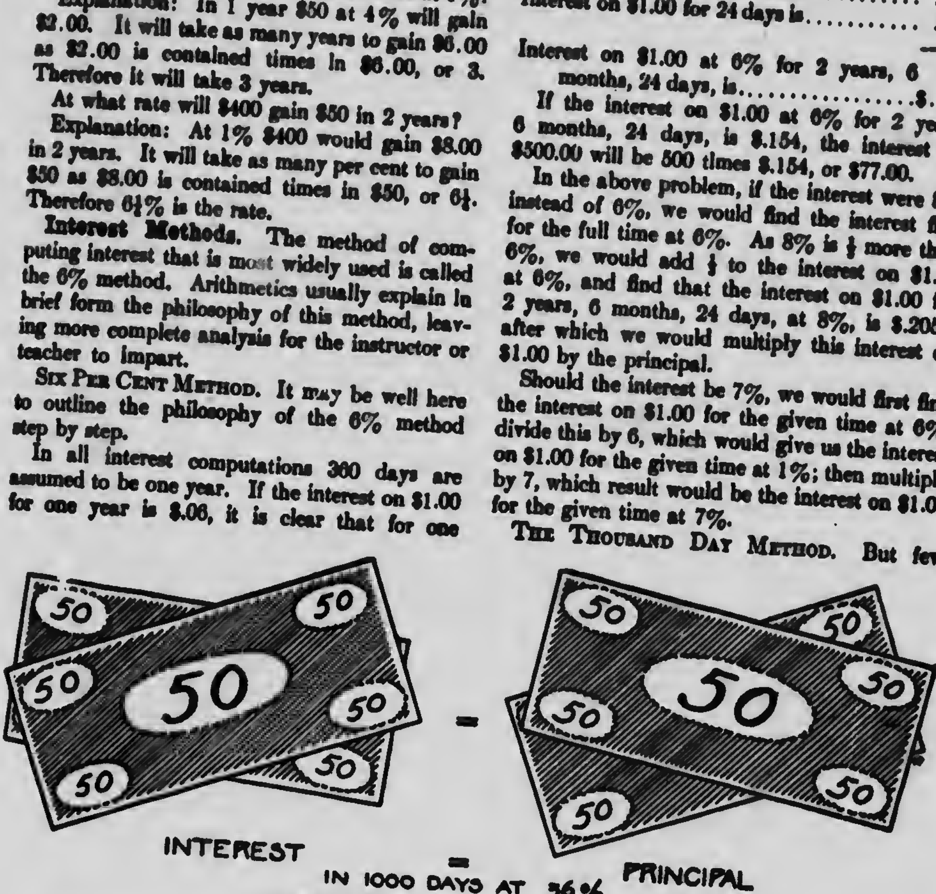
Interest on $1.00 for 2 years is...........	.12
Interest on $1.00 for 6 months is.........	.03
Interest on $1.00 for 24 days is...........	.004
Interest on $1.00 at 6% for 2 years, 6 months, 24 days, is..................	$.154

If the interest on $1.00 at 6% for 2 years, 6 months, 24 days, is $.154, the interest on $500.00 will be 500 times $.154, or $77.00.

In the above problem, if the interest were 8% instead of 6%, we would find the interest first for the full time at 6%. As 8% is $\frac{1}{3}$ more than 6%, we would add $\frac{1}{3}$ to the interest on $1.00 at 6%, and find that the interest on $1.00 for 2 years, 6 months, 24 days, at 8%, is $.205$\frac{1}{3}$, after which we would multiply this interest on $1.00 by the principal.

Should the interest be 7%, we would first find the interest on $1.00 for the given time at 6%, divide this by 6, which would give us the interest on $1.00 for the given time at 1%; then multiply by 7, which result would be the interest on $1.00 for the given time at 7%.

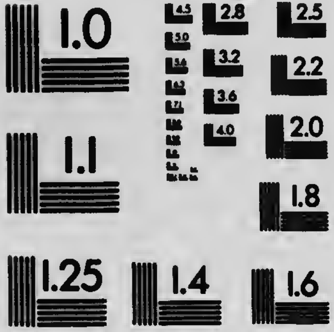
THE THOUSAND DAY METHOD. But few people know of the existence of a brief method of computing interest, known as the thousand day method. This is one of the few methods not complicated, and it has the virtue of clearness. Next to the 6% method it is recommended as the best, for no other system of computing interest excels the thousand day method in simplicity and perfect adaptation to nearly



ILLUSTRATING THE THOUSAND DAY METHOD

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



every problem. The theory of this method may be stated as follows:

The simple interest of any sum of money will exactly equal the principal in 1000 days at 36%.

Before proceeding to learn a rule by which to solve a problem under this method, find the interest on $100.00 for 1000 days at 36%, by the six per cent method. You will find this interest to be $100.00. You can now without doubt write your own rule for the thousand day method. It is as follows:

Multiply the principal by the number of days, point off three decimal places in the product, and the result is the interest on the principal for the given time at 36%.

If your problem requires the interest at 6%, divide the result by 6.

If 3% is required, divide by 12;

If 4% is required, divide by 9;

If 9% is required, divide by 4;

If 12% is required, divide by 3;

If 1% is required, divide by 36;

If 10% is required, multiply the interest at 1% by 10.

Below is a solution of a problem by the thousand day method. Find the simple interest at 9% upon $248.58 for 2 years, 2 months, 20 days.

Solution. 2 years, 2 months, 20 days equals 800 days. Pointing off three places, we have the interest on $1.00 for the given time at 36%. Multiplying the interest on $1.00 by the number of dollars, the product is $198.864, which is the interest on the whole amount for 800 days at 36%. We require the interest at 9%, which is one-fourth as much as 36%. Therefore, dividing $198.864 by 4, we find the interest on $248.58 for 2 years, 2 months, 20 days, at 9%, to be $49.716.

Eighth Year

General Suggestions. This, in most schools, is the great review year for rounding out subjects touched in the upper grades and for specializing on business problems. The new work is square root, longitude and time and the metric system.

Outline of Work. 1. Varied Processes. Ratio and proportion continued. Square root.

2. Fractions. Review with special reference to business uses.

3. Denominate Numbers. Longitude and time, standard time, metric system.

4. Mensuration. Continuation of work of seventh grade, with efforts to gain in skill in rapid computation.

5. Living Problems. Commercial discount, commission, insurance, taxes, stocks and bonds, modern forms of checks, money orders and the like to be treated as actual problems, using modern business methods.

Helps on Outline. 1. Proportion is but a continuation of the work in ratio, begun in the primary and carried on through the intermediate grades. Every fraction expresses a ratio. Having two equal fractions, therefore, we have two equal ratios; and the numbers making up the fractions or the ratios form a *proportion*.

To illustrate: The equality of the ratios 2 to 4 and 3 to 6 gives the proportion $2:4=3:6$, because 4 is 2 doubled, just as 6 is 3 doubled. A great number of the rules in mathematics depend on the theory of proportions. Indeed it is the foundation of the famous old "rule of three." That rule, by which so many problems are worked, depends upon the fact that when the first three terms of a proportion are given, to get the fourth, one need only multiply the second and third together and divide the product by the first. This "rule of three," or proportion, is, when the conditions of the problem are thoroughly grasped, the great and handy tool.

2. Review in particular the work of a previous grade in which a considerable number of the class seem to be backward. In this the question should be, at this stage, not "Can the problem be solved this way?" but, rather, "Is this the best and quickest method?" Try to give your pupils a large stock of "spot-cash" knowledge.

3. Why teach the metric system? Because it is simple and rational, and is gradually coming into use, as in the United States postoffice department, by druggists, in science, etc. The pupils should use chiefly the more common measures: the liter, gram, kilogram, milligram, meter, kilometer and millimeter.

If the names seem strange and difficult to the pupil, the teacher might refer to the fact that a gas meter measures gas, and a water meter measures water, and then ask what the word meter probably means. Show a meter stick. Ask how many mills in one dollar; then how many milli-meters are there in one meter stick?

Little time need be spent on the table if the general scheme is understood.

4. The square rod as a unit of measure may be clearer in the minds of the pupils if the teacher will in their class room (or even outside) place four pupils so as to form a square 16½ feet on a side. At the same time the difference between a square rod and a linear rod may be brought out. After this sort of work, "What is the difference between 5 square rods and 5 rods square?" is not a catch question: the pupils are thinking of real measurements.

5. Give real and practical problems like the following:

A farmer has a 30-acre meadow, yielding 1½ tons of hay to the acre. If, by spending $300 a year for fertilizers, he can bring the yield to 4 tons to the acre, how much more will be make a year, hay being worth $8 a ton?

The old-style problem in partial payments should be discarded, now that it has not the practical value it had when banks were fewer, for more modern business methods. The school cannot be expected to teach the technical points involved in corporations or in insurance, but it should teach the general business principles underlying them.

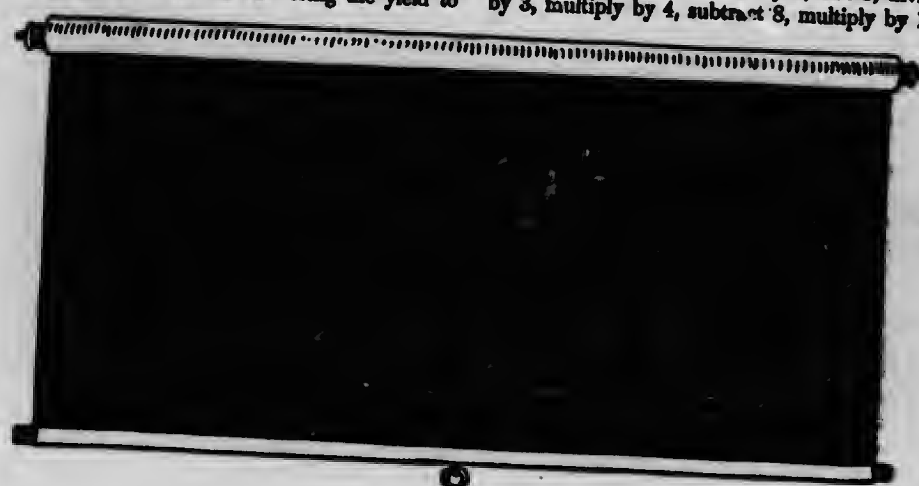
Blank forms, such as are used in different business transactions, ought to be brought into class for use. The short business methods should be taught and the underlying principles emphasized. To aid in this, many teachers of the upper grades are now adopting certain devices used in the modern business colleges for making transactions clearer by making them seem more real. For instance, they have their pupils engage in an imaginary business, buy and sell according to the methods in current use, use an imaginary bank, etc.

Rapid Addition. Skill in rapid addition is quickly acquired by practice, and competitive exercises are always found stimulating. One of the best devices for procuring efficiency in rapid computations is the following:

The teacher will state that she hopes someone can tell the answer to the problem she is to give as quickly as she finishes its statement. Then she "makes up" her problem and repeats it in the making, somewhat as follows: "6 times 5, divide by 2, divide by 3, add 1, divide by 3, multiply by 4, subtract 8, multiply by 10, add 4, add 12, divide by 2, divide by 2, divide by 2. Who has the answer? That's right, Mary, the answer is 2."

Another: "Take 3, add 9, divide by 4, multiply by itself, double it, add 2, cut off all the ciphers, subtract 2, add 19, add 8, add two ciphers, cut off the left-hand figure, divide by 7, divide by 4, cut off all ciphers, divide by 5, divide by 5. Yes, William, the answer is 1." "Teacher, I thought I was wrong when you told us to cut off all ciphers from 25." "Well, you were told that to test your confidence in yourself; I am glad you kept on to the end, believing you had made no mistake and that there were no ciphers at that point."

The teacher must be able to compose her problem, keeping her mind running ahead for



ADDITION CHART

new combinations and remembering always the last result obtained. It will not be difficult after a few trials, and will be found at once one of the best mathematical exercises and a most attractive five-minute busy-work period, in which every pupil will take a lively interest. At first do not attempt to state the problems too rapidly.

ADDITION CHART. On page 51 we gave you directions for making a chart especially designed for drill in addition and suggested exercises in connection with it. Too much emphasis cannot be laid upon rapid addition. If not persisted in too long at a time it is a mental exhilaration, as well as a positive permanent mathematical advantage to the pupil. Using the same chart, which we hope you made as suggested on page 51, after the pupils have mastered addition of two numbers the chart may be pulled a little lower, disclosing three rows of figures. It will be noticed in the diagram on the preceding page that the sum of each of these rows is less than 10. It may be well to arrange your chart after the same order. As soon as pupils have acquired ability to add all of these columns of three figures, the chart may be pulled still farther down, disclosing more difficult work.

METHODS OF ADDITION. Persons likely to be disturbed while engaged in addition frequently use checks to help them in case of interruption. The following are the principal methods.

Civil Service Method. The problem below shows at its right the sum of each partial addition; each column is added without carrying the tens figure from one column to another. The sums of the various columns are set down as indicated, then added:

2480	13
725	28
6844	29
2893	13
3251	16193

Bankers' Method. The advantage of this method over the civil service method is that the result is always in sight without making the second addition, since the ten's figure carried from one column to another is added to each partial sum. Immediately to the right of the problem below is given the partial addition. The number shown as the sum is not the result of adding the partial additions, but represents the last addition and the last figure in each of the other partial additions. The usual way of showing an addition by the bankers' method is as in the third row of partial additions. One would then read for the sum the last two figures set down and the units figure in each of the other numbers:

2480	13	13
725	29	29
6844	31	31
2893	16	16
3251	16193	16193

Cross Addition. An interesting mental exercise, but one lacking elements of practicability, is performed by adding to the upper number the units, tens and hundreds successively of the next number below. Variations can be had by adding from left to right or by beginning below and adding above. In oral recitation, drop "and" and "are" and simply give results. Examples:

	38
38 and 5 is 43 and 40 is	45
83 and 3 is 86 and 70 is	73
156	
	156

	225
225 and 2 is 227 and 60 is 287 and 800 is	862
1087 and 4 is 1091 and 20 is 1111 and 300 is	324
1411 and 5 is 1416 and 10 is 1426 and 400 is	415
1826	
	1826

Applications. The following estimates and problems afford opportunity for much practical drill in denominate numbers.

Surveyors and engineers usually measure with steel tapes generally 100 feet long, divided into feet and fractions of a foot.

A hand, used in measuring a horse at the shoulder, is equal to 4 inches. A span is equal to 9 inches.

A gunther's chain is 4 rods or 66 feet long and consists of 100 links.

A knot is equal to 1.15 common miles and is used in measuring distance at sea.

A square for measuring floors is equal to 100 square feet.

In order to survey a piece of ground it is first necessary to find some corner stick or rock from which to start. This being found, the line is then run according to an official chart until the particular subdivision is located.

The Canadian land measure, which is the same as that of England and the United States, is 4,840 square yards to an acre.

A Scotch acre is equal to 6,150 square yards; an Irish acre to 7,840 square yards; a French acre is equal to 11,960 square yards and an acre in Prussia is equal to 3,053 square yards.

To find the number of acres in a rectangular piece of land, multiply the length in rods by the breadth in rods and divide by 160.

To find the number of square rods in a triangular piece of land, if right-angled, multiply the width by the length and divide by 2.

To find what fractional part of an acre is contained in a town lot, multiply the length in feet by the width in feet and divide by 43,560.

$\frac{1}{8}$ of an acre equals a square of land $73\frac{3}{4}$ feet each way.

$\frac{1}{4}$ of an acre equals a square of land $104\frac{1}{3}$ feet each way.

$\frac{1}{3}$ of an acre equals a square of land $120\frac{1}{2}$ feet each way.

$\frac{1}{2}$ of an acre equals a square of land $147\frac{1}{2}$ feet each way.

1 acre equals a square of land $208\frac{7}{10}$ feet each way.

Dry measure is used in weighing such articles as grains, fruits and all articles not liquid.

Before weighing scales became common it was customary to use measures for this purpose.

Dry measure weights of different commodities are fixed by law. A table for reference can be prepared and pupils should learn the weights used in their own country.

One bushel of grain is equal to 2,218.1[illegible] cubic inches.

One bushel of vegetables is equal to 2,6[illegible] cubic inches.

The legal bushel of the United States is the Winchester measure of 2,150.42 cubic inches, while that of Canada is the English measure of 2,218.142 cubic inches, so that 33 United States bushels are equal to about 32 of ours.

Wheat, beans and potatoes weigh about 60 pounds to the bushel; shelled corn 56 pounds; oats 34 pounds; rye and flaxseed 56 pounds; corn on the cob 70 pounds; buckwheat 52 pounds; beets 60 pounds; onions 50 pounds; barley 48 pounds.

A bushel of corn means a bushel of shelled corn, or ear corn enough to make a bushel when shelled.

One gallon is equal to 277.27 cubic inches; the United States gallon is equal to 231 cubic inches.

One cubic foot of water is equal to $62\frac{1}{2}$ pounds.

A teacup holds about 4 fluid ounces.

A tablespoon holds about $\frac{1}{2}$ a fluid ounce.

A teaspoon holds about 1 fluid dram.

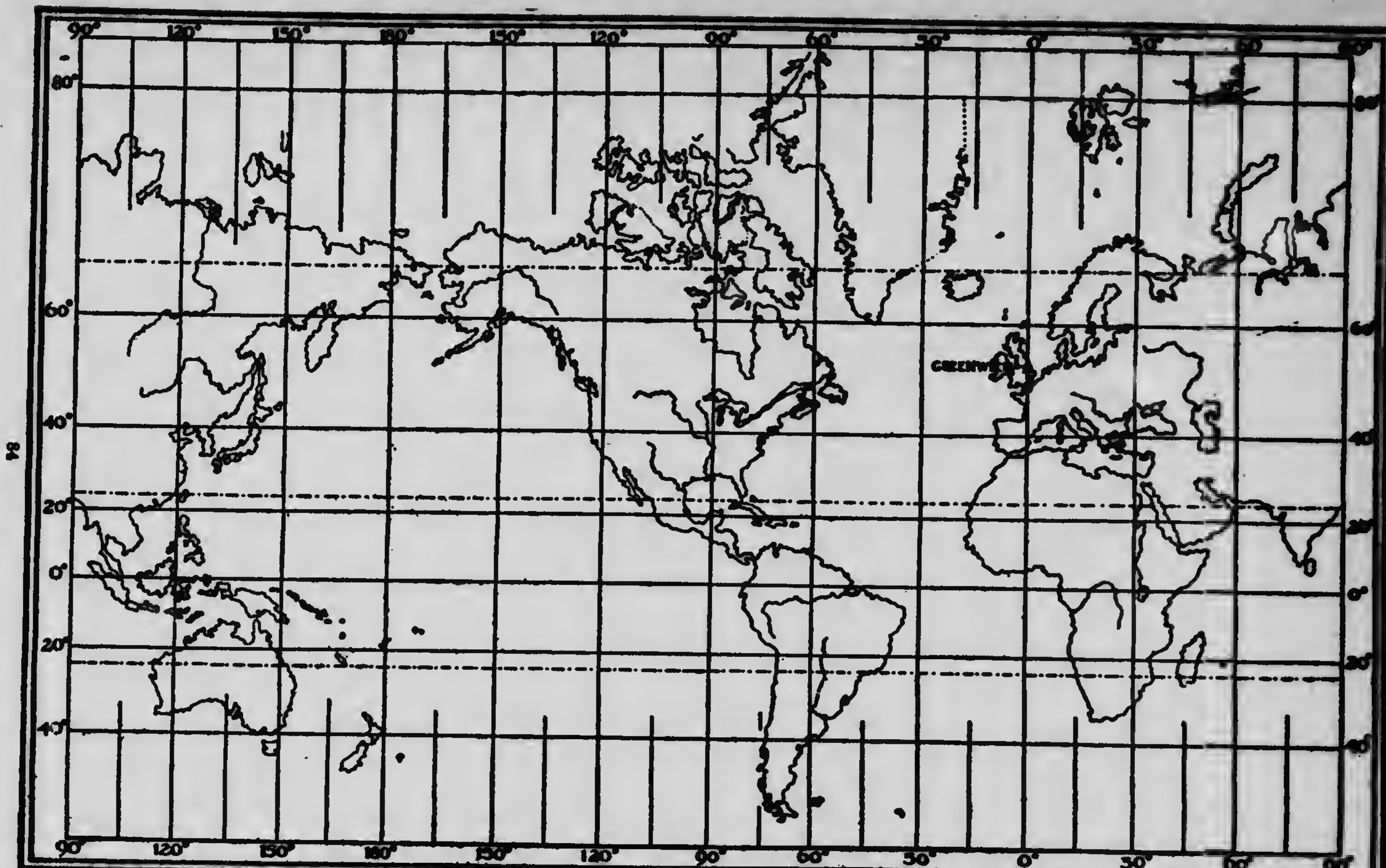
Longitude and Time

Introductory. Our dictionaries and arithmetics tell us that longitude is a name applied to distances on the earth's surface east or west of a given point, from which all measurements relating to the entire world are reckoned. For short distances we usually measure in units called miles; but such measurement is inadequate in connection with great distances, and quite impossible when used with reference to other heavenly bodies. Our scientists have a common measure which they apply to the entire solar system, of which the earth is one small member.

The earth is round; its path around the sun we know to be circular; the other planets are round and their paths as they whirl through space are in form nearly circular. Therefore, in measuring distances on the surface of the earth it is natural that our scientists have taken the circle as the basis of measurement; for that reason, we shall study the circle of the earth, or the distance around it.

Divisions of the Great Circle. The teacher in school tells us that the circle or circumference of the earth is divided into 360 equal parts, each part of which is called a degree. This measurement came down to us from more than 2,000 years before Christ, for it was used by the Babylonians and adopted, with slight improvements, by the ancient Greeks. The reason that 360 divisions in the great circle were made is that the ancients believed that the year contained 360 days. A degree, then, is one of the 360 equal parts of the circle of the earth.

We know that from the instant in any day that the sun is directly over our heads until it is again in the same position, 24 hours have passed. During that 24 hours each portion of the earth's surface, at one moment or another, has been directly under the sun. Therefore, in the 24 hours, the entire circumference of 360° has passed directly beneath the sun. Now we see clearly why our arithmetics tell us 24 hours of time will be the same measurement as 360° of space, for it takes 24 hours for the entire 360° of the earth's circumference to pass beneath the sun. If, then, 24 hours of time equal 360° of space, 1 hour of time will equal 1/24 of 360° of space, or 15° of space. Now let us put in tabular form those two facts before we go farther:



LONGITUDE AND TIME MAP OF WORLD, WITH DIVISIONS OF 15° AND 30°

24 hrs. of time = 360° of space,
1 hr. of time = 15° of space,

and let us apply this truth at once in a practical way. If it is noon exactly where you stand and there is a difference of 1 hour in every 15°, how far east or west of you will the time be 2 hours different from what it is where you are? Will it be earlier or later than noon at points east of you? The earth in its orbit moves from west to east, so it is clear that when it is noon with you it has already been noon at places east, for they have been directly beneath the sun and the sun has appeared to move on westward toward sundown. If you are at a point called A and it is noon, and a point called B is 15° E. of you, then at that point it is 1 o'clock in the afternoon. By the same process of reasoning, when it is noon at your location at A, it is not yet noon at a point 15° W. of you, for that point has not yet, in its whirling through space, come directly under the sun. It will not do so for 1 hour, for it has yet to turn 1/24 of the distance around on the axis before coming directly beneath the sun. These are elementary truths, but they must be understood before one has a basis of fact on which to build his knowledge of longitude and time.

It is clear that we must have smaller divisions than degrees if we would measure with accuracy. The ancients divided a degree into 60 equal parts, called minutes, because they divided their hour into 60 equal parts, called minutes. Now, we must not confuse a minute of time and a minute of space, for they are as distinct as hours and degrees. The minute of space is still further subdivided into 60 equal parts, called seconds of space, for the reason that the minute of time is also divided into 60 equal parts, called seconds. Therefore, we may complete the partial table above, as follows:

24 hrs. of time = 360° of space,
1 hr. of time = 15° of space,
4 min. of time = 1° of space,
1 min. of time = 15′ of space,
1 sec. of time = 15″ of space.

Exercises. Let some object conveniently placed represent the sun; place a globe in such a position toward the sun that it must be noon at the place where you live; point out all the other places on the globe where it must be noon at the same time. *Meridian* is a term which means noonday; therefore, the name *meridian* has been given to this imaginary line which passes through your town and through all other towns where it is noon at the same time. A more complete definition of meridian is great circle—the meridian which passes through your home extends around the world. Locate on the globe the opposite meridian. When it is noon on your meridian, what time must it be at the place exactly opposite? How many hours difference in time between these two places? How many degrees difference between these two places.

Point out the place east of your meridian which is half-way toward the opposite side of the globe from you. It would be sunset. How many hours difference in time and how many degrees distant is that spot from your home? Point to another meridian where it is also 6 o'clock, considering it yet to be noon at your place. Will it be sunrise?

From what you can learn from the above exercises answer this question:

If clocks keeping correct time were placed at points exactly 15° apart clear around the earth, beginning at your home, what would be the exact difference in time these clocks would show?

Plan for Teaching. Longitude and time should not be taught without the use of the globe and a flat map of the world; it would be well, also, to present a diagram of a hemisphere; better than the ordinary representation of a hemisphere as shown in Fig. 1 would be a

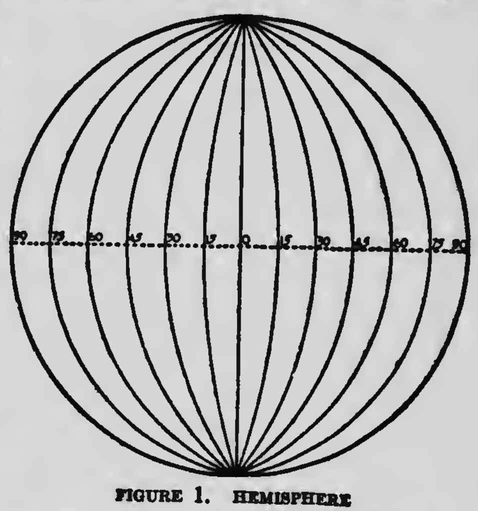


FIGURE 1. HEMISPHERE

diagram, such as Fig. 2, showing the north or south pole so that the entire 360° of the circle can be shown.

Do not leave the fundamental principles until each member of the class thoroughly understands them; the boy or girl who does not know the relative values of 1 hour and 15° will never learn longitude and time; drill over and over on the fact that 24 hours of time represent

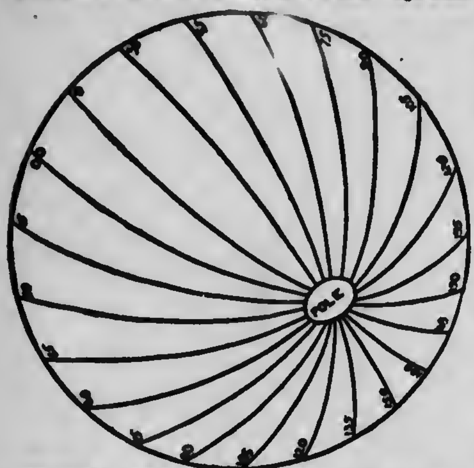


FIGURE 2. SHOWING CONVERGING MERIDIANS

the passing under the sun of 360° of space in the revolution of the earth. That once understood, it is easy to show that 15 of these degrees pass under the sun in 1 hour of time, and from that, the other subdivisions are explained without difficulty.

Have a pupil stand facing north with hands outstretched toward the east and west. If it is noon directly over his head, ask him if it is earlier or later than noon in a certain city some hundreds of miles east or west. Then follow with easy problems relating to places whose location the class fairly well understands. Ask them to tell you how many hours apart in time the city A and the city B are, if one is 30° E. of you and one 15° W. You can continue such problems until you have practically made the circuit of the globe. (See map, page 82.)

The Given Meridian. Thus far we have not developed the fact that all men must agree upon a certain meridian from which to reckon longitude east and west on all the earth's surface. In our investigations above we have based all questions and computations upon the meridian running north and south through our home. The children will understand clearly why it is impossible that all men should be able to use in their computations our own meridian, so we all agree upon a certain meridian which runs north and south through England, France, Spain and Western Africa, exactly at the point where it passes through Greenwich, England, where is located a great astronomical laboratory. This point is only a few miles from the largest city in the world. We call the meridian of Greenwich

COMPARATIVE TIME, WHEN NOON IN TORONTO.

0° and reckon all distances in longitude east and west from that given meridian.

Exercises. Have the pupils solve th[e follow]ing problems, mentally, without consulting the chart which appears on page 82:

1. Chicago is about 90° W. of Greenwich. Chicago clocks show how many hours later or earlier than Greenwich time?

2. When it is 2 o'clock in the afternoon at Greenwich, what time is it in Chicago?

3. St. Petersburg is 30° E. of Greenwich; Hamburg, in Germany, is 10° E. of Greenwich. How many hours difference in time between the two places?

4. If it is noon in St. Petersburg, what time is it in Hamburg?

5. Denver is about 105° W.; Carson City, Nevada, is about 120° W. When it is 11 o'clock in the morning at Denver, what is the time in Carson City?

The diagram on the preceding page will help you to understand the differences in time between cities. The clock in the center shows noon in Toronto. It is forenoon in all places west and afternoon in places east of Toronto.

Rule for Longitude and Time. If the pupils have had no difficulty in understanding the principles thus far developed and have been able to solve the simple problems above suggested, they will understand the reasons underlying the following rules for solution of the more difficult problems in longitude and time:

1. *When the difference in longitude is given, divide this difference in longitude, expressed in degrees, minutes and seconds, by 15. The difference will be the difference in time expressed in hours, minutes and seconds.*

Below is an example to illustrate the rule:

The longitude of Baltimore is 76° 37′ W.; that of San Francisco is 122° 23′ W. What is the difference in time?

$$\begin{array}{r} 122^\circ\ 23' \\ 76^\circ\ 37' \\ \hline 15\,)\ 45^\circ\ 46' \\ \hline 3 \text{ hrs. } 3 \text{ min. } 4 \text{ sec.} \end{array}$$

2. *When the difference in time is given, expressed in hours, minutes and seconds, multiply the difference by 15. The result will be the difference in longitude in degrees, minutes and seconds.*

Below is an example to illustrate the rule:

When it is noon at San Francisco it is 13¼ minutes past 3 o'clock in the afternoon at New York. If the longitude of New York is 74° 3′ W., what is the longitude of San Francisco?

$$\begin{array}{r} 3 \text{ hrs. } 13\tfrac{1}{4} \text{ min.} \\ 15 \\ \hline 48^\circ\ \ 20' \\ 74^\circ\ \ \ 3' \\ \hline 122^\circ\ \ 23' \end{array}$$

Note. If one point is east of the meridian at Greenwich and one point is west, the difference in time or in degrees is found by adding rather than subtracting. Demonstrate the truth of this.

Below are a few problems for practice. Each should be understood by every pupil who attempts to solve it, and any difficult points should be fully explained before the next problem is attempted:

1. A vessel sailed from a port directly on a line of latitude for a certain distance, then turned and went due north to port. Here the captain found his watch to be 40 min. slow. In what direction did he sail at first, and how many degrees?

2. A man travels until his watch is 1 hr. 20 min. fast. Does he go east or west, and how many degrees?

3. A boat race is finished on the Thames at 4 o'clock P. M. How early can the fact be published in Halifax papers? Halifax is about 63° 30′ W.

4. What time is it in Buffalo, 79° W., when it is 20 min. after 6 o'clock A. M., July 6, in Constantinople, which is 29° E.?

5. The following cities have the longitude given:

Berlin	13° 24′ E.	Detroit	83° 43′ W.
Quebec	71° 13′ W.	London	6′ W.
Calcutta	88° 20′ E.	Paris	2° 20′ E.

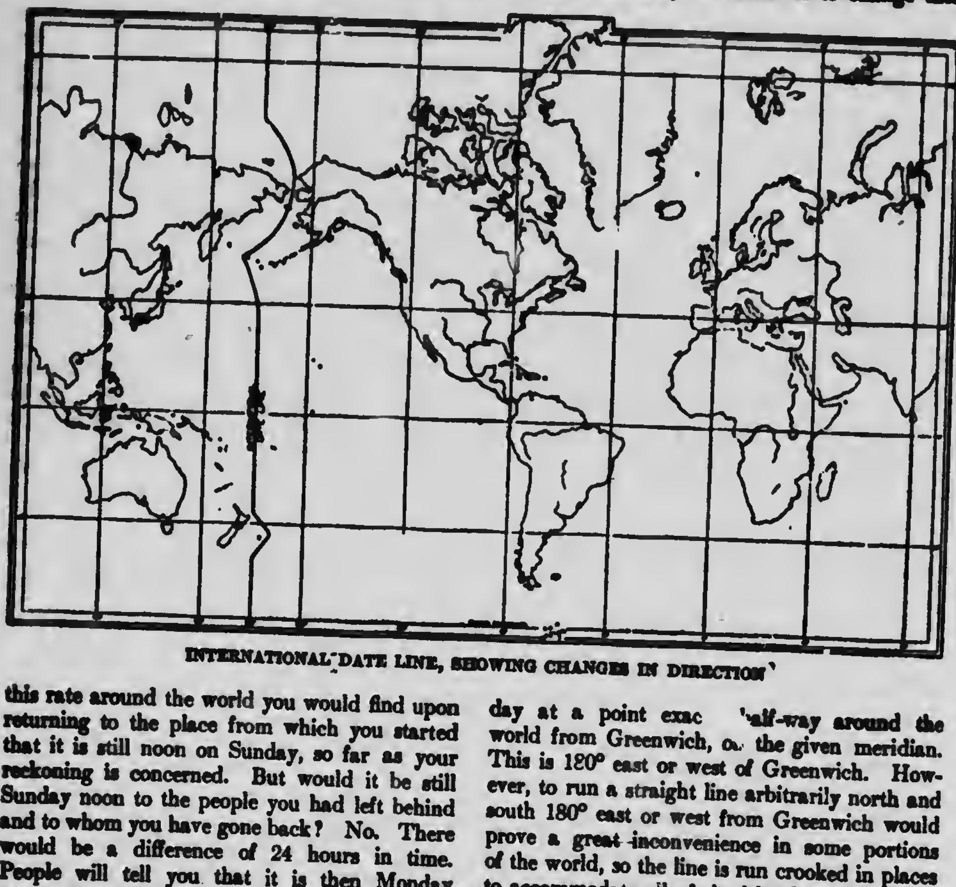
(a) When it is 3 o'clock P. M. in Berlin, what time is it in Detroit?

(b) When it is noon at Calcutta, what time is it in London?

(c) It is 8 o'clock P. M. in Paris; what time is it in Quebec?

International Date Line. When it is Monday where you live, is it Monday on all parts of the earth's surface until the day changes to Tuesday at your home? You will readily see that such is not the case, for all people cannot reckon the beginning of their day from your meridian. We may understand, therefore, that there is a certain line drawn in imagination on the earth's surface where the date changes.

Suppose we imagine that on Sunday noon you are able to leave your home and travel westward with the sun and with the same rapidity, keeping the sun directly over your head all the time. In one hour you would have traveled 15°, but the sun would still be directly overhead and it would still be noon with you, on Sunday. In another hour you would have traveled 30°, yet it would still be Sunday noon. In another hour you would have gone 45° from home and it would still be Sunday noon, for you are keeping with the sun. Continuing at this rate around the world you would find upon returning to the place from which you started that it is still noon on Sunday, so far as your reckoning is concerned. But would it be still Sunday noon to the people you had left behind and to whom you have gone back? No. There would be a difference of 24 hours in time. People will tell you that it is then Monday noon. Somewhere in your travel with the sun the time instantly changed from Sunday to Monday. Had you asked of native peoples in the progress of your journey the day of the week, you would have been told, even as far west as the Sandwich Islands, that it was Sunday; but a little beyond that point, as you neared the coast of Asia, you would have been told that it was Monday. Through all of Asia and entirely through Europe people would have declared that the hour was Monday noon, although during the entire trip it was continually the same day and the same hour of the day to you—Sunday. If you had wished to be in accord with the people among whom you were traveling, you would have had to change your day from Sunday to Monday, somewhere along the route.



INTERNATIONAL DATE LINE, SHOWING CHANGES IN DIRECTION

It is customary for mariners to change their day at a point exactly half-way around the world from Greenwich, or the given meridian. This is 180° east or west of Greenwich. However, to run a straight line arbitrarily north and south 180° east or west from Greenwich would prove a great inconvenience in some portions of the world, so the line is run crooked in places to accommodate all of the islands of one group on one side of the line rather than to divide them. For instance, the Aleutian Islands, off the coast of Alaska, are partly east and partly west of the 180th meridian. If the international date line were drawn exactly north and south from pole to pole, it might run midway of one of these islands and one little fur-clad native might be living in Thursday while with his neighbor over the hill the day might be Friday. Therefore, the date line deviates from its direction due north and south and moves southwest until those islands are passed, when again it turns straight south to the equator, then it moves east about 45°, thence south about 30°, thence with a slight variation to the southwest. This international date line is imaginary, and authorities do not absolutely agree as to its location. It is evident that no necessity compels an arbitrarily fixed line, but all are in accord as to its general position and direction.

STANDARD TIME CHART
Showing approximate boundaries and difference in time

T hart on the preceding page shows the line as generally published.

Standard Time. With the development of the country and the increased facilities for communication between provinces, many opportunities have been found for making changes which have aided in the transaction of all kinds of business. For many years travellers in Canada and the United States were greatly inconvenienced because every great railroad was run on a different time system; in 1880 the railways were operated by seventy-eight time meridians. For instance, a line of road from New York to Chicago would have all the watches of its employees set exactly alike. This made it impossible that over the entire thousand miles of line each employee could keep his watch regulated by local time. The road might declare that it would run its trains by New York time, which is about 40 min. faster than Chicago time. All employees' watches, then, along the entire line of road must constantly register New York time, regardless of the location of the employee. Another railroad running from Chicago to Winnipeg might adopt Chicago time as its standard or might choose to run on Winnipeg time.

Such conditions on all railroads could result in nothing short of dire confusion. A traveller might reach Winnipeg according to the schedule of the railroad on which he is riding. He might desire to go farther west than Winnipeg and would find that the train he wishes to take leaves that city at 5:30 P. M. In the absence of a common standard of time adopted by these two railroads this traveller would not know whether the departing 5:30 train leaves Winnipeg at 5:30 by the time of the first railroad or whether 5:30 may mean a half-hour or an hour earlier or later than the time on which the first road is run.

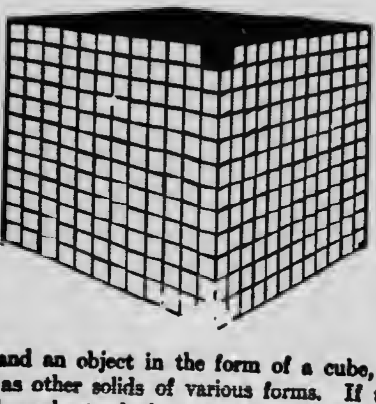
The system of standard time brought order and safety out of confusion and danger. By this system the country is divided into zones of 15 degrees, extending 7½ degrees on each side of the central meridians, and the central local mean time is used for all places within that zone. Thus the first and most easterly Canadian division, known as Atlantic time, includes the territory which lies 7½ degrees each side of the sixtieth degree of longitude. The standard time for the entire zone is the local or sun time of Halifax (four hours behind Greenwich time). Largely through the efforts of Sir Sandford Fleming, between the years of 1876 and 1881 the adoption of this plan was kept before the public and the government, with the result that since 1883, when a General Time Convention was held in Chicago, standard time has been in use on all railroads in North America. Besides the Atlantic zone, there are four other divisions of time in Canada which correspond with those of the United States. The first of these is Eastern time, the 75th meridian being almost in its centre, and the time throughout the Eastern section is that of the 75th meridian, which is practically the sun time of Ottawa. The next division toward the west is known as Central time, and includes the section from Port Huron to Winnipeg; the meridian running nearly through the middle of the Central division is the 90th. The official time in the Central division is therefore practically the local time of the city of Port Arthur and is one hour earlier than the time in the eastern division. West of the Central division is the Mountain division of time, which includes the western half of Manitoba, Saskatchewan and part of Alberta, the central meridian being the 105th, which is only 23 minutes of longitude from Regina. Thus Regina local time is standard time for the Mountain division; it is one hour earlier than Central, two hours earlier than Eastern and three hours earlier than Atlantic time.

Beyond the Mountain division is the last section, in which Pacific or Coast time prevails; the meridian of longitude which establishes time for this division is the 120th. The northern part of the boundary between Alberta and British Columbia runs on this meridian, but as there is no large city exactly on the line, Vancouver, 123° 5′ W., is made the division point on the railroad. Throughout this division the time is one hour earlier than Mountain time and eight hours earlier than Greenwich time.

The system of counting time by twenty-four hours instead of twelve is in use on all the Canadian railways west of Lake Superior and also on the Intercolonial Railway between Halifax and Montreal. Thus twenty o'clock is eight o'clock at night, midnight being the beginning and end of each twenty-four hour period. The twenty-four hour notation is part of the scheme of time reckoning worked out by Sir Sandford Fleming more than thirty years ago.

Cubic Measure

Every solid object has three dimensions, length, breadth and thickness. In teaching cubic measure the instructor should always have



at hand an object in the form of a cube, as well as other solids of various forms. If the pupils understand the common operations of fractions and decimals, solution of problems involving cubic measure is not difficult. The teacher or parent who attempts to give help in problems involving solids must have a knowledge of the underlying principles and be able to state the facts in relation thereto so that they may be comprehended by the boy or girl of ordinary intelligence. There is not a difficult principle involved. The illustration herewith represents one cubic foot; the smallest cube shown is one cubic inch. It would be fortunate if the school equipment included enough of these cubic inch blocks to form a cubic foot. How many would there be? By the manipulation of these small inch cubes any class could understand the scientific basis of cubic foot, cubic yard, etc. Such blocks could be used in other groupings to form solids of various dimensions, and the solid contents of these varying bodies could be very plainly and quite easily illustrated.

A Few Rules. To find the number of cubic feet in a log multiply one-fourth of the average circumference by itself and multiply the product obtained by the length, which will give the contents in cubic feet.

To find the number of cords of wood contained in a pile, multiply the length in feet by the height in feet and then by the width in feet and divide the result by 128.

A cord of stone will make approximately 100 cubic feet of wall.

Three bushels of lime and one cubic yard of sand will lay a cord of stone.

A Cord of Wood. A cord of wood is a solidly built pile 8 feet long, 4 feet wide and 4 feet high.

1. How many cords, stove-wood measure, each stick 12 inches long, could be made from a full-sized cord of wood?

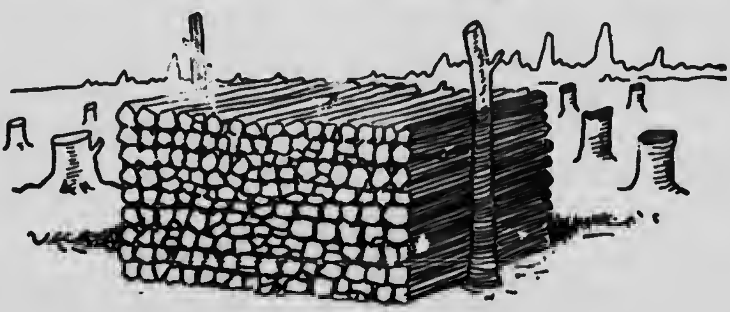
2. If the full cord as pictured above is bought for $3.00 and sawed into stove lengths as in problem (1) and sold for $1.25 a cord, what is the profit?

A CORD OF STONE

3. If 6 hours' time was required to saw this wood, and labor cost 25 cents per hour, was there anything gained on the transaction?

Weights and Measures. Distilled water is the unit by which the standard of weight is de[illegible]mined.

[illegible]ong ton, which is used in weighing coal an[illegible] [illegible]erchandise in large quantities, is equal to 2,2[illegible]0 pounds.



A CORD OF WOOD

MEASURES OF WEIGHT

One pound Avoirdupois weight equals 7,000 grains.

One pound Troy weight equals 5,760 grains.

The carat, used in weighing diamonds, is equal to 3 1/5 grains Troy weight.

The fineness of gold is also determined by the carat, the standard purity being .9 gold to .1 alloy, the alloy being of pure copper.

A firkin of butter weighs 56 pounds.
A barrel of flour weighs 196 pounds.
A barrel of beef or pork weighs 200 pounds.
A barrel of salt weighs 280 pounds.
A cask of lime weighs 240 pounds.
A keg of nails weighs 100 pounds.
A pint of water weighs about 1 pound.

Square Root and Cube Root

Principles. When a number is multiplied by itself we call the product the square of the number.

If we have given the square of a number we may be required to find the number which, multiplied by itself, produces the number called the square. When performing such a problem we call the operation that of extracting the square root.

What is the Square of a Number? Suppose we are asked to square the number 42. 42 is a number composed of 4 tens, or 40, and 2 units. Then we can say,

$$42=40+2$$

Therefore, to find the square of 42, whether we are conscious of the fact or not, we actually go through the following operations:

$$42^2=(40+2)^2$$

$$(40+2)^2=40\times40+2(40\times2)+2\times2=1764$$

From the above, we understand the principle underlying the following rule:

The square of a number equals the square of the tens figure, plus twice the tens by the units, plus the square of the units figure.

Then the square of 37 equals:

$$30\times30+2(30\times7)+7\times7$$

This formula may be shortened as follows:

$$30^2+2(30\times7)+7^2$$

Write formulas similar to the above for squaring 29; 46; 68; 71.

If the principle of the square of a number is well understood, we are ready to undertake the explanation of the opposite formula, extracting the square root of a number. In extracting the square root we simply work backward the principle of squaring a number.

Square Root. As multiplying is the means of squaring a number, division must be the means of extracting its square root. Since 1 equals 1^2, 100 equals 10^2, 10,000 equals 100^2, and so on, it is evident that the square root of any number between 1 and 100 lies between 1 and 10, and that the square root of any number between 100 and 10,000 lies between 10 and 100. In other words, the square root of any number expressed by one or two figures is a number of one figure. The square root of any number expressed by three or four figures is a number of two figures. Then, in performing the operation of extracting the square root, an integral number is divided into groups of two figures each, commencing at the right hand, or the decimal point, so the number of figures in the root will be equal to the number of groups of figures.

Let us extract the square root of 1764. From the explanation above we know that there will be two figures in the root, for we divide the number into groups of two figures each and find two such groups:

17′ 64

The greatest square in 17 is 16, and the square root of 16 is 4; therefore 4 is the tens figure in the root:

```
17' 64|42
16
 164
 164
```

The square of the tens figure is subtracted and the remainder contains twice the tens figure times the units, plus the square of the units figure. Twice the 4 tens is 8 tens, and the 8 tens are contained in the 16 tens of the remainder 2 times, hence 2 is the units figure of the root.

Extract the square root of the following numbers: 2209; 4096; 9216; 13,225; 29,855,296.

Cube Root. Cube root is the process of resolving a give number into three equal factors, or of finding the length of one edge of a cube.

The radical sign ($\sqrt[3]{\ }$) with the small figure 3 over it denotes that the cube root of the number over which it stands is to be extracted. Thus, $\sqrt[3]{1728}=12$.

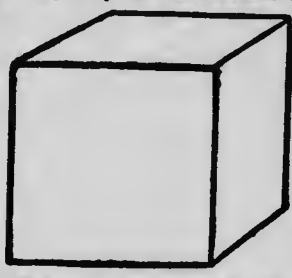
The cube of a number is the product of the number used three times as a factor.

The cube root is one of the three equal factors.

Every divisor in cube root is area or surface, and every dividend is cubical contents.

Any additions made to a cube must be made to each of the three faces.

By the use of the geometric or block method it will be very easy for the student to under-



stand the process of extracting the cube root. If one understands thoroughly the "reason why" for each step, it will be unnecessary to take up the study of the rule.

We give you diagrams representing the divisions, additions and dividends. These graphic illustrations will prove helpful and enable the student to evolve a rule.

Required: to find the cube root of 110,592.

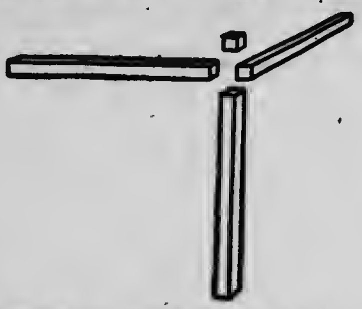
PROCESS

```
                        110' 592 | 40+8
                         64 000
   3×40² = 4800    |     46 592
3×40× 8 =  960    |
      8³ =   64    |
          ----     |
          5824     |     46 592
```

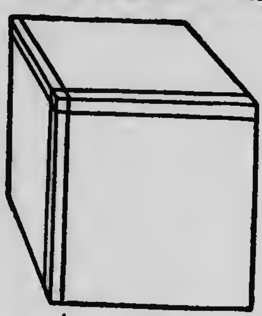
Every perfect cube consists of four parts, as illustrated above.

1. The cube of the tens.
2. Three times the product of the square of the tens by the units.
3. Three times the product of the tens by the square of the units.
4. The cube of the units.

Mensuration. This word is a noun meaning the act, the process, or the art of measuring. Mensuration is a branch of geometry and is limited to finding the length of lines, areas of surfaces and volumes of solids, having given certain facts of lines and angles. The under-

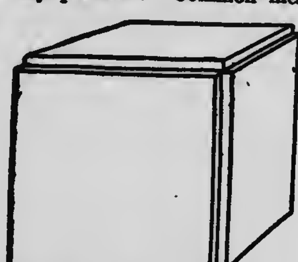


lying principles on which the rules which apply to mensuration are based cannot be entirely understood by the student of arithmetic. Some



of these rules may be worked out by arithmetical processes, while others require involved applications of geometrical formulas.

That part of arithmetic devoted to mensuration is very practical. Common measures of



lines, surfaces and solids enter into the calculations of men every day of their lives, and all should be familiar with these common principles.

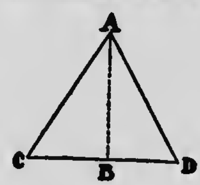
Definitions. The student should become familiar with the meanings of the terms explained below:

POLYGON. A polygon is a plane figure bounded by straight lines. If it has three sides it is a triangle; four sides, a quadrilateral; five sides, a pentagon; six sides, a hexagon; seven sides, a heptagon; eight sides, an octagon, etc. A polygon having four sides, and called a quadrilateral, is also called a rectangle if all the angles of the figure are right angles. It is called a parallelogram if the opposite sides are parallel. The figures A and B below represent a rectangle and parallelogram respectively.

FORMULA. To find the area of a rectangle it is only necessary to multiply the base by the altitude. The same rule applies to the parallelogram. In the figure above, showing the parallelogram, AB is the base and DE is the altitude. It contains the same area exactly as a rectangle having a base equal to AB and an altitude equal to DE.

Any parallelogram may be divided into two equal triangles, and it follows, then, that the area of one of these triangles is one-half the area of the entire parallelogram. It is evident, then, that the area of any triangle is the product of the base by one-half the altitude.

Circles. Cut a circle from stiff paper with a diameter of 4 inches. Mark it off into triangles as shown in the half circle below. The bases of the triangles form what part of the circle?



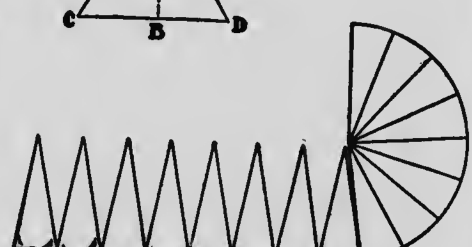


ILLUSTRATION OF CIRCLE

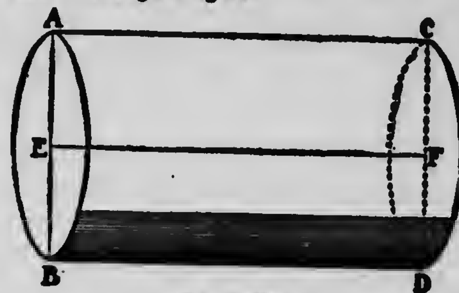
The altitude of each triangle corresponds to what part of the circle? If we are able to find the area of a triangle, can we then find the area of the circle?

The altitude of a triangle is the perpendicular distance from the base to the farthest opposite point. In the triangle above, the line AB is its altitude. Since we know how to find the area of one triangle, we can find the areas of as many triangles as we have made from our circle. Therefore, to find the area of a circle:

Find the area of one of the triangles and multiply by the number of triangles, or in briefer form, multiply the circumference of a circle by half its radius.

The Cylinder. A cylinder is a round body with equal and parallel circles for its bases and having a uniform diameter. In the accompanying figure the line EF represents the altitude, AB the diameter. The convex surface is the curved exterior.

To find the convex surface of a cylinder multiply the circumference of the base by its altitude. You can easily understand the reason for this rule if you can imagine that the entire outer surface can be changed in shape so that it lies flat as a rectangle. The area of a convex surface of a cylinder is the same as the area of such a rectangular figure.



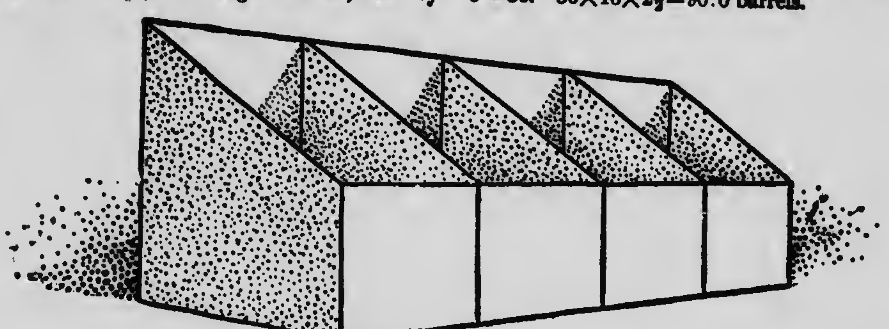
THE CYLINDER

To find the volume of a cylinder multiply the area of the base by the altitude. The area of the base is the area of one of the circles forming the base, and above we explained how to find the area of a circle.

Common Measurements

On this and the following pages will be found the principal short rules in use in connection with common measurements.

Measures of Capacity. To find the number of bushels of grain in a bin or box, multiply the length in feet by the height in feet, then by

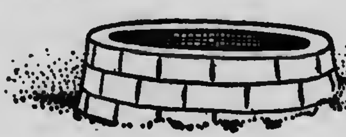


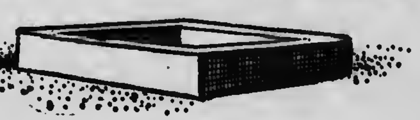
the width in feet and then by 8, striking off the right hand figure. The result obtained will be the number of bushels. For instance: In a bin 10 feet long, 6 feet high and 8 feet wide, $10\times8\times6\times8=384.0$.

To find the approximate contents of a round bin or tank, square the diameter in feet and multiply by the depth in feet, then by $2\frac{1}{2}$, striking off the right hand figure. For instance: A tank 6 feet in diameter and 10 feet deep will contain $6^2=36$. $36\times10\times2\frac{1}{2}=90.0$ barrels.

In estimating the contents of a cistern, one barrel is equal to $31\frac{1}{2}$ gallons and one hogshead to 2 barrels.

To find the number of barrels a cistern will hold, multiply the square of the diameter of the





cistern in feet by the height in feet and divide this result by 4. For instance, if a cistern is 6 feet in diameter and 8 feet deep it will hold 6²=36. 36×8=288÷4=72 barrels.

To find the number of barrels in a square cistern, multiply the width, height and depth together and divide the product by 4. For instance:

A cistern is 6 feet wide, 8 feet long and 4 feet deep; multiply together equals 192. 192÷4=48 barrels of 31½ gallons each.

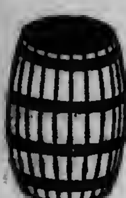
A tank 5 feet square will hold 6 barrels for every foot of depth.

A tank 6 feet square will hold 8½ barrels for every foot of depth.

A tank 7 feet square will hold 11⅔ barrels for every foot of depth.

A tank 8 feet square will hold 15¼ barrels for every foot of depth.

A tank 9 feet square will hold 19¼ barrels for every foot of depth.



A tank 10 feet square will hold 23¾ barrels for every foot of depth.

To find the medium diameter of a cask or barrel, add to the head diameter ⅔ of the difference between the head and bung.

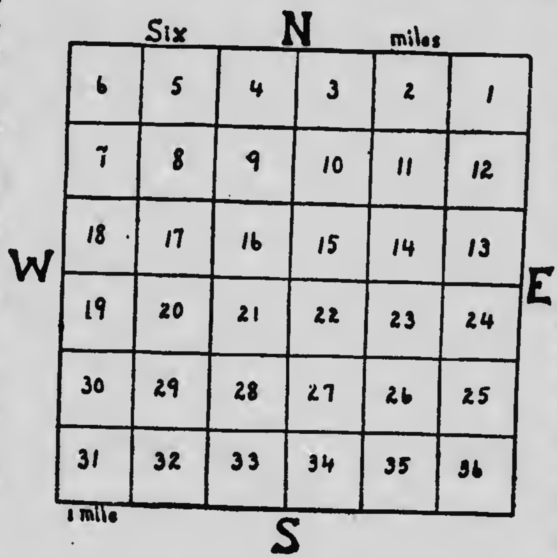
Land Measuremen A regular township, according to the Dominion surveys, is 6 miles square and is divided into 36 equal parts or sections, each section containing 640 acres and measuring one mile square.

To fix permanently these values in the pupil's mind, a few exercises can be given in connection with the study of this diagram, such as:

How many acres of land in 4½ sections?

How many more acres in 7½ sections than there are in 3 sections?

How many acres of land in ¼ section?



How many acres of land in 2½ sections?

How many acres of land in 5 sections?

How many more acres in 3½ sections than in 2 sections?

To familiarise the pupils with the different divisions of a township, have them make diagrams showing farms located in different parts of the section shown on next page, such as—

The N. ½ of the S. E. ¼.

The W. ½ of the S. E. ¼.

The S. W. ¼ of the N. E. ¼.

The S. ½ of the N. W. ¼.

Then after locating such farms interesting problems can be made computing the value, as:

What will be the cost at $35.50 per acre of a farm comprising the N. ½ of the S. E. ¼?

Lumber Measurements. Farmers, carpenters, and masons make use of short methods of arriving at results. In making estimates they use the following data:

A board foot, used in measuring lumber, is 1 foot long, 1 foot wide and 1 inch thick.

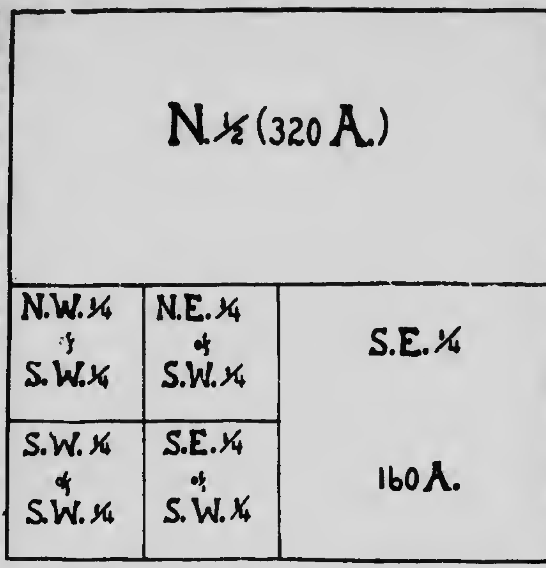
In computing dimensions of lumber, do not use fractions. A board measures between 5 and 6 inches in width; if nearer 5 call it 5 inches, and if nearer 6, call it 6.

To find the number of feet in a number of 12-foot boards, find the total width of the boards in inches and the sum will equal the number of feet in the pile.

To find the number of feet in a number of 14-foot boards, add to the total widths of the boards ⅙ of the sum obtained.

To find the number of feet in 16-foot boards, add to the sum of the widths of the boards ⅓ of the result. For example: To find the number of feet in 6 boards 8 inches wide and 14 feet long, 6×8=48. ⅙ of 48=8. 8+48=56 feet, the number of feet contained in the boards.

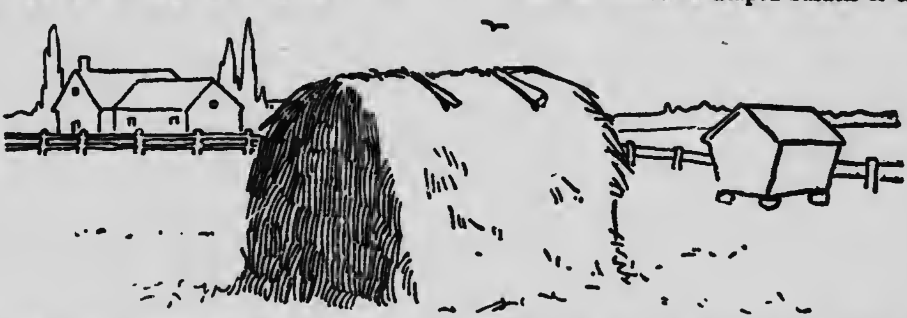
To find the number of feet of lumber contained in a fence, multiply the sum of the widths of the boards in a portion of the fence by $16\frac{1}{2}$ and if more than 1 inch thick by the thickness, and divide by 12. The result obtained will be the number of feet contained in a rod of fence and this multiplied by the number of rods of fence will give the number of feet of lumber used. To illustrate:



To find how much lumber will be required to fence a square mile of land with three 6-inch boards and one 10-inch board in each panel of fence: $3\times6+10=28$ inches, total width of boards in each panel. $28\times16\frac{1}{2}\div12=38\frac{1}{2}$ feet in each rod of fence. The number of rods of fence around a square mile of land equals 1,280 rods multiplied by $38\frac{1}{2}=49{,}280$ feet, number of feet of lumber in the fence.

To find the number of laths required in a room, find the number of square yards in the room and multiply by 18.

Measures for Crops. A ton of dry hay is estimated at 500 cubic feet to the ton.



To find the number of tons in a mow, multiply the length in feet by the height in feet and then by the width in feet and divide the result by 500. To illustrate: In a mow 30 feet long, 10 feet high and 20 feet wide there will be $30\times10\times20\div500=12$ tons.

To find the number of tons in a stack, multiply the width in feet by the length in feet by ½ the height and divide by 500. For example: A stack 20 feet long, 10 feet high and 15 feet wide will contain $15\times20\times5\div500=3$ tons in the stack.

To find the contents of a round stack, multiply the distance around the stack in yards by itself and then multiply by 4 times the height in yards, striking off two places from the right of the result thus obtained. This gives the number of cubic yards in the stack and by dividing by 20 will give the number of tons. To illustrate: A stack 20 yards around and 8 yards high will contain $20\times20\times32=12800$. $12800\div20=6\,2/5$ tons.

To find the contents of a crib in bushels of shelled corn, multiply the number of cubic feet in the crib by 8 and strike off the right hand figure. To illustrate: A crib 18 feet long, 10 feet high and 8 feet wide will contain $18\times10\times8\times8$ or 5760 bushels.

To find the number of heaped bushels of ear corn contained in a crib, multiply the number of cubic feet in the crib by 4 and strike off the right hand figure, as, a crib 15 [illegible] long, 10 feet high and 8 feet wide will co[illegible] $15\times10\times8\times4$ or 7200 bushels.

When the sides of the crib are flared, multiply the height in feet by half the sum of the top and bottom widths and then multiply by the length in feet, multiplying the result by 4 and striking off the right hand figure. For example: A crib 12 feet wide at the top, 8 feet wide at the bottom, 14 feet long and 10 feet high will contain 12+8÷2=10 feet, average width. 10×10×14×4=5600 bushels.

General Rules in Mensuration

To find the slant height of a cone when the diameter of the base and the altitude are given, extract the square root of the sum of the squares of the altitude and one-half the diameter.

To find the area of the convex surface of a regular pyramid or cone, multiply ½ the sum of the perimeter of the two bases by the altitude.

To find the area of the surface of a sphere, multiply the circumference by the diameter.

To find the volume of a sphere, multiply the convex surface by ⅓ of the radius.

To find the area of a parallelogram, multiply the base by the altitude.

To find the area of a triangle, multiply the base by ½ the altitude.

To find the area of a trapezoid, multiply ½ the sum of the parallel sides by the altitude.

To find the area of a polygon, divide into triangles and find the sum of their areas.

To find the area of a circle, multiply the radius by ½ the circumference.

To find the circumference of a circle, multiply the diameter by 3.1416.

To find the hypothenuse of a right-angled triangle, when two dimensions are given, extract the square root of the sum of the squares of the three dimensions.

To find the base or perpendicular of right-angled triangle, from the square of the hypothenuse subtract the square of the given side and extract the square root of the remainder.

To find the volume of a pyramid or cone, multiply the area of the base by the altitude and divide by 3.

To find the convex surface of a cylinder, multiply the circumference of one base by the altitude.

To find the volume of a cylinder, multiply the area of one base by the altitude.

To find the volume of the frustum of a regular pyramid or cone, multiply the sum of the areas of the two bases plus the square root of their product by ⅓ the altitude.

To find the contents of an irregular body, immerse the body in a vessel full of water, and measure the quantity of water displaced.

To find the area of a rectangle, multiply the length by the breadth.

To find the diameter of a circle, divide the circumference by 3.1416; or multiply it by .318309.

To find the side of a square equal to a given circle, multiply the diameter by .886227 or ½ of $\sqrt{3.1416}$.

To find the diameter of a circle equal to a give square, multiply the side of the square by 1.12838.

To find the side of an inscribed square, multiply the diameter by .707106, or the circumference by .225079.

To find the circumference from an inscribed square, divide the side of the square by .225079.

To find the side of the largest inscribed equilateral triangle, multiply the diameter by .866025.

To find the diameter of the three largest equal circles that can be inscribed in a given circle, divide the diameter of the given circle by 2.155.

To find the contents of a cube, multiply three sides together.

To find the surface of a cube, multiply the square of the length of one of its sides by 6.

Business Forms

Time Note with Interest

$450. Toronto, Ont., Feb. 4, 1912.

For value received, sixty days after date I promise to pay to John G. Rogers, or order, four hundred fifty and 00/100 dollars, with interest at 6% per annum.

George L. Holmes.

Demand Note

$500. Montreal, Sept. 7, 1912.

On demand, for value received, I promise to pay to Edward L. Reynolds, or order, five hundred and 00/100 dollars, with interest at 7%.

William Roberts.

Joint Note

$650. Winnipeg, Man., June 15, 1912.

Ninety days after date, for value received, we promise to pay to the order of Robert L. Taylor, six hundred fifty and 00/100 dollars, with interest at 6%, at the Dominion Bank, Toronto.

Thomas L. Hanley.
Mary B. Hanley.

SIGHT DRAFT

$560.50. Halifax, N. S., Aug. 4, 1912.

At sight, pay to the order of Albert L. Bond, five hundred sixty and 50/100 dollars, value received, and charge to the account of

THE BANK OF NOVA SCOTIA.

To the Bank of Montreal, Toronto, Ont.

TIME DRAFT

$150. Quebec, Dec. 1, 1911.

Thirty days after date pay to the order of M. A. Mitchell, one hundred fifty and 00/100 dollars, at the Imperial Bank, Vancouver, and charge to the account of

NORMAN A. PALMER.

To Reed, Jones & Co., Vancouver.

ORDER

$40. Victoria, B. C., May 9, 1912.

Please pay to Richard A. Fenton, forty dollars and charge to the account of

HENRY W. ALLEN.

To Franklin Bros. Co., Victoria, B. C.

DUE BILL

$190. St. John, N. B., March 2, 1912.

Due James L. Arnold, for value received, one hundred ninety dollars. D. A. CURTIS.

RECEIPT

$125. Ottawa, Ont., June 10, 1912.

Received of Herbert R. Morris, one hundred twenty-five dollars, in settlement of account.

JAMES R. STONE.

IN FULL OF DEMAND

Calgary, Alberta, May 5, 1912.

Received of James M. Brown, four hundred fifty dollars, in full of all demands to date.

FRANK L. MARTIN.

ORDER FOR GOODS

Regina, Sask., Nov. 1, 1911.

Ward, Smith & Co., Regina, Sask.

Deliver to R. S. Marsh merchandise to the value of seventy-five dollars and charge to my account. WILTON S. LONG.

Percentage

Easy Basis of Comparison. In an examination Charles answers correctly five questions out of ten, while Mary answers thirty-five out of fifty. Mary has done better than Charles, but how are we to know exactly how much better? We see that Charles has answered 5/10 of his questions, and Mary 35/50, but we require a single term to show their relative degree of merit.

John lost 30 cents out of a dollar he owned and William spent 40 cents out of a dollar he had earned. How shall we find a number which will show what part of a dollar John had more than William?

The two problems above given are like thousands of others, with slight variations, and it is clear that some system of calculation must be found by which they may easily be solved.

In the first problem, let us reduce our fractions to those having the common denominator 100. Then Charles has answered 50/100 of his questions and Mary 70/100 of hers. Mary is a better student by 20/100 than Charles. We have learned to express 20/100 decimally as .20, which is a simpler form than the fraction.

In the second problem, we begin its solution by remembering that a dollar contains 100 cents. John lost 30/100 of his money; William spent 40/100 of his; therefore, John has yet 70/100 of his original amount, and William 60/100 of his. John has 10/100 more money than William, which proportion we express decimally as .10.

These problems are solved on the basis of 100 for the complete amount in each case. We consider in the first instance the questions asked Charles and Mary on the basis of 100, and in the second place we know that the dollar is easily reckoned on its basis of 100 parts, or 100 pennies, comprising the whole. So we may build a section of our arithmetic which shall have for its foundation computations based on 100 parts to make the whole, or the entire thing, and we call this system *Percentage* from two Latin words, *per* and *centum*, which together mean *by the hundred*. Instead of saying that a certain number is so many hundredths of one hundred, we say that it is so many *per cent*. In writing, we shorten the words *per cent* to the sign %.

The percentage system would not be of much use to us if by its means we could compare numbers only directly with one hundred. It would be easy enough to tell how many one-hundredths of one dollar a quarter is, but it would not help us in telling how many one-hundredths an inch is of a foot, or a quart is of a peck. However, if we remember the simple rule that any common fraction may be expressed as a per cent merely by reducing it to hundredths, we will find that the application of percentage is extended over a great part of arithmetic Thus:

1/2 =50/100=50%
1/5 =20/100=20%
1/4 =25/100=25%
3/5 =60/100=60%
3/50= 6/100= 6%

There are a number of fractional parts of one hundred which are expressed as per cents so often that the per cents should be committed to memory.

1/2 =50 %	2/3=66⅔%
1/3 =33⅓%	3/4=75 %
1/4 =25 %	2/5=40 %
1/5 =20 %	3/5=60 %
1/6 =16⅔%	3/8=37½%
1/8 =12½%	5/8=62½%
1/10=10 %	7/8=87½%
1/12= 8⅓%	

If we examine the very simplest statement in percentage, 25% of \$24=\$6, we see that there are three numbers used—the number of which the per cent is taken, the number which tells how many hundredths are taken, and the number which results from taking the indicated number of hundredths of the given amount. The first of these is called the *base;* the second the *rate,* and the third the *percentage.* Thus in the statement above, 25% of \$24=\$6, \$24 is the base, 25% the rate and \$6 the percentage.

The sum of the base and the percentage is called the *amount;* the difference between them the *difference.*

The Three Cases. No problem in percentage can be worked unless two of the three numbers named above are given. These two may be either the base and the rate, the problem being to find the percentage; the rate and the percentage, the problem being to find the base; or the base and the percentage, the problem being to find the rate. The first one is the simplest, and the one most often met with.

Exercises under Case I. Given the base and the rate to find the percentage. Let it be remembered that the base represents the whole of anything. In the problem, What is 8% of 500?, 500 is the base, as it represents the whole, and we are required to find 8/100 of this whole. By the analytical method we may more clearly understand the process of the solution:

100%, or the whole, =500
1%= 5
8%= 40

The arithmetics tell us that if we have given the base and rate and are required to find the percentage, we multiply the base by the rate, decimally expressed. Let us see why this is correct. In the above problem we have to find 8% of 500. This means that we are to find 8/100 of 500. Expressed in fractional form, our problem resolves itself to this:

8/100×500

8/100 may be expressed decimally as .08. Then we see clearly that the arithmetical process of solution is as follows:

$$\begin{array}{r} 500 \\ .08 \\ \hline 40.00 \end{array}$$

It will be evident from the above example that the rule which applies in percentage problems of Case I is, *Multiply the base by the rate.*

Solve the following examples, the first ten orally, the others with paper and pencil.

What is—

1. 5% of 200?
2. 50% of 12 oranges?
3. 25% of 400 yards?
4. 37½% of 64 bushels?
5. 7% of 80 cows?
6. 33⅓% of \$750?
7. 62½% of 240 acres?
8. 8⅓% of 96 apples?
9. 20% of 1200 sheep?
10. 6% of 90 feet?
11. John has 64 marbles; James has 37½% as many. How many has James?
12. Mary earned \$2.40; she spent 10% for ribbons, 6% for candy, and 4% for pencils. How much did she spend?
13. A flagstaff is 72 feet high. How high is a flagstaff that is 75% as high? One 25% as high?
14. A man owned 1,000 acres of land and sold 62½% of it. How much did he have left?
15. Mr. A paid \$450 for dry goods. He sold them at a gain of 27%. How much did he gain?
16. A lawyer collected \$1,200, and received for his services 3%. How much money did he receive?
17. A paid \$4,500 for a store, which he sold to B at a gain of 10%. B then sold it to C at an advance of 8⅓%. What did C have to pay for the store?
18. A man paid \$150 for a horse and two years later sold it at a loss of 6%. How much did he get for the horse?
19. Frank had \$50. He spent 40% of it for a suit of clothes and 5% of what remained for a straw hat. How much did he then have?

20. A merchant employs an agent to purchase goods for him, paying him for his services 3% of the cost of the goods purchased. How much money must he send the agent if the latter is to purchase $1,500 worth of goods?

Exercises under Case II. This is the case in which the rate and percentage are given and the base is to be found. In the problem discussed first under Case I we were asked to find 8% of 500. We found it by two different forms of solution to be 40. 40 is a certain part of 500, for it is the same as 8% of 500. Then is it not clear that the percentage, 40, and the rate, 8, exactly equal each other? Let us apply that truth to problems under Case II, in which the rate and the percentage are given and in which we are to find the base. Remember that the base is still 100%, or the whole:

25 is 20% of what number?

We are to find 100% and we know that 20% of it is 25. Let us solve this problem by the analytical method:

20% of some number	=25.
1% of that number	$=1\frac{1}{4}$.
100%, or the whole number,	=125.

All problems of this class, no matter how complicated they may at first appear, may be solved by this analytical form. The usual method used in the arithmetics follows this rule: *Divide the percentage by the rate, expressed decimally.*

Solve the following problems, as many of them by the analytical and fractional methods as possible, the others by the usual arithmetical rule. By the fractional method the first problem below is easily solved. 20% is 1/5 of the whole. Then if 18 is 1/5 of the whole, 5/5 of the whole would be 5×18, or 90.

Find the number of which—

1. 18 is 20%.
2. 230 is 75%.
3. 24 is $8\frac{1}{3}$%.
4. 81 is 9%.
5. 770 is 11%.
6. 18 is 90%.
7. 345 is $12\frac{1}{2}$%.
8. 276 is 40%.
9. 375 is $62\frac{1}{2}$%.
10. 421 is $16\frac{2}{3}$%.

11. An agent was to receive a commission of 4% for purchasing goods for a merchant; his commission amounted to $36. How many dollars' worth of goods did he buy?

12. In selling a store at an advance of 10%, Mr. B made $400. How much did the store cost him?

13. John had a certain sum of money in the morning. He found at night that he had lost $.51, or 17% of it. How much did he have in the morning?

14. Mr. Brown lost $30 by selling a quantity of apples at 6% below cost price. How much had the apples cost him?

15. In selling a house for $5,625, Mr. Gray made $12\frac{1}{2}$ per cent. Find the original cost of the house.

This problem differs from any that we have had before. $5,625, the sum for which the house was sold, is the base plus the percentage—that is, the amount. To find the base, divide this amount by 1 + the rate − $1.12\frac{1}{2}$.

16. By selling a quantity of flour for $487.50, a merchant gained $8\frac{1}{3}$%. How much did the flour cost him?

17. Frank had a certain number of marbles. After losing 25% he had 45 left. How many did he have at first?

This is just the opposite of problem 15. Here we have given the difference between the base and the percentage. To find the base, therefore, we divide this difference by 1 − the rate, which is .75.

18. Mr. Black sold two horses, at $202.50 and $206.25 respectively. On the former he gained $12\frac{1}{2}$%; on the latter he lost $8\frac{1}{3}$%. Did he gain or lose on the transaction, and how much?

19. Mary received some money for her birthday. She spent 10% for candy, and then 20% of the remainder for ribbons, and had $1.80 left. How much did she receive?

The significant part of this problem is the word *remainder*. Mary did not spend 10% and then 20% of the original sum, so we cannot add 10% and 20%, and say that she spent 30% of her money. We must work it as if it were two separate problems—first find the number of which $1.80 is 80%, and then find the number of which that amount is 90%.

20. A sold a horse to B at an advance of 20% on the original cost; B then sold it to C at a gain of $12\frac{1}{2}$% over what he had paid for it. B received $202.50 for the horse. What was the original cost?

Exercises under Case III. This is the case in which the base and the percentage are given and the rate per cent is to be found. Keep in mind the fact that the base is always 100%, and that the percentage is such a part of the base as is indicated by the rate per cent. Let us analyze the following problem:

10 is what per cent of 30?

30 is the entire amount or the entire number, and is 100%. 10 is a certain part of 30 and we are required to find that part. 30 equals 100%. If 30 equals 100%, 1 equals 1/30 of 100%, or $3\frac{1}{3}$%. If 1 equals $3\frac{1}{3}$%, 10 would equal $10 \times 3\frac{1}{3}$ %, or $33\frac{1}{3}$%.

There is another simple way of solving this problem. 10 is $\frac{1}{3}$ of 30, and if the whole number is 100%, then $\frac{1}{3}$ of 100%, or $33\frac{1}{3}$%, will represent the relation between 10 and 30.

From this we may make the general rule: *To find the rate divide the percentage by the base.*

Solve the following problems:

What per cent of

1. 60 is 20?
2. 90 is 30?
3. 96 is 8?
4. 216 is 36?
5. 72 is 6?

6. A lawyer collected $466 for a firm, and received for his services $23.30. At what rate was he paid for making the collection?

7. Mr. Brown bought a house for $6,000 and sold it for $7,000. What was his gain per cent?

8. C paid $150 for apples and sold them for $165. What per cent did be gain?

9. B bought two horses, for $150 and $200 respectively. He sold them for $175 each. What per cent did he gain or lose on the two?

10. A storekeeper buys pencils at 8 cents a dozen and sells them at 2 cents apiece. What per cent does he gain?

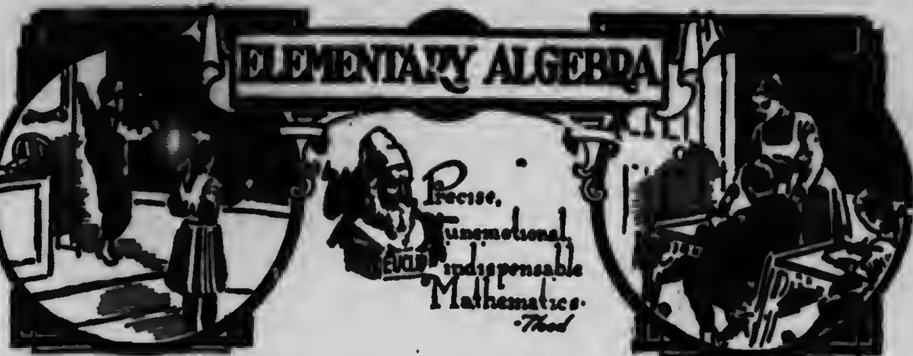
11. An agent received $80 for buying $2,000 worth of goods for a merchant. What was the rate per cent at which he was paid?

12. If by selling a picture for $231 I gain 10%, what per cent would I gain by selling it for $241.50?

The applications of the principles of percentage in practical arithmetic are numerous. Commission, Trade Discount, Taxes, Insurance, Stocks and Bonds—all of these subjects have as their basis the simple principles of percentage which have been discussed. The following table connects all of these subjects, and others, with percentage, and that, in its turn, with the simple subject of multiplication. A study of this table will show that many of the terms with which we meet in more advanced arithmetic are but new names for ideas which have been familiar to us from the very beginning of our study of arithmetic. When we begin to understand the relation one fact bears to another, then we begin to get a proper perspective.

APPLICATIONS OF TERMS OF MULTIPLICATION TO PERCENTAGE

Multiplication	Multiplicand	Multiplier	Product		
Percentage	Base	Rate	Percentage	Amount	Difference
Loss and Gain	Cost	Rate	Gain or Loss	Selling Price when a gain	Selling Price when a loss
Commission and Brokerage	Work done by the Agent	Rate	Commission	Total Cost	Net Returns
Trade Discount	Asking Price	Rate	Discount		Selling Price
Insurance	Amount Insured	Rate	Premium		
Taxes	Assessed Valuation	Rate	Tax		
Customs and Duties	Invoice Price	Rate	Duty		
Stocks and Bonds	Par Value	Rate	Gain or Loss	Market Value when a gain	Market Value when a loss
	Investment	Rate	Income		



Relation to Arithmetic. Quite a little of the time given to non-essentials in arithmetic could be spent to better advantage in most schools in laying the foundations of the study of algebra. Some algebraic knowledge may be the best possible aid to a good understanding of much of arithmetic. For these reasons, in many schools the two branches are carried together in upper classes.

Learn Why a Thing Is True. It is our design here merely to lay the foundation for the study of algebra, to explain the reasonableness of fundamental principles. If this is accomplished to the satisfaction of the student his later successes will come with comparative ease. Too many of us older people accepted algebraic formulas as true without knowing why they were true, or by what processes they were reached. We believe all teachers of today know that underlying reasons should be explained; their later work will be made easier if they give classes a clear analysis of first principles. If the helper of the boy or girl, either teacher or parent, knows a general fact but knows not why it is true, it will be a means of satisfaction as well as a duty well performed toward those who need instruction to investigate thoroughly. Much of this fundamental help follows in these pages; it opens the way to practically all of the science, as far as it is given consideration in our public school system.

Signs and Symbols. The signs used in arithmetic are applied to algebra without change of form or meaning:

$+$ (plus) indicates addition

$-$ (minus) indicates subtraction

$\times$ (times) indicates multiplication

$\div$ (divided by) indicates division

$=$ is the sign of equality; whatever appears at the left of this sign equals in number, value or amount that which is written at its right. Thus, $7x+5=3x+13$. Seven times the value of x, whatever that may be, added to 5 equals 3 times the same value of x added to 13.

The signs of parentheses, brackets and braces are called *signs of aggregation*, because everything within them is to be treated as a single expression, to be simplified and reduced to lowest terms before being applied to other parts of the problem. For illustration,

$[10+\{3+6-(4+2)+6\}-4]+8=?$

Here we treat $(4+2)$ in parentheses as a single number, then everything within the braces as a single number, after the part in parentheses has been simplified; finally, after simplifying all that remains within the braces, reduce to simplest form all within the brackets, after which add 8. The same rule applies if the terms enclosed by the signs of aggregation are algebraic. See if you can solve this problem:

$[4a+6a+\{5a-a+(3a+4a)\}-a]=?$

Coefficient. The next term you must learn, and one not found in arithmetic, is the word coefficient. It means any number or symbol placed before another symbol, and it stands as a multiplier; the coefficient shows how many times the number or symbol is to be taken. In the term $4y$, 4 is the coefficient of y, and indicates that the value of y is to be taken 4 times; ∵ the value of y happens to be 5, then $4y$ equals 20. In $(a+b)x$, $a+b$ is the coefficient of x, and x is to be taken $a+b$ times; this you will understand better a little later, even without further explanation.

The Signs of Parentheses. If a compound expression is to be treated as a single expression it is to be enclosed in parentheses, as we learned above. The authorities of our algebras tell us that—

If an expression within a parenthesis is preceded by the sign +, the parenthesis can be removed without making any change in the signs of the expression, and without altering values.

Let us learn that the above is true without having to accept the word of another. If we prove the truth for ourselves we positively know, and it is good to know things at first-hand:

If a man has 20 dollars and afterwards collects 6 dollars and then 4 dollars, it makes no difference whether he adds the 6 dollars to his 20 dollars, and afterwards the 4 dollars, or whether he puts the 6 dollars and the 4 dollars together and adds their sum to his 20 dollars.

The first process is represented by $20+6+4$.

The second process is represented by $20+(6+4)$.

Hence, $20+(6+4)=20+6+4$.

If this man has 20 dollars and afterwards collects 6 dollars and pays a bill of 4 dollars, it makes no difference whether he adds the 6 dollars to his 20 dollars and pays out of this his bill of 4 dollars, or whether he pays the 4 dollars from the 6 dollars collected and adds the remainder to his 20 dollars.

The first process is represented by $20+6-4$.

The second process is represented by $20+(6-4)$.

Hence, $20+(6-4)=20+6-4$.

If the above explanation is clear you will easily understand the following:

$3+(8-2)=3+8-2$.

$4+(6-3)+(7-2)=4+6-3+7-2$.

The above explanation is in connection with the sign + when it precedes a parenthesis. The authorities in algebra further tell us that—

If an expression within a parenthesis is preceded by the sign —, the parenthesis can be removed, provided the sign before each term within the parenthesis is changed, the sign + to —, and the sign — to +.

This is not quite so easily understood as the principle just explained, so let us carefully examine the matter, using the same illustration we found so serviceable in the first instance:

If a man has 20 dollars and has to pay two bills, one of 6 dollars and one of 4 dollars, it makes no difference whether he takes 6 dollars and 4 dollars in succession, or whether he takes the 6 dollars and the 4 dollars at one time from his 20 dollars.

The first process is represented by $20-6-4$.

The second process is represented by $20-(6+4)$.

Hence, $20-(6+4)=20-6-4$.

If this same man has 20 dollars consisting of 5 dollar bills, and has a debt of 6 dollars to pay, he can do this by giving two bills and receiving in return 4 dollars.

This process is represented by $20-10+4$.

If the debt paid is 6 dollars, that is $(10-4)$ dollars, the number of dollars he has left can be expressed by $20-(10-4)$.

Hence, $20-(10-4)=20-10+4$.

If the explanation is understood you will readily find answers to the following. We have stated results in three instances:

$10-(9-5)=10-9+5=6$

$7-(3-2)=$?

$9-(4+3)=9-4-3=2$

$(8-2)-(5-3)=8-2-5+3=4$

$15-(10-3-2)=$?

$(3a-2a)-(a-a)=$?

Numerical Values. By way of a review, refer again to the definition of coefficient. It is a multiplier; in the expression $7y$, we understand that y, whatever its value, is to be taken 7 times. Then, if $y=4$, the expression $3y+4y=12+16$, or 28; or, $3y+4y=7y$, or 28. Applying this knowledge, solve the following problems. You will find results stated in a few instances, for your encouragement.

If $a=5$, $b=4$, $c=3$, find the value of:

1. $9a-2bc$. (Ans. 21; here bc are to be
2. $5ac+2a$. multiplied together, and 2 is
3. $3(a-b+c)$. their coefficient.)
4. $c+2(a-b)=5$.
5. $2b-3(a-c)$.
6. $2c-b(a-b)$.

Let us solve and explain the last problem, step by step; you will then know whether your methods have been correct:

(1) $2c-b(a-b)$.

(2) Removing parentheses, $2c-ab+b^2$; b times b is not $2b$, but is the result of b multiplied by itself, as in arithmetic;

(3) Assigning values to the letters, $6-20+16$.

Adding terms having plus signs, deducting from the sum the term having a minus sign,

(4) $22-20=2$.

Addition. The processes of addition in arithmetic and algebra vary but little. If in arithmetic we add 4 and 5, there is a term known to us which expresses the result of this addition; it is 9. If in algebra we wish to add a and b, there is no single term which will express the sum; the addition of two algebraic expressions can be represented only by connecting the second with the first by the sign +. If there are no like terms in the entire expression whose sum we are required to find, the operation of addition is algebraically complete when the two expressions are thus connected; hence, the sum of x and y is $x+y$.

Add $3x+4y+6x+y$. Here we find like terms twice; hence we combine these like terms before completing our addition, for we must have the expression in its simplest form. So we combine the similar terms:

$$3x+6x=9x$$
$$4y+\ y=5y$$

Therefore we have the complete problem, $3x+4y+6x+y=9x+5y$.

We may give the problem this form:

$$\begin{array}{l} 3x+4y \\ 6x+\ y \\ \hline 9x+5y \end{array}$$

Add the following, remembering that if no sign appears before a term, the plus sign is always understood; and recalling, further, that we express the *sum of coefficients* only:

1. Add: $2c^3-c^2d+6cd^2+d^3$; $c^3+6c^2d-5cd^2-2d^3$; $3c^3-c^2d-7cd^2-3d^3$.

2. Add: $4a^2+3+5$; $-2a^2+3a-8$; a^2-a+1a.

3. Add: $-3a+2b+c$; $a-3b+2c$; $2a+3b-c$.

4. Add: $2a+3b+6y$; $2b-2a+y$; $a-4b-6y$; $a+b+y$.

5. Add: $2a^2+4b-2c$; $3c-2b$; $3c+b-a^2$; a^2+c.

Is it clear why you must arrange this problem in the following order?

$$\begin{array}{r} 2a^2+4b-2c \\ -2b+3c \\ -a^2+\ b+3c \\ a^2\qquad +c \\ \hline \end{array}$$

Subtraction. The reason assigned for the rule for subtraction in algebra is sometimes difficult for the boy and girl to understand. Let us state it as usually given, and explain it step by step, with the practical help of problems. The rule tells us to—

Set the like terms one under the other in the minuend and subtrahend, then change all the signs of the subtrahend and proceed as in addition.

We have learned how to add, and know that the algebraic sum of $8a$ and $-3a$ equals $5a$:

$8a$	first number
$-3a$	second number
$5a$	sum

In addition in arithmetic, we know that if either number be subtracted from the sum, the difference must be the other number. Here, then, if we subtract $-3a$ from $5a$, what is left must equal the first number, and it is $8a$, no matter how strange the number may look to you. In performing this subtraction, we know that the result reached must be $8a$. So far, simply keep in mind that we have only applied to algebra an arithmetical truth, that either term in addition, if subtracted from the sum, gives the other term as a remainder; no matter how unreal the result of such a subtraction may look to us we are forced to believe it is correct.

See if here is further proof: If we add $-8a$ and $3a$ the sum is $-5a$:

$-8a$	first number
$3a$	second number
$-5a$	sum

Subtract $3a$ from $-5a$ and the remainder, if our rule of arithmetic is true, must be $-8a$, for that is the other number.

Again, the sum of $-8a$ and $-3a$ is $-11a$:

$-8a$	first number
$-3a$	second number
$-11a$	sum

Subtract $-3a$ from $-11a$ and the remainder must be the first term, $-8a$.

Now let us show these last three problems in subtraction side by side. We have understood the explanations given, for we know they are based on arithmetical truths we have long known:

Minuend	$5a$	$-5a$	$-11a$
Subtrahend	$-3a$	$3a$	$-3a$
Remainder	$8a$	$-8a$	$-8a$

Note once more that in these problems in subtraction the algebraic sum of each surtabhend and remainder equals its minuend. These, then, are correct solutions of the above problems; and from our experience with them we desire to learn the shortest method for subtraction and the briefest possible rule to apply.

Look at the three problems above. In each the same remainder would have been found had we imagined the signs in the subtrahends to have been changed and the minuends and subtrahends then added. Apply this rule to each of the three examples:

Arrange the problem so that like terms in the minuend and subtrahend will be one above the other; change all the signs in the subtrahend from + to − and from − to + and proceed as in addition. The result will be the remainder sought.

If we have made clear the reason for the above rule a difficult task has been performed.

Multiplication. If we desire to set down graphically the product of $abcx$ and bc^2xy we find the factor b is taken twice, the factor c three times, the factor x twice, and each remaining factor once. Therefore, the result of our multiplication, written in expanded form, is $abbcccxxy$, or, simplified, $ab^2c^3x^2y$.

As in arithmetic, the little figures at the right and slightly above the letter are called exponents, and each indicates the number of times the letter or term is to be taken; a^2 means the *square of* a, or a multiplied by itself, or a raised to the second power. If a stands alone the first power of a, or a^1, is understood. The problem in the paragraph above makes it clear that in multiplication we add the exponents of like terms. Thus, $a^2\times a=a^2\times a^1=a^3$.

Applying the suggestions, note the various steps in the solution of the following problem in multiplication:

$$\begin{array}{l} 5a^2b+2c \\ \underline{2bc} \\ 10a^2b^2c+4bc^2 \end{array}$$

The signs in this problem are all $+$, but it is certain that many will contain the $-$ sign. Let us see what it means. We are required to find the product of $-5x^2y$ and $3x$. Since $-5x^2y$ indicates that $5x^2y$ is to be subtracted, then multiplying $-5x^2y$ is equivalent to subtracting $5x^2y$ $3x$ times, or to subtracting the product of $5x^2y$ and $3x$ once. The product, therefore, is $-15x^3y$.

Observe the analysis of the following problem: Multiply $-5x^2y$ by $-3x$. To multiply these terms together is equivalent to subtracting $-5x^2y$ $3x$ times. We remember, however, that in subtraction the sign of the subtrahend is always changed, so in subtracting $-5x^2y$ $3x$ times, we have the equivalent of adding $5x^2y$ $3x$ times, or of adding the product of $5x^2y$ and $3x$ once. Therefore, the product in this instance is written $15x^3y$.

Side by side, then, we have these operations in multiplication:

$$\begin{array}{llll} 5x^2y & -5x^2y & 5x^2y & -5x^2y \\ \underline{3x} & \underline{3x} & \underline{-3x} & \underline{-3x} \\ 15x^3y & -15x^3y & -15x^3y & 15x^3y \end{array}$$

From the above it is evident that when the signs in the multiplicand and multiplier are alike, the product is a positive quantity, taking the sign $+$; when the signs in the multiplicand and multiplier are unlike, the product is a negative quantity, taking the $-$ sign.

When the multiplicand and multiplier each contains more than one term the form of the solution is as follows:

$$\begin{array}{l} 2a+3b \\ \underline{2a-3b} \\ 4a^2+6ab \\ \underline{\quad\;\; -6ab-9b^2} \\ 4a^2 \qquad\quad -9b^2 \end{array}$$

For practice solve these problems:

1. Multiply $5x-3y$ by $5x-3y$.
2. Multiply $a-7b$ by $a-5b$.
3. Multiply $x^2+5x-10$ by $2x^2+3x-4$.
4. Multiply $a^2-3ab-b^2$ by $-a^2+ab+2b^2$.
5. Multiply a^2-ab+b^2 by $a+b$.

Division. In multiplication the exponents of like terms in the multiplicand and multiplier are added in the product; as division is the reverse of multiplication, we subtract the exponents in the dividend and divisor to determine their power in the quotient. Let us see if this does not seem reasonable:

Divide a^3 by a.

$$\begin{array}{l} a^1)\,a^3\,(a^2 \\ \quad\;\; a^3 \end{array}$$

Proof: $a^2\times a=a^3$.

Another way of showing this division is the following:

Divide a^3 by a.

$a^3=aaa$

Divide aaa by a

$$\frac{aaa}{a^1}=aa$$

$aa=a^2$.

Divide $3a^4b^3c-9a^3bc^2-6a^2c^3$ by $3a^2c$.

Solution: $$\frac{3a^4b^3c-9a^3bc^2-6a^2c^3}{3a^2c}=$$

$$\frac{3a^4b^3c}{3a^2c}-\frac{9a^3bc^2}{3a^2c}-\frac{6a^2c^3}{3a^2c}=$$

$$a^2b^3-3abc-2c^2$$

In long division, for convenience in multiplying, the divisor is usually written at the right of the dividend instead of at the left as in arithmetic. Note the form of the solution:

$$\begin{array}{ll} 2a^2+5ab+3b^2 & (\underline{2a+3b} \\ \underline{2a^2+3ab} & (\underline{\;a+b\;} \\ \quad\;\; 2ab+3b^2 & \\ \quad\;\; 2ab+3b^2 & \end{array}$$

By inspection it is found that $2a$ will be contained in the first term of the dividend a times. Multiply this partial quotient a by the entire divisor, placing the product under the first terms of the dividend, then subtract; bring down with the remainder the next unused term of the dividend. By inspection it is found that the first term of the divisor is contained in the new dividend b times. Multiply the new partial quotient by the entire divisor, and proceed as before.

Observe that when the signs of the dividend and divisor are alike, the quotient is a positive quantity, or +; when the signs of the dividend and divisor are unlike, the quotient is a negative quantity, always —. Apply the above truth to the following problem. Follow the solution very carefully step by step:

Divide x^4+4a^4 by $x^2+2ax+2a^2$.

$$\begin{array}{lll} \text{Solution:} & x^4+4a^4 & \underline{(x^2+2ax+2a^2} \\ & \underline{x^4+2ax^3+2a^2x^2} & \underline{(x^2-2ax+2a^2} \\ & \quad -2ax^3-2a^2x^2 & \\ & \quad \underline{-2ax^3-4a^2x^2-4a^3x} & \\ & \qquad\qquad 2a^2x^2+4a^3x+4a^4 & \\ & \qquad\qquad \underline{2a^2x^2+4a^3x+4a^4} & \end{array}$$

Note that new partial dividends have been brought down with respect to the *ascending* powers of *a*. Solve the following problems:

1. Divide $9a^2-18ay+9y^2$ by $3a-3y$.
2. Divide $y^2-12y+35$ by $y-5$.
3. Divide $3a^4-10a^3b+22a^2b^2-22ab^3+15b^4$ by $a^2-2ab+3b^2$.
4. Divide $x^5-2x^4-4x^3+19x^2-31x+15$ by x^2-7x+5.
5. Divide x^4+64 by x^2+4x+8.

Simple Equations. It is not necessary to enter upon a long and detailed explanation of the equality of two or more terms connected by the sign =. A brief illustration will make the principle clear to every beginner in algebra

THE BALANCE SCALE

The ordinary balance scale will serve our purpose. In one pan we place a 5-pound weight; in the other we place a 3-pound weight and a 2-pound weight; we know the first weight balances the other two, and we may indicate the fact by the following statement:

$$5=3+2$$

Adding 4 pounds to each pan, our new statement is,

$$5+4=3+2+4$$

Removing 2 pounds from each pan, we write the new condition,

$$5+4-2=3+2+4-2$$

These statements are called *equations*, and from them we may easily assume each of the following principles to be true:

1. The same quantity may be added to both sides.
2. The same quantity may be subtracted from both sides.
3. Each side may be multiplied or divided by the same number.

In the equation $7x+4=32$, there is balanced value, or quantity; it tells us that $7x$ does not equal 32, but that to $7x$ we must add 4 to equal 32, or that 32 is 4 more than $7x$. So we must subtract 4 from 32 if we want to know the number which exactly equals $7x$. Then our revised equation will be,

$$7x=32-4$$

Simplifying, $7x=28$

$$x=4$$

We moved 4 to the right of the equation and in doing so changed its sign from + to —, the reason for which is clear from the explanation above. At the same time we placed all known quantities, 32 and 4, on the same side of the equation, leaving the unknown quantity on the left. These two principles embody the philosophy of the simple equation. Let us apply what we have learned to several problems:

1. A 60 foot pole is divided into two parts so that one part is 5 times as long as the other; find the length of the two parts.

The length of neither part is known, therefore let us represent the shorter length by the letter x, to indicate that its numerical value is not known but is to be found. Then,

$$\begin{array}{ll} & x = \text{shorter part,} \\ & \underline{5x = \text{longer part,}} \\ & 6x = \text{both parts,} \\ & 6x = 60 \text{ feet.} \\ \text{Therefore,} & x=10 \text{ feet, the shorter part,} \\ \text{and} & 5x=50 \text{ feet, the longer part.} \end{array}$$

2. Find a number such that when 17 is added to its double, the sum will be 49.

The unknown number may be represented by x and we must also find a number just double the unknown number. Then,

$$x=\text{the number,}$$
$$2x=\text{double the number.}$$

Now if we add 17 to double the number, the sum will be 49. Therefore, it is evident that 49 is 17 more than double the number, or in other words, that to double the number we must add 17, if we would reach the result 49. We have our statement

$$2x+17=49.$$

Then, if 49 is 17 more than $2x$, we should subtract 17 from 49, which is the same as subtracting 17 from both sides of the equation, and we have

$2x=49-17$

Then, $2x=32$

and $x=16$.

Using the above problems as types, solve the following:

1. If the sum of the ages of a father and son is 60 years, and the father is 5 times as old as the son, what is the age of each?

2. A tree 90 feet high was broken so that the part broken off was 8 times the length of the part left standing. Find the length of each part.

3. Three times a given number is equal to the number increased by 40. Find the number.

4. The yield of an orchard was 70 bushels of fruit. Three times the number of bushels of apples is 6 more than the number of bushels of pears. Find the number of bushels of each.

5. A horse, a cow, and a sheep together cost $106. The cow cost sixteen times as much as the sheep, and the horse cost $40 more than the cow. What was the cost of each?

6. Frank, Fred and Harry together caught 36 fish. Fred caught twice as many as Harry. Frank caught three times as many as Fred. How many did each catch?

7. Three boys together caught 24 fish. John caught twice as many fish as Harry. Frank caught as many as both John and Harry caught. Find the number caught by each.

8. A man doubled his capital every 5 years for 15 years. He then had $25,600. What was his capital at first?

9. Divide 400 into three parts, such that the second is four times the first, and the third five times the second.

10. A merchant earned three times as much on dry goods as on shoes, and twice as much on shoes as on notions. His entire profits were $486. Find his profit on each.

Problems Involving Two Unknown Quantities

In the equations above we have had to deal with problems in which only one quantity was unknown. The next step in advance introduces us to a slightly more complex form of example in which two quantities are unknown, but which will give us no trouble if there has been a clear understanding of the principle underlying solutions where there was but one unknown quantity.

Three Methods. There are three methods commonly employed in the solution of any problem involving two or more unknown quantities. These are principles by which one unknown term is first eliminated—that is, by which its numerical value is found—this new value then being placed in the original equation as a substitute for its former unknown value. These three processes are called elimination by addition or subtraction, elimination by substitution and elimination by combination.

By Addition or Subtraction. The first is probably the easiest form and almost any problem can be solved by this process. Let us explain in detail a problem in which we must find the value of two unknown numbers or quantities; we will perform the operation by elimination by addition or subtraction:

Solve $\begin{cases}3x+4y=34\\6x+3y=33\end{cases}$

By careful inspection we find that if we multiply the first equation by 2, we will have for its first term $6x$, which is exactly equal to the first term in the second equation. The whole product will be $6x+8y=68$. We can now subtract from this equation the second equation of the problem and we shall find our difference to be $5y=35$. These first few steps in the solution of the problem are given in detail below:

(1)........................ $3x+4y=34$
(2)........................ $6x+3y=33$
(3) Multiplying (1) by 2....... $6x+8y=68$
(4) Bringing down (2)......... $6x+3y=33$
(5) Subtracting................ $5y=35$
(6)........................ $y=7$

If y equals 7, it is easy to apply the value of y in either of the original equations, or, to use a technical term, substitute in equation (1) or equation (2) the value of y.

Knowing that y equals 7 we put the value of $4y$ instead of that term in the first equation, and we have $3x+28=34$. The two known quantities are not on the same side of the sign of equality, so we will transpose, which gives us the equation $3x=34-28$, or $3x=6$, and $x=2$. Now we may finish the statement of the solution of the problem, as follows:

(7) Applying value of y in (1). $3x+28=34$
(8) Transposing............. $3x=34-28$
(9) Then.................... $3x=6$
(10) Therefore.............. $x=2$
(11) Proof.................. $6+28=34$

It would be well for the beginner in algebra to write out as fully as appears in the eleven steps above the solution of every problem he attempts, until the orderly plan is well understood. Solve the following problems, eliminating in each one unknown quantity either by addition or subtraction. It may be necessary sometimes to multiply both given equations by such numbers as will make elimination of one unknown term possible. For instance, in the first problem given below if we wish to eliminate y at first we can multiply the first equation through by 3 and the second through by 5. This will give us $15y$ in each equation, and we may then eliminate y by addition.

1. Solve $\begin{cases} 6x-5y=10 \\ 5x+3y=37 \end{cases}$

2. Solve $\begin{cases} 2x+5y=23 \\ 4x+3y=25 \end{cases}$

3. Solve $\begin{cases} 4x-3y=0 \\ 5x+2y=60 \end{cases}$

Elimination by Substitution. This is the process of clearing an equation of one of its unknown terms by substituting in either equation the value of one of its unknown terms, in the following manner:

Solve $\begin{cases} 2x+5y=31 \\ 3x+4y=29 \end{cases}$

The first step is to find the value of either x or y. We will write the first equation in another form which the student will understand:

$$y=\frac{31-2x}{5}$$

Now we can write the second equation of the problem by placing our new value of y in it, and we have,

$$3x+4\left(\frac{31-2x}{5}\right)=29$$

Applying your knowledge of arithmetic to the above fraction we will perform the operation which is called clearing of fractions, and we shall then have,

$$3x+\left(\frac{124-8x}{5}\right)=29,$$

which, reduced still further, equals $15x+124-8x=145$. Transposing the known quantities to the right of the sign of equality, we have $15x-8x=145-124$. Now let us place this entire problem in formal order as directed in the explanation of the problem involving elimination by addition or subtraction:

(1). . . . . $2x+5y=31$
(2). . . . . $3x+4y=29$
(3) Transposing $2x$ in (1) and dividing by 5. . . . . $y=\frac{31-2x}{5}$
(4) Substituting the value of y in (2). . . . . $3x+4\left(\frac{31-2x}{5}\right)=29$
(5) Clearing of fractions. . . . . $15x+124-8x=145$
(6) Transposing. . . . . $15x-8x=145-124$
(7). . . . . $x=3$
(8) Substituting the value of x in (3)* $y=\frac{31-6}{5}$
(9). . . . . $y=5$

*It would be as well to substitute the value of x in either (1) or (2) as in (3).

Solve the following problems, eliminating by substitution:

1. Solve $\begin{cases} 5x-4y=-2 \\ 4x-6y=-10 \end{cases}$

2. Solve $\begin{cases} 7x-4y=20 \\ 3x+2y=42 \end{cases}$

3. Solve $\begin{cases} 7x+2y=24 \\ 6x-y=7 \end{cases}$

It frequently happens that there will be three unknown quantities, the values of all of which are to be found. Such a problem presents no more difficulties than any of the above, for the student should apply the rules for elimination to two of the given equations and find the values of two of the unknown quantities, then substitute these values in connection with the third unknown quantity. Such a problem, with full solution, is given below:

Solve $\begin{cases} x+y+z=6 \\ 2x+3y+4z=20 \\ 3x-4y+6z=13 \end{cases}$

(1) . . . . $x+y+z=6$
(2) . . . . $2x+3y+4z=20$
(3) . . . . $3x-4y+6z=13$
(4) Bring down (2). . . . . . . $2x+3y+4z=20$
(5) Multiply (1) by 2. . . . . $2x+2y+2z=12$
(6) Subtract. . . . . $y+2z=8$
(7) Bring down (3). . . . . . . $3x-4y+6z=13$
(8) Multiply (1) by 3. . . . . . $3x+3y+3z=18$
(9) Subtract. . . . . $-7y+3z=-5$
(10) Multiply (6) by 7. . . . . . $7y+14z=56$
(11) Add (9) and (10). . . . . $17z=51$
(12) Therefore. . . . . $z=3$
(13) Substituting in (6). . . . $y+6=8$
(14). $y=2$
(15) Substituting in (1). . . . $x+2+3=6$
(16). $x=1$
(17) Proof. . . . . $1+2+3=6$

Solve the following problems and prove the correctness of your work in each instance:

1. Solve $\begin{cases} x-y+2z=7 \\ 3x+2y-z=8 \\ 4x-3y+z=3 \end{cases}$

2. Solve $\begin{cases} 5x-6y+4z=15 \\ 7x+4y-3z=19 \\ 2x+6y+6z=46 \end{cases}$

3. A farmer sold 10 barrels of apples and 3 barrels of potatoes for \$29; and at the same rate 4 barrels of apples and 5 barrels of potatoes for \$23. Find the price of each a barrel.

If the student states clearly a problem such as the above, he will have no difficulty with any part of it. The statement of this is as follows:

x = value of 1 barrel of apples,
y = value of 1 barrel of potatoes,
$10x+3y=29$
$4x+5y=23$

Solve according to instructions governing the solution of problems involving two unknown quantities.

4. Two numbers are such that 3 times the first plus 5 times the second equals 44; but 3 times the second plus 6 times the first equals 60. What are the numbers?

5. A book-seller sells 3 bound copies of a work and 7 stitched copies. He receives for them all $32.40. Another day he sells 2 bound copies and 5 stitched copies for $22.60. How much does a stitched copy cost, and how much a bound copy?

Advance Work. We have covered the fundamental principles of algebra in the foregoing pages. The subject of fractions involves no new theory; it requires simply arithmetical knowledge of fractions added to the algebraic principles which have here been described. If one learns thoroughly what has been given in these pages he can proceed intelligently to the study of factoring, highest common divisor, the least common multiple, and on through quadratic equations.

The subject of algebra is fascinating as a study, but it is an exacting science. The slightest mistake, even in the change of one sign, destroys the work of an entire problem. There is really no better subject that the boy or girl can study to develop care and painstaking accuracy.

The Earliest Science. Almost as far back as the beginning of civilization we find the beginnings of astronomy—the earliest science. And the fact that it was the earliest seems natural enough when we consider the question seriously. People might drink water for centuries without wondering in the least about its chemical properties; they might know, that a heavy object dropped from the hand would invariably fall *down*, without once wondering why it did not fall *up;* they might quarry rock from the earth without ever a question as to how it got to its present position. All of those things were so close at hand as to seem almost commonplace; people knew how to make use of such material objects and of the obvious facts about them, and that was enough to satisfy any unscientific age.

Ancient Belief. But the sun, the moon, the stars—they presented different questions. The question was not what to do with them; the problem was, what are they? Too conspicuous to be overlooked, too far away to be examined, it was natural that about them should grow up theories and religions, and finally a science. But at first the science was not just what we call astronomy; it was that, and something else. The wise men who far back in Chaldea stayed on their roofs through the night to study the heavens were not interested simply in the positions, the movements, the relative brightness of the heavenly bodies; those things chained their attention, but chiefly as an aid to something else. Could it be that the stars, the constellations, the comets, had nothing to do with human life? Those old investigators could not believe that such a thing could be. To them, the earth was, of course, the central fact in the universe, even before the theory was advanced that it was the central body; and what reason was there for the existence of those innumerable points of light, shifting, changing, if they did not in some way influence the earth and its inhabitants? And so there grew up what we call now *astrology*, a regular science of predicting events, and especially the fortunes of men, from the positions of the heavenly bodies. The Egyptians, the Chaldeans, the Hindus, the Chinese, placed great faith in the so-called science; the Jews, after the captivity, practiced it; the Greeks and Romans made much use of it. Even the early Christians believed in it thoroughly, and it was not until the time of Copernicus, in the sixteenth century, that the science of astronomy really began to emerge and to stand as a science worth while in itself, not merely as an aid to astrology. Copernicus, by his discovery of the fact that the sun was the center of the universe and that our earth is but one of the bodies that revolves about it, overthrew the theory that the heavenly bodies were but fortune-tellers for men.

The Most Wonderful Science. As it is the oldest, so astronomy is one of the most wonderful, of the sciences—the most wonderful, perhaps. For with other sciences the materials are at hand; wonderful as was the discovery that water is composed of two gases; wonderful as have been the discoveries about the geologic ages which have preceded us, yet the water was there to be analyzed, the rocks and fossils could be touched, measured, examined. But the nearest of the heavenly bodies is so far away that our minds can have no conception of the distance, and yet astronomers have determined accurately not only those distances, but the size of the various planets, their weight, and even their composition. The methods by which these wonderful discoveries have been made are too technical to be studied here, but a single example of what has been accomplished may serve to convince us as to the almost miraculous character of these discoveries.

The Attraction of the Planets. From the time of the great discovery of Sir Isaac Newton in 1686, the discovery of the law of gravitation, astronomers found the things which they could figure out were almost infinitely increased. The sun held the earth in its elliptical path by a certain pull, just as it held every other planet; but that was not all. The earth pulled the sun and every other planet, and every other planet pulled the earth. Of course, since the other planets are so much smaller than the sun their pulls are very much less, but still they are enough to demand consideration. The path of any planet about the sun is not just what it would be if it were the only planet; all the other planets are drawing it a little from its course, this way or that way. And it was this fact which led to the remarkable discovery of the planet Neptune.

The Discovery of Neptune. Newton and his successors had figured out, by means of the law of gravitation, the paths of all of the planets. But one planet, Uranus, did not keep to its path. Astronomers figured and figured, but could discover nothing wrong. Should they let the slight irregularities in the behavior of this planet overthrow their faith in the laws which they had discovered and set down? Finally someone suggested that there might be, far out beyond Uranus, too far away to influence much the movements of the other planets, a new planet, undiscovered, which was disturbing Uranus. It seemed an almost impossible problem to solve, but finally two men, an Englishman and a Frenchman, after years of work, announced that their figuring—not their telescopes—had assured them that there was such a new world. Their results, reached independently, agreed remarkably, and the two instructed the eager astronomers as to where, at a certain time, they were to direct their telescopes. And there, just where they hoped, yet scarcely dared really expect, to find it, the astronomers found the new planet—the planet Neptune. It had been seen before, often enough; but it is so far away that it looked like a faint, bluish-green star, and seemed to have no motion like a planet.

The Appearance of the Planets. Of course to us the most interesting phase of astronomy is simply the appearance of the heavens, not through a telescope but to the naked eye. The planets in their seasons, the bright stars, the groups of stars called constellations, cannot fail to draw and hold our attention whenever we are out on a clear night. Perhaps the most interesting, though by no means the most conspicuous, objects in the heavens at night are the planets. Of these there are eight, counting the earth. Mercury, the planet that is nearest the sun, is almost never seen without a telescope. It is said that the great astronomer Copernicus grieved because he would die without having seen it. Sometimes about three-quarters of an hour after sunset it may be seen for about fifteen minutes.

The old Greeks talked much about Hesperus, and our own poets love to write of the evening star. This brilliant star which, in certain seasons, appears in the southwest shortly after sunset, is the planet Venus. Gradually, night by night, it rises higher. At length it appears to remain stationary for a few evenings, then it returns and finally disappears. Soon after its disappearance there is seen in the southeast, a little before sunrise, a bright star. The Greeks called this Lucifer, the morning star, but we know that it is the same planet Venus which a little earlier appeared in the evenings.

We have doubtless all noticed a certain star which shines with a steady brightness, and which is the reddest star in the sky. This is the planet Mars. The brightest of the planets next to Venus is Jupiter, which appears sometimes at such an hour that it is called the evening star. Saturn is a bright star with a slightly reddish tint, Uranus is rarely seen without a telescope, and Neptune only with a telescope.

Far more conspicuous than the planets and far more easy to study are the "fixed stars," as they are called. This term does not mean that such stars are always in the same place; that you will always find the star Sirius, for example, in the same place at the same hour. But it means that such stars keep the same positions relative to other stars—that they do not move about as do the wandering planets.

The Winter Heavens. Let us suppose that we are looking at the heavens on a clear evening in January, at about eight o'clock. We will turn first to the north where is the constellation which all people in North America know best—the Great Dipper. The seven stars which form this well-known group, together with many other fainter stars about them, have for centuries and centuries been called, the world over, the Great Bear. Just why, we do not know. We can find no resemblance to a bear, but we do find a very clear resemblance to a dipper in the seven stars,

ASTRONOMY

Definition: Astronomy is the science which treats of the heavenly bodies.

General Divisions: Descriptive Astronomy. Practical Astronomy. Physical Astronomy.

SOLAR SYSTEM

Sun

1. 866,000 miles in diameter.
2. In volume 1,300,000 times the size of the earth.
3. Distance from the earth about 93,000,000 miles.
4. Sun-spots vary in size from 1,000 to 100,000 miles in diameter.
5. Its gravity 27 times that of the earth.
6. Probably composed of heated gases held together by gravity.

Mercury

1. Nearest the sun.
2. Diameter about 3,030 miles.
3. Moves round the sun in 88 of our days.
4. Greatest distance from the sun 43,000,000 miles.
5. Its volume $\frac{1}{17}$ that of the earth.

Venus

1. Second from the sun.
2. The most brilliant planetary body.
3. 2,300,000 miles from the earth.
4. Diameter about 7,700 miles.
5. Will cross sun's disk June 8, 2004.

Earth

1. Third from the sun.
2. Fifth in size.
3. Has one moon.
4. Greatest distance from sun 92,963,000 miles.
5. Velocity in its orbit 17 miles a second.
6. Thickness of atmosphere, 50 to 60 miles.

Mars

1. Fourth from the sun.
2. Greatest distance from the sun 152,000,000 miles.
3. Distance from the earth varies from 35,000,000 to 244,000,000 miles.
4. Requires two years to revolve about the sun.

Jupiter

1. Fifth from the sun.
2. Three times as large as all the other planets put together, but [illegible] part as large as sun.
3. Mean diameter 85,000 miles.
4. Mean distance from sun 475,000,000 miles.
5. Accompanied by seven moons

Saturn

1. Sixth from the sun.
2. Diameter about 70,000 miles.
3. Mean distance from the sun, 875,000,000 miles, and a revolution requires 29½ years.
4. Has eight satellites and a system of flat rings.

Uranus

1. Seventh from the sun.
2. Mean distance from sun 1,750,000,000 miles.
3. A year equal to 84 of our years.
4. Its mean diameter about 33,000 miles.

Neptune

1. Eighth from the sun.
2. Mean distance from sun 2,600,000,000 miles.
3. About 35,000 miles in diameter.
4. Invisible to the naked eye.
5. Has one moon.

STELLAR SYSTEM

Stars

Characteristics

1. Always occupy the same relative position.
2. Called "fixed stars," but many actually move.
3. Classified according to brightness.
4. Telescopic stars, those unseen by the naked eye.
5. Vary in color, as red, yellow, blue and green.

Number

1. As seen by the telescope the number is incalculable
2. But a few thousand visible to the naked eye.

Size

1. Little is known as to absolute size.
2. The light of Sirius, the brightest fixed star, is estimated as 63½ times that of the sun.
3. Astronomers recognize stars as small as those of the sixteenth magnitude.

Distance

The shortest distance from the earth that of Centauri, 20,000,000,000 miles.

Constellations

Zodiac

1. The region containing the paths of the sun, moon and planets
2. Was marked out into 12 parts, each with its constellations, denoted by certain signs.
3. The twelve signs of the zodiac. Aries, the Ram, Taurus, the Bull; Gemini, the Twins; Cancer, the Crab; Leo, the Lion, Virgo, the Virgin, Libra, the Balance; Scorpio, the Scorpion; Sagittarius, the Archer; Capricornus, the Goat, Aquarius, the Waterman; Pisces, the Fishes.

Milky Way

1. Encompasses the heavenly sphere like a girdle.
2. The luminous appearance caused by a multitude of stars visible only to the strongest telescope.
3. At one part it divides into two branches separated for a distance of 150° and then reunites.

Orion. The most brilliant constellation in the northern sky.

Nebula

1. A white cloud-like patch of light always in the same position.
2. Two nebulae visible to the naked eye, the one in Orion. About 10,000 seen through the telescope.
3. It is probable that nebulae include clouds of meteors

SUGGESTED FOR BLACKBOARD OUTLINE

THE WINTER HEAVENS
(From the *Scientific American*)

see—the latter one because the ability to see it was considered proof of keen sight.

The two stars that form the upper edge of the dipper, that farthest from the handle, are called *pointers*, because a line drawn through them and continued passes almost through Polaris, the North Star. This star, with six others, some fairly bright, some quite faint, makes the Little

bright stars which are so placed as to form an irregular letter M. These five, with one fainter star, form what is known as Cassiopeia's Chair, a very noticeable constellation, once you have found it.

These are the most notable groups of stars in the northern sky. Now let us turn to the south. The most beautiful constellation in our sky is

THE SUMMER HEAVENS
(From the *Scientific American*)

a small star, which is in the sword. The bright reddish star above marks one shoulder of the hero, the other shoulder being formed by a somewhat fainter star; while below the girdle Rigel, one of the brightest stars we see, shows the right foot, and a smaller star, east of Rigel, marks the left knee, on which Orion rests while he fights the bull. The bull is the constellation Taurus, may be counted in this little group on a clear night, and they are arranged somewhat in the form of a dipper. The Pleiades is one of the most celebrated of the constellations. Some ancient nations began their year with its rising, and the Book of Job speaks of it (xxxviii: 31): "Canst thou bind the sweet influences of the Pleiades, or loose the bands of Orion?"

In January, at the time when we are supposed to be looking at the sky, the dipper is standing almost straight upright on its handle. At the bend of the handle is the star called Mizar: near it is a small star which the Arabs called sometimes the Lost One, sometimes the Proof. These names were given it because it is so hard to

Dipper, not nearly so perfect as the big one, but quite recognizable.

Now imagine a line drawn through Mizar, the star which we have just learned is at the bend of the handle of the Great Dipper, and the North Star. About as far on one side of the North Star as Mizar is on the other are five rather now before us. This is Orion, the Warrior, of whose deeds before he was set in the sky as a constellation the ancients told many wonderful tales. The easiest stars in the figure to find are the three bright bluish ones, set in an oblique line, which form the belt. Below the belt, at a right angle with the lowest of the three stars, is an irregular group of stars north and west of Orion.

The brightest star in this group is the reddish star called Aldebaran, seen almost directly in the south at the time we are making our observations; and to the north and west of Aldebaran is the beautiful cluster of the Pleiades. Six stars

Now let us come back to Orion. If we follow the line of the three belt stars downward, we come to the most magnificent star in the heavens —Sirius, the Dog Star. This beautiful star is estimated to be about thirteen times as large as our sun.

North of the red star Aldebaran, and almost directly overhead, is a very bright star, Capella. Of course there are other bright stars and other interesting constellations, but these are the easiest to locate and the ones most often referred to.

The Summer Heavens. If, now, we imagine that the time has changed, and we are looking at a July sky, we shall find that that has changed, too. The Great Dipper is still visible in the north, near the horizon, but now it seems to rest on the front edge of the bowl. The Little Dipper and Cassiopeia are in the same relative positions, but in different places in the sky. If we, in our imagination, trace a line through the last two stars of the handle of the Great Dipper, we shall find a bright, golden star, called Arcturus. In the east appears a bluish star, brighter than Arcturus, called Vega. West and south of Vega is the beautiful Northern Crown, a semicircle of six stars, with its bright central star called the Gem.

But the brightest constellation of the July sky is the Scorpion, directly in the south. Its brightest star, Antares, with three fainter stars, forms a figure like a boy's kite, while a line of stars below Antares forms the tail. This is a very easily recognizable constellation, and when you have once found it you will look for it in the summer sky, as you do for Orion in the winter.

Method of Study. The subject of astronomy is given considerable space in The New Practical Reference Library. Not only is there a long article, general and historical, under the head *Astronomy*, and full articles on all the planets and the important stars and constellations, but there are numerous articles on such general subjects as *Astro-Photography, Axis, Declination, Degree*, etc. All of these are found listed under the heading Astronomy in the Classified Index. Also in the Classified Index, under the title Biography, subhead Astronomers, appear all the astronomers whose lives are given in The New Practical Reference Library. A thorough study into the subject of astronomy is therefore possible with the aid of these volumes, and it is felt that there are few subjects for study which will, in interest alone, better repay the student. An outline for the systematic study of the subject, such as a teacher might take up with his students, is here given:

Outline

I. Definition
II. General divisions
    (1) Descriptive astronomy
        (a) Description of the
            (1) Motions
            (2) Figures
            (3) Periods of revolution
            (4) Other phenomena of the heavenly bodies
    (2) Practical astronomy
        (a) Teaches how to observe the
            (1) Motions
            (2) Figures
            (3) Periods of revolution
            (4) Distance of the heavenly bodies
        (b) Teaches how to use necessary instruments
    (3) Physical astronomy
        (a) Explains cause of motions
        (b) Demonstrates laws by which causes operate
III. History
    (1) Among the Egyptians
    (2) Among the Chaldeans
    (3) Among the Chinese
    (4) Among the Greeks
    (5) Among modern peoples
IV. The solar system
    (1) The sun
        (a) Size
        (b) Distance
        (c) Physical nature
            (1) Sun spots
            (2) Rotation
            (3) Faculae
        (d) Eclipses
        (e) Physical and chemical effects
            (1) Light
            (2) Heat
            (3) Gravitation
    (2) The earth
        (a) Form and rotation
        (b) Time; longitude
        (c) Atmosphere
        (d) Gravitation
        (e) Satellite—the moon
            (1) Size
            (2) Character of surface

(3) Distance
(4) Orbit
(5) Relation to tides
(3) Other planets—shape, size, rotation, constitution, appearance
(a) Mercury
(b) Venus
(c) Mars
(d) Jupiter
(e) Saturn
(f) Uranus
(g) Neptune
(h) Minor planets
(4) Nebular Hypothesis

V. The stellar system
(1) Stars
(a) Characteristics
(b) Number
(c) Size
(d) Distance
(2) Constellations
(3) Comets

VI. Laws of motions of heavenly bodies

VII. Methods of determination of
(1) Distances of planets
(a) From the sun
(b) From the earth
(2) Size of heavenly bodies
(3) Mass of heavenly bodies

VIII. Astronomical instruments
(1) Telescope
(2) Measuring instruments
(3) Transit instrument
(4) Mural circle
(5) Altitude and azimuth instrument
(6) Equatorial

IX. Great astronomers

Interesting Facts. Some of the spots on the sun are 100,000 miles in diameter. Could the earth be placed in the center of one of these spots and viewed from a point on the circumference, it would appear to the observer about four times as large as the moon does to us.

The spectroscope shows that the sun and stars are composed of the same substances as are found in the earth. What does this tend to prove?

Experiments show that the heat of the sun is sufficient to warm a shell of water having a diameter equal to the radius of the earth's orbit and a depth of four-tenths of an inch, 7° Fahrenheit in one minute.

The satellites of Jupiter are about the size of our moon, being from 2,000 to 3,000 miles in diameter.

The time required for a planet to make a revolution round the sun constitutes the year of that planet. Measured by the time of the earth's revolution round the sun, the planet's years are respectively as follows: Mercury, 88 days; Venus, 7½ months; Mars, 1 year, 10 months and 22 days; Jupiter, 11 years, 10½ months; Saturn, about 30 years; Uranus, 84 years, and Neptune, 165 years.

Because of their periodic return and peculiar appearance, comets are among the most interesting of the heavenly bodies. The ignorant and superstitious associate their appearance with dire calamities, such as war, pestilence and the end of the world. Newspapers publish now and then statements which are given out as coming from come eminent astronomer, and containing predictions of the exact time and place at which a comet which is attracting attention will strike the earth and shatter it to fragments. Such statements should never be taken seriously. Astronomers never make them, and they do not rest upon any foundation of fact.

Questions

With what people did astronomy first take a somewhat scientific form?

Which of the Greeks taught the motion of the earth around its axis and around the sun?

When do meteors most frequently occur?

From what century does the present astronomical system date?

What is Aquarius, and when is the sun said to enter it?

What has been the most remarkable recent discovery in regard to comets?

In what manner is the term "earth shine" described?

What is the cause of an eclipse of the moon? Of the sun?

What is the average number of eclipses in a year?

Describe the term "coal sack," observed in the Galaxy, or what is commonly known as the Milky Way.

What is the course and the cause of the Milky Way?

What is the harvest moon?

What is the average diameter of the planet Jupiter?

What was the very valuable discovery regarding light made from observing Jupiter's satellites?

What is the theory concerning the distribution of water and land on the planet Mars?

What is the rare form of metal which is found in meteoric stones?

What are the gray plains of the moon?

To whom is the nebular hypothesis due? How is it now received by astronomers?

When and by whom was Neptune discovered? Is it visible to the naked eye?

How does the magnitude of the star Sirius compare with that of the sun?

What is the precession of the equinoxes?

What is computed to be the amount of light sent out from the sun?

What is the largest telescope in the world?

How short a day has Uranus and how long a year?

What two names did the ancients give Venus because of its alternate appearance in the morning and the evening?

What is the zodiac? How was it divided by the ancients and what are the divisions called?

What is zodiacal light?

How many years does it take light to come from the nearest star to us?

Why are some stars called variable, others temporary and others the fixed stars?

Which planet approaches nearest the earth?

To what two men is the systematizing of astronomy due?

What discovery of Newton practically completed the proof of the Copernican theory?

Why was Copernicus excommunicated by the pope?

Why is it more satisfactory to study the movements of the heavenly bodies by astro-photography than through the telescope?

What are the three main branches of astronomy? Which one of these divisions gives a description of the motions and figures of the heavenly bodies? Which division teaches us to observe the revolutions of the heavenly bodies? Name the division of astronomy which explains the causes of the motions and demonstrates the laws by which these causes operate.

What is the difference between an observatory and a laboratory? Where is the famous Yerkes observatory?

Who invented the telescope?

What led Galileo to observe the laws governing the oscillation of the pendulum? To what important discovery did this lead?

Why do we regard the sun as the most important of the fixed stars?

What is the diameter of the sun?

Work and Play. Observing people know that one can work hard if he can play hard. There may be temporary profit but not permanent gain from much work and no play; there is sure to be failure—financial, and often moral—from a life of much play and too little work. Shakespeare told us that "No profit grows where is no pleasure taken;" the human machine cannot long stand a strain from which there is not temporary relief. Another truthfully said that "All work and no play makes Jack a dull boy;" no variety enters into his life and he fails to acquire the stimulus and exhilaration which always come with change.

Granted, then, that games and play are as necessary as work, what shall we play, and when? We are told, with characteristic force and pleasing brevity, when not to play, by Theodore Roosevelt, who says, "When you play, play hard, but when you work do not play at all." Americans play more than other peoples; we are the most prosperous nation on earth, also, and many people believe that there is relation between these facts. Healthful recreation is more and more taking the place of sports and games which not only are no benefit to health, but which are positively injurious. Anything which compels one to be out of doors, which makes him breathe deeply and use all his muscles in well-balanced and not over violent exercise, is to be encouraged.

Classified List of Games. THE NEW PRACTICAL REFERENCE LIBRARY presents almost 100 articles relating to athletic sports, games and plays, and to terms belonging to them. The portion of these which relate directly to outdoor recreation are classified below, so the person who seeks information on them may turn at once to the various titles in regular alphabetical arrangement:

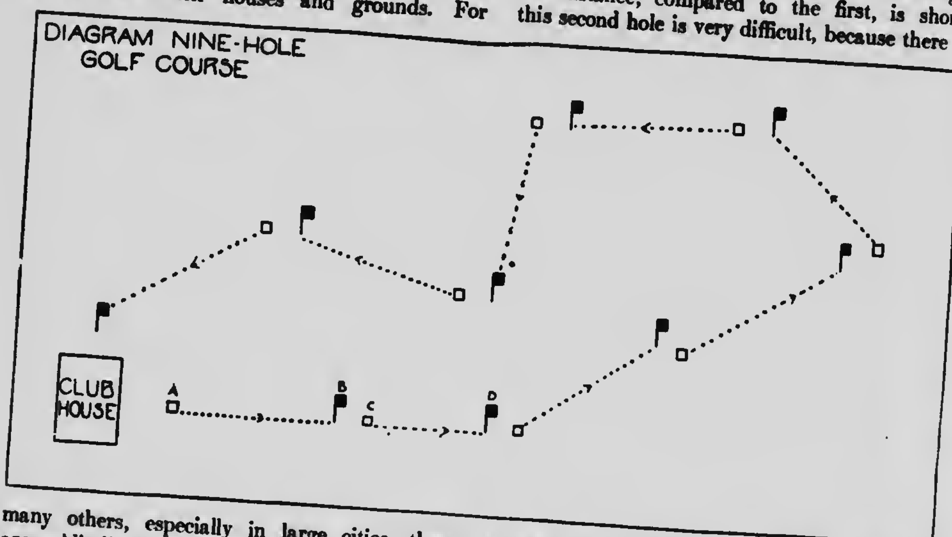
OUTDOOR GAMES AND SPORTS

Angling	La Crosse
Archery	Lawn Tennis
Baseball	Marbles
Canoeing	Polo
Coasting	Quoits
Cricket	Rounders
Croquet	Rowing
Curling	Shooting
Falconry	Skating
Fives	Swimming
Football	Tobogganing
Golf	Trapping
Hand Ball	Trawling
Hockey	Water Polo
Hunting	Wrestling
Ice Yachting	Yachting

Brief statements respecting some of our deservedly popular games may well be given here. No man or woman need be ashamed to admit a liking for healthful sports or hesitate to participate in them. There are more outdoor contests for men than for women, but in at least two, lawn tennis and golf, women are worthy rivals of men in efficiency displayed and in their understanding of the fine points of the games. Baseball is enjoyed by women as keenly as by most men, even though they cannot play the game.

Golf

Among the Oldest and Best. Golf is one of the best of outdoor games because it furnishes exercise without overworking any part of the body. It can be played by old people as well as by young, by convalescents as well as by athletes—in short, it is a game for everybody. It has been known for many years as the "Royal and Ancient Game of Golf." As early as 1457 the Scottish Parliament prohibited golf playing on Sunday. Even in those early days the game must have had a strong hold on everybody who played it. Many of the most famous characters in English history were enthusiastic golfers. Charles I was playing golf when the news of the Irish Rebellion of 1642 was brought to him. We are told that he was so upset by the news that he could not finish the game. Tradition says that many of Scotland's rulers, including the unfortunate Mary, Queen of Scots, were golfers. In our time King Edward VII was for many years the patron of St. Andrew's, the most famous club of golfers in the world. Today the game is not restricted to any group or class. For those who can afford it there are clubs which own their houses and grounds. For many others, especially in large cities, there are public links open to everybody.



How the Game is Played. The average person who has never enjoyed golf is likely to consider it a frivolous pastime, because he has no idea of the skill required. The diagram will make clear how the game is played. The player stands at A, the first teeing ground, and drives his ball in the direction of B, the little cup or "hole," which is marked by a tall iron rod or "flag." No doubt you think anybody could do that. Alas! The player was not careful: his ball has rolled into a sand-pit, behind which rises a grass-covered mound three and a half feet high. This obstacle is a "bunker." You can see that it will be hard for the player to get his ball very far beyond the sand-pit on his next shot. Luckily he gets it just over on his first attempt. Now he takes a third shot, which leaves his ball about ten yards from the hole. Meanwhile, his opponent has played. The opponent's "drive," that is, the shot from the tee, was a few yards short of the bunker. On his second shot the ball skims over the bunker and rolls to the green, a smooth, grassy plot in the middle of which is a small cup or hole. Both players now take two shots to get the balls into the hole, but the second player wins the hole, because he has taken only four shots to the first man's five.

The players pick up their balls and walk to C, the second teeing-ground. The winner of the previous hole always plays first. Though the distance, compared to the first, is short, this second hole is very difficult, because there is a small pond in front and a little to the left of the hole, and several bunkers to the right of the pond. Our opponent's ball falls into the water. According to the rules of the game he may play the ball where it lies—of course that would be foolish—or pay the penalty of a stroke to pick it up and drop it backwards over his head. Then he knocks the ball safely to the green. Meanwhile, the other player has made a fine drive. His ball has bounced between the pond on one side and the bunkers on the other. On his first shot he is in almost the same position as his opponent on his third. It takes both players two more shots to put the balls into the hole. This time the first player has won.

So the game goes on. A careful score is kept of the number of strokes taken by each man. At the end of the "round," when the players have gone once round the course, each man's scores are added. The winner is the man who has won the most holes or used the least strokes; either way of counting may be used, but this should be decided before the game begins. Most golf courses today are eighteen holes. You can see that a great deal of land is required for this purpose, from the fact that the holes may be anywhere from 150 to 600 yards apart. Many courses have only nine holes, such as shown in the diagram. No matter how long the course, it is always laid out so that the first half runs in one general direction, that is, "out," and the second half in the opposite direction, that is, "in." In this way the players play their game and return almost to the point from which they started.

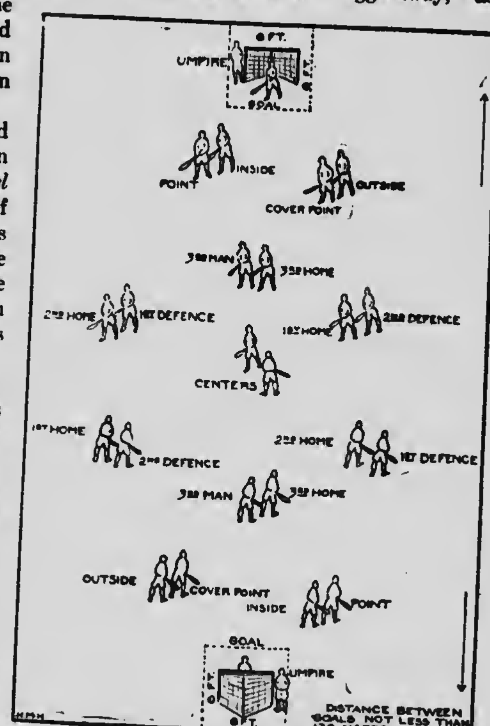
There is also a kind of competition called *bogey play*, in which each man plays against an imaginary opponent called *bogey* or *Colonel Bogey*. "Bogey" is an arbitrary number of strokes allowed for each hole. The best players often use fewer strokes than "bogey," but the average player of ability is more likely to take more strokes. A player using fewer strokes than "bogey" is said to be *up* on bogey; if he uses more strokes he is *down*.

Up and *down* are also used to refer to match play, a player being "up" the number of holes he is ahead of his opponent. For example, if A has won nine holes and B has won six holes, A is "three up" on B. If A and B are playing an eighteen hole match, three holes remain to be played. Now if A wins the next hole he wins the match, being four holes ahead of B with only two holes left to play. So A wins by "four up and two to play." As soon as one player is ahead by more holes than there are holes remaining to be played he wins the match. If the players are tied at the end of a round they play an extra hole. Then A is said to win "one up, nineteen holes."

In Volume II golf is fully described, the various points of the game being clearly outlined.

Lacrosse

The National Game. Lacrosse undoubtedly originated among the North American Indians. The name "lacrosse" was applied to the sport by the early French explorers, who noted the resemblance of the hooked stick to a bishop's cross. The *crosse* is a light stick, five or six feet long, crooked at the end to allow a net of cat-gut or deer skin to be stretched across. The ball used by the Indians was made of hide, stuffed with hair, bark or the knot of a tree, but all balls are now made of India rubber, 2½ inches in diameter. Many interesting anecdotes of this game are related by the early settlers and explorers. As many as 1,000 Indians sometimes played on a side. The players were put through a long course of training and the game was preceded by elaborate ceremonial dances. History records that on one occasion a band of Indians led by Pontiac invited the garrison of Fort Michilimackinac (now Mackinac) to witness a game of "baggataway," as they called it, and proceeded to massacre all the whites. In time the game was adopted by the white settlers, but it is only since 1867 that it may be called the national game. In that year a set of practical rules were adopted, clubs were organized and a great impetus given to the game in every part of Canada.

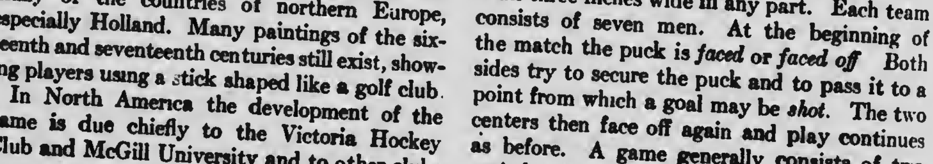


THE GAME OF LACROSSE

How It Is Played. The object of the game is to drive the ball as many times as possible through the opponent's goal, at the sam time defending one's own goal from a similar attack. There are twelve men on each side. Each player, except the goal-keeper (generally known simply as "goal"), is opposed by another player whose duty it is to outmaneuver his opponent. The two centers begin the game by "facing off;" that is, after the ball is placed in the center of the field, the two players place the backs of their crosses on either side of the ball and at the word "play" each tries to draw the ball toward him. The ball is scooped up from the ground and carried horizontally on the crosse, while the player runs towards his opponent's goal. The other team tries to stop his progress by securing possession of the ball. If the center now sees a good opportunity he tosses the ball to one of his team-mates, who then runs with it or tosses it on. When one side has scored a goal the centers again face off and the game goes on. In the necessity for quickness of eye and limb, not to mention brain, in the general effect on the players and in the fascination for both players and spectators, are found the reasons for the great popularity of lacrosse.

Hockey

Ice Hockey. The article *Hockey* in Volume III describes the game now generally known as field hockey. In Canada and the United States hockey invariably means ice hockey. In England field hockey is still common, but in the Dominion ice hockey is played almost to the total exclusion of the other. So when we speak of hockey we mean ice hockey. In its simplest

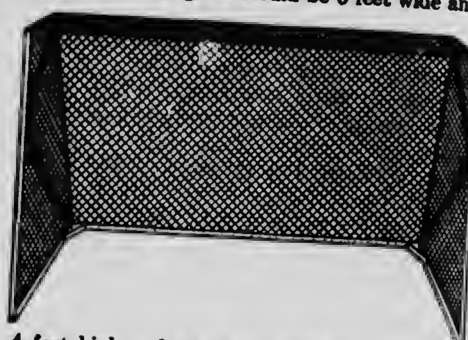


HOCKEY STICK

form hockey has been played for centuries in many of the countries of northern Europe, especially Holland. Many paintings of the sixteenth and seventeenth centuries still exist, showing players using a stick shaped like a golf club.

In North America the development of the game is due chiefly to the Victoria Hockey Club and McGill University and to other clubs co-operating with them. About 1881 the first attempts were made to draw up a recognized set of rules. Three years later the first general tournament was held, and in 1887, the "Amateur Hockey Association of Canada" was formed. Soon afterwards the efforts of several Canadian teams resulted in the spread of the game to the northern sections of the United States, where it has become fully as popular as in the Dominion. The "Canadian Amateur Athletic League" has jurisdiction over the numerous Canadian hockey clubs and the American Amateur Hockey League has a similar position in the United States. The emblem of supremacy among the Canadian leagues is the Stanley Cup, presented by Lord Stanley, once governor-general of Canada.

Method of Play. The game should be played on a rink at least 112 feet long by 56 feet wide. The goals should be 6 feet wide and



4 feet high and should be provided with nets like the lacrosse goal. The *puck* is a flat round piece of vulcanized rubber, one inch thick and three inches in diameter. The sticks are made of one piece of hard wood, and may be not more than three inches wide in any part. Each team consists of seven men. At the beginning of the match the puck is *faced* or *faced off* Both sides try to secure the puck and to pass it to a point from which a goal may be *shot*. The two centers then face off again and play continues as before. A game generally consists of two periods of twenty or thirty minutes each; in case of a tie an additional period is played.

Ice hockey requires good skaters, as speed and sureness are the essentials of a good hockey player. Because of the speed with which skaters can cover a rink, hockey is one of the fastest of all games. At one moment the puck may be at one end, and then thirty seconds later a goal may be scored at the other end. Aside from the work of the offense, the goal-keeper has probably the most responsible position. A good goal will save his side from many a defeat even though his mates may be weaker in other parts of the game. Hockey offers considerable opportunity for individual effort, but the best results are obtained when the individual is subordinated to the team and consistent team-work is developed.

Basketball

A Popular Pastime. Basketball enjoys the unique distinction of having been invented by one man at a single sitting. In 1891 a lecturer on psychology in the training-school of the Young Men's Christian Association at Plainfield, Massachusetts, was speaking of the mental processes of invention. As a test he proposed to his class that each member invent a game, with all its conditions and limitations. The same night, James Naismith worked out basketball as an ideal game to meet the hypothetical case, and the next day in the lecture room it was tried with the aid of the members of the gymnastic class. These facts explain why it was that basketball was at first played only by teams formed by members of the various Young Men's Christian Associations in different cities. But the game became so popular in these circles that it spread to schools and colleges, to other athletic clubs, and to the general public everywhere.

Basketball is deservedly a popular game for boys and girls of all ages and all classes; it calls for healthful exercise of all parts of the body. Every boy or girl who has played the game knows that using feet only will not make a player; no matter how strong the hands and arms may be, they alone will not enable the player to cover the ground. Alertness of eye, quickness of movement, accuracy and endurance are necessary. Perhaps even more valuable than this all-round development of the body is the simultaneous development of the mind. Every second of play presents a new situation to the mind. The player must decide at once; he must seize his opening the moment it appears. No boy can play basketball and remain slovenly and careless in his habits and n[illegible]. The very nature of the game requires him to be wideawake and energetic. The boy who never cares, who never has energy enough to [illegible] what is expected of him, who is always tir[illegible] will soon find that there is no place for him in a basketball game. It does not require a boy of great physical strength to play basketball. Any healthy boy who can run on his legs and move his arms will find that basketball is doing him good. The game does not need boys already fully developed; its purpose is to help in their development.

There remains a still greater benefit to every player. Aside from quickness of movement and of judgment, basketball requires coolness and self-control. The training thus acquired will stand in good stead in later years. A player may be knocked over accidentally: has he the right to lose his temper, thus lessen his own value to the team and disturb his team-mates? Certainly not. Everybody knows that a player who has lost his temper quickly loses his head; then he is better on the side-lines than in the game. The boy who fights hard, plays a clean, square game, and keeps his temper, is the boy who will come out on top in basketball as in every other game or activity in life. Basketball helps to develop the manly characteristics of a boy's nature. The writer has seen many a player help his opponent up and ask him if he was hurt or apologize to him for the accidental push. There was no desire to stoop to a weaker man or bow down to a stronger one, but it was simply an exhibition of the spirit of fair fighting, the spirit which must prevail in all sports.

A Game for Girls. Basketball soon after its invention was adopted as a game for girls. Whatever may be said of it as a game for boys may be equally well said of it as a pastime for girls. It will help to develop the girls physically and mentally during the years when they most need healthful exercise. The girl who mopes around the house all day long, the girl who is always dissatisfied, the girl who has no interest but her own pleasure, is just as disagreeable as the boy who is always tired and doesn't care. The growing girl needs exercise just as much as the growing boy. With some slight modifications of the rules, such as shortening the time and making all roughness impossible, basketball has become as popular for girls as for boys "The proof of the pudding is in the eating;" the value of basketball is proved by playing the game.

An excellent description of the game of basketball is given in regular alphabetical order in Volume I.

Baseball

Its Development. Baseball is a game rapidly increasing in popularity in Canada. For many years it has been the one outdoor game in the United States which has stood far above all others, but it is only within recent years that this popularity has spread to the Dominion. Its excellence as a pastime for amateurs should not be lost sight of in the rush with which it developed as a professional game. Few games offer better chances for healthy outdoor exercise for boys and men. Played with a soft ball about four to six inches in diameter, it is gaining ground as a winter indoor game. So popular is baseball that the public has encouraged promoters of clean sport to engage in it as a business. There are great leagues of baseball teams in the United States, each league operating under strict rules covering all points of the game and its organization. These are called the National League and the American League, and are popularly called the "major leagues." The many other leagues throughout Canada and the United States are generally known as the "minor leagues." Of these the best known are the Canadian League and the International League, the latter being composed of six United States teams and two Canadian teams, Toronto and Montreal.

A Scientific Development. Baseball is possibly more carefully studied and scientifically developed than any other American enterprise. This may seem a strange and unlikely statement, but it is true. What business house figures on movements of employes down to seconds in producing certain results, or practices so persistently on "team work"? In the game of baseball as scientifically understood, a base-runner on first base knows that he has practically three seconds to get safely to second base, ninety feet away, before the pitcher can deliver the ball to the catcher and the latter has time to throw it to second base to intercept the runner. The loss of a fraction of a second in getting started may be fatal to the runner, or one superfluous motion or slightest error in judgment on the part of catcher or pitcher may give the runner all the time he needs.

Every player in the "big leagues" knows in terms of seconds the value of every play and constantly practices to make himself so perfect a part of a great machine that he shall never make an error of judgment. Errors he does make, but not many of them are due to poor judgment. Such splendid results as are achieved are due to constant, untiring practice, under the cold, critical eyes of masters of the game. A business house with an organization so compact as the "machine" which we call a major league ball team could do—well, there is very little in its line it could not accomplish.

Rules and laws governing the great leagues are copied in all the lower ranks; the boys on the vacant lot play the same game as the masters of the art in the great cities, and they play it intensely, as though it were the most serious matter connected with existence. No more exacting critics of famous players exist than these same boys when they witness a professional battle, and the youngsters know the various plays and players better than most adults.

Every Man on Record. In no other sport, and in no business organization, is so careful a record kept of efficiency of the individual as in baseball. The record of every player is known from the Atlantic to the Pacific, and the man rises in the profession or falls as the published figures proclaim his strength or weakness. A record of the players in a single game indicates how figures for a week, a month, and an entire season are compiled. The Montreal team of the International League played the Toronto team of the same league on a certain day, and the official score for the Toronto "Leafs" was as follows:

	AB	R	H	PO	A	E
Meyer, r. f.	5	0	2	2	0	1
O'Hara, c. f.	3	3	3	0	1	0
Shaw, l. f.	4	3	1	0	0	0
Jordan, 1b.	4	1	2	12	0	0
Bradley, 3b.	5	1	1	3	3	0
McConnell, 2b.	2	0	0	0	3	0
Fitzpatrick, s. s.	3	1	1	2	3	1
Bemis, c.	4	1	1	8	0	0
Drucke, p.	4	0	0	0	2	0
Totals	34	10	11	27	12	2

Explanation of "Box Score." When the columns of figures and abbreviations are explained, the average reader will see more clearly the system by which efficiency is noted and defects are emphasized. A glance at the table gives the story of the game. The names of the playing positions are shown in the diagram in the article *Baseball*, in Volume One. The symbols heading the columns have the following meanings:

AB—At Bat. Number of times the player took his turn at batting the ball. If the batter is given a base on balls, or is hit by a pitched ball, he is not charged with a turn at bat.

R—Runs. The total number of runs made by the player during the game.

BH—Base Hits. The number of times the batter hit the ball to a section of the field where it could not be caught and from which it could not be returned to first base in time to "put out" the batter.

TB—Total Bases. The number of bases gained in the game as the direct result of his own hits.

BB—Bases on Balls. Showing the number of times the batsman was allowed to go to first base because the pitcher could not or would not pitch the balls accurately.

SH—Sacrifice Hits. With a runner on first base the man at bat may simply allow a pitched ball to hit his bat and thus he may easily be "put out" at first base, but the play enables his fellow player to run to second base and thus increase the chances that the team will score a run.

SB—Stolen Bases. The number of times a player gains a base by cunning and strategy, without the help of a hit by the batter.

PO—Put Out. The number of times a man is able to retire an opposing player, as, for instance, when he catches a batted ball before it touches the ground or stops a fast rolling ball and through his own efforts "puts out" a runner.

A—Assists. The number of times a player by timely throwing of the ball assists a fellow player to "put out" an opposing base runner.

E—Errors. The number of errors of judgment committed which gives the opposing team an advantage; also the number of failures properly to handle the ball when it comes in a player's direction.

There are nine innings in a g. e, and one inning continues until three men are put out on each side. There are then twenty-seven "put-outs" in a game for each team. The table above shows who made the "put-outs."

Because of the length of the season, the cleanness of the sport, and the care taken in professional circles to maintain a high standard of ethics, both toward other players and toward the public, it is safe to predict that it will increase in popularity in the future fully as rapidly as it has in the past.

Questions on Athletics

What is meant by match play in golf? Medal play?

Who is "Colonel Bogey?"

Explain "A wins by three up and two to play."

Why is golf known as the "royal and ancient game?"

What is said to be the national game of Canada?

What can you say of the origin of lacrosse?

How many men play on each team?

Describe the method of play in lacrosse.

What are some of the reasons for its popularity?

In what European country was hockey especially popular as early as the sixteenth century?

What is the Stanley Cup?

What is the minimum size of a hockey rink?

How many men compose a hockey team?

What outdoor game is adapted to both sexes?

Why does golf recommend itself as an outdoor game?

Give reasons for outdoor sports gaining in popularity. Where is this especially true?

Aside from pleasure, what benefits accrue from rowing? Swimming? Tennis? Skating?

How do the schools regard this subject? What are some of the late developments along this line?

Compare the games of ancient days with those of modern times, in their effect on health, intellect and morals of the nations.

Mention games whose chief instrument is the ball, boat, gun, horse.

What are some of the far-reaching effects on a nation whose people engage in outdoor recreation?

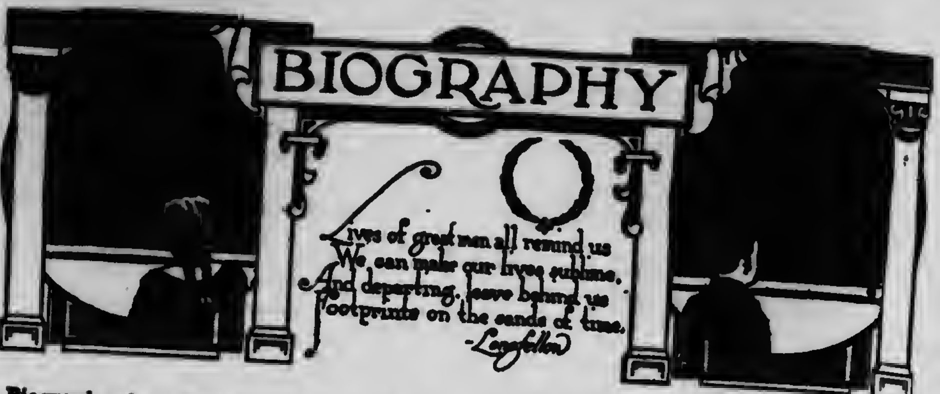
Are interest and enthusiasm necessary in what is known as gymnastics in our common schools?

Does the openness of the play help to make baseball a clean sport?

Can basketball be played all the year?

What kind of ball is used in basketball?

Is there any regulation as to size of balls and bats in the game of baseball?



Biography for Children. If the teacher or parent of a child ever hears him say, "I don't like to read biography—I don't care for 'lives' of people," that teacher or parent may be sure that the lives have simply been presented to him in the wrong way. For everyone, young or old, is naturally interested in "lives"—if they are shown him from the right angle. What, indeed, are most of the stories which so delight children but biography, presented from the point of view which appeals to a child? Joseph, Daniel, David, King Arthur, the Cid, Roland—any child will listen to stories of them told over and over again, and then ask to hear them once more. We expect a child to like stories of these heroes; we pick out the points that will strike the child's fancy, fire his imagination, hold his interest. But our attitude changes when we come to consider other men whom tradition has not marked as children's heroes. "Why," we say, "should a child be interested in the Apostle Paul? A boy or girl does not care particularly for preaching and for missionary work." And we forget that Paul had, if ever a man had, just those experiences that children love to hear about; that he was "in deaths oft, ... in journeyings often, in perils of waters, in perils of robbers, ... in perils of the wilderness, in perils in the sea." Or we think again, "Of course a child doesn't care to read about Dickens or Longfellow or Hawthorne. Of what particular interest is it to him that one man wrote *The Tale of Two Cities* and another man wrote *The Marble Faun?*" But let us see whether we cannot find in what we might at first think of as a biography for grown people plenty that would interest a child. There may be, in such a biography, an apparent lack of proportion; but it is simply an exaggeration of some points, not a distortion. As a child grows older and becomes wider in his interests, he will learn other facts to fit on to and fill out those he has already learned; but he will not need to unlearn anything of what he has remembered.

Charles Dickens

Charles Dickens did not write many things just for children; there is his *Child's History of England*, which you will read when you get a little older, and there are some of the Christmas stories which will please children almost as well as grown people. But he did not, like Hans Christian Andersen, spend the most of his busy life writing stories for children. However, no one ever loved children more or understood them better. We can see this love in the way he treats the children in his stories. There are many of these children, some of them rich, cared for and happy, but more of them poor or abused or neglected. Later on we shall see why Dickens liked to write about sad little children; just now we shall stop for a time and get acquainted with one or two of the children that everybody knows and that everybody will know as long as there are books and people to read them.

There is little Paul, in *Dombey and Son*. Everyone loves little Paul, but everyone feels sorry for him, in spite of the fact that he has a father who loves him and is willing and able to give him everything he wants that money can buy. But the poor father has never really loved anybody before, so he does not just know how to love Paul; and Paul, who is sick and weak, can't enjoy the things that other boys enjoy or be happy in the way other boys are happy. This makes him seem strange and old-fashioned, half a little boy and half a little old man. When you read the following description of him when he was at boarding school at

Doctor Blimber's, can you make a picture of him in your mind, and do you feel sorry for the strange, frail little boy?

"He grew more thoughtful and reserved every day. . . . . He loved to be alone; and in those short intervals when he was not occupied with his books, liked nothing so well as wandering about the house by himself, or sitting on the stairs, listening to the great clock in the hall. He was intimate with all the paper-hanging in the house; saw things that no one else saw in the patterns; found out miniature tigers and lions running up the bedroom walls, and squinting faces leering in the squares and diamonds of the floor-cloth."

. . . .

"Lo and behold, there was something the matter with the great clock; and a workman on a pair of steps had taken its face off, and was poking instruments into the works by the light of a candle! This was a great event for Paul, who sat down on the bottom stair, and watched the operation attentively: now and then glancing at the clock face, leaning all askew against the wall hard by, and feeling a little confused by a suspicion that it was ogling him.

"The workman on the steps was very civil; and as he said, when he observed Paul, 'How do you do, sir?' Paul got into conversation with him, and told him he hadn't been quite well lately. The ice being thus broken, Paul asked him a multitude of questions about chimes and clocks; as, whether people watched up in the lonely church steeples by night to make them strike, and how the bells were rung when people died, and whether those were different bells from wedding bells, or only sounded dismal in the fancies of the living. Finding that his new acquaintance was not very well informed on the subject of the curfew bell of ancient days, Paul gave him an account of the institution; and also asked him as a practical man, what he thought about King Alfred's idea of measuring time by the burning of candles; to which the workman replied, that he thought it would be the ruin of the clock trade if it was to come up again. In fine, Paul looked on, until the clock had quite recovered its familiar aspect, and resumed its sedate inquiry; when the workman, putting away his tools in a long basket, bade him good-day, and went away. Though not before he had whispered something on the door-mat to the footman, in which there was the phrase 'old-fashioned'—for Paul heard it.

"What could that old fashion be, that seemed to make the people sorry! What could it be!"

And aren't you glad to find that little by little all the people at the school, the teachers and the pupils and the servants, came to love Paul? This is the way Dickens tells us about it:

"In those days immediately before the holidays, in short, when the other young gentlemen were laboring for dear life through a general resumption of the studies of the whole half-year, Paul was such a privileged pupil as had never been seen in that house before. He could hardly believe it himself; but his liberty lasted from hour to hour, and from day to day; and little Dombey was caressed by every one. Doctor Blimber was so particular about him, that he requested Johnson to retire from the dinner-table one day, for having thoughtlessly spoken to him as 'poor little Dombey'; which Paul thought rather hard and severe, though he had flushed at the moment, and wondered why Johnson should pity him. It was the more questionable justice, Paul thought, in the doctor, from his having certainly overheard that great authority give his assent on the previous evening, to the proposition (stated by Mrs. Blimber) that poor dear little Dombey was more old-fashioned than ever. And now it was that Paul began to think it must surely be old-fashioned to be very thin, and light, and easily tired, and soon disposed to lie down anywhere and rest; for he couldn't help feeling that these were more and more his habits every day."

. . . .

"A buzz then went round among the young gentlemen, of 'Dombey's going!' 'Little Dombey's going!' and there was a general move after Paul and Florence down the staircase and into the hall, in which the whole Blimber family were included. . . . . The servants, with the butler at their head, had all an interest in seeing Little Dombey go; and even the weak-eyed young man, taking out his books and trunks to the coach that was to carry him and Florence to Mrs. Pipchin's for the night, melted visibly."

Florence, Paul's sister, is a lovable little girl, and we are sorry that her father cannot look at her with our eyes and love her as we do and as Paul does.

There is one little boy about whom Dickens tells a great deal, in whom he was particularly interested, and in whom we are particularly interested. That little boy is David Copperfield, and the reason that Dickens liked him and that we like him is that while he is called David Copperfield, he was really little Charles Dickens. That does not mean that everything that David says and does in the book Charles Dickens really said and did in his boyhood; but Dickens wanted David to be just the same kind of a boy that he had been; he gave David the same feelings and thoughts which he himself had had as a boy, and he made many of the things happen to David which had happened to him. We will not read anything just now about David, but will see what we can find out about the boy Dickens, partly from what others have told us, and partly from what he himself tells us about David.

Charles Dickens was born in 1812, at Landport, a suburb of Portsmouth. He was less than three years old when the family moved to London, so that he could have no memory pictures of the place in which he was born. But he remembered, as most of us can remember some little thing that happened when we were very little, that everything was white with snow when they moved. Little Charles's family was comfortable enough—they had plenty to eat and to wear, and nobody seemed to worry much about money; for Charles's father was a clerk at a fairly good salary, and while there were a good many children, the money seemed enough to go around. But Charles was different from other boys in some ways. For one thing, he was never very strong, and could not join with other children in all their play, so that he began very early to read, and to read books that most of us do not learn the names of until we are grown up. You see, there were not hundreds and hundreds of books in those days written just for children, with beautiful pictures and big print; and children who really wanted to read had to make what they could out of books written for grown people. But the books that little Charles found in a little room next to his own suited him very well. He could not understand all of them, but he knew that they were adventure stories, and he tells us, in *David Copperfield:* "I had a greedy relish for a few volumes of voyages and travels—I forget what, now—that were on those shelves; and for days and days I can remember to have gone about my region of our house, armed with the centerpiece out of an old set of boot-trees—the perfect realization of Captain Somebody, of the Royal British Navy, in danger of being beset by savages, and resolved to sell his life at a great price." And all of these stories, as well as sor which his own bright little brain made u Charles used to tell to his brothers and siste and playmates, so that we may imagine th other children liked to have him with them even if he wasn't always strong enough to play

It wasn't only the children that Charles use to tell stories to, either. His father was ver proud of his clever little boy, and very often when there was company at the house would keep him up late, far too late for a little boy, telling funny stories and singing lively songs.

But suddenly all Charles's good times came to an end—his schooldays, his comfortable living, everything. In those days if a man could not pay his debts he was sent to prison, and that is what happened to Charles's careless father when Charles was about clever years old. However, if a man in the debtor's prison had a little money he could buy good food and make himself fairly comfortable, and so it is likely that Charles's father, in prison, had a better time than Charles, who had been put to work in a blacking warehouse. He worked very hard all day, tying, trimming and labeling blacking pots; he had very little to eat; he slept all night in a miserable little attic; and he had only the roughest boys to talk with; but it was none of those things which made him most unhappy. It was simply that he could see no end to the wretched life; he couldn't see where he was to get any education or any time or chance to do anything worth while. And that was what Charles wanted most in the world—to make something of himself. He was very, very unhappy, so unhappy that he never liked, in his happy later days, to talk about this time. But he has given us, in *David Copperfield,* a good picture of his life at this time:

"Mr. Quinion then formally engaged me to be as useful as I could in the warehouse of Murdstone and Grinby, at a salary, I think, of six shillings a week. I am not clear whether it was six or seven. I am inclined to believe, from my uncertainty on this head, that it was six at first and seven afterwards. He paid me a week down (from his own pocket, I believe), and I gave sixpence out of it to get my trunk carried to Windsor Terrace at night: it being too heavy for my strength, small as it was. I paid sixpence more for my dinner, which was a meat pie and a turn at a neighboring pump; and passed the hour which was allowed for that meal, in walking about the streets."

. . . .

"I was so young and childish, and so little qualified—how could I be otherwise?—to undertake the whole charge of my own existence, that often, in going to Murdstone and Grinby's of a morning, I could not resist the stale pastry put out for sale at half-price at the pastrycook's doors, and spent in that the money I should have kept for my dinner. Then, I went without my dinner, or bought a roll or a slice of pudding. I remember two pudding-shops between which I was divided, according to my finances. One was in a court close to St. Martin's Church,—at the back of the church,—which is now removed altogether. The pudding at that shop was made of currants, and was rather a special pudding, but was dear, two pennyworth not being larger than a pennyworth of more ordinary pudding. A good shop for the latter was in the Strand—somewhere in that part which has been rebuilt since. It was a stout, pale pudding, heavy and flabby, and with great flat raisins in it, stuck in whole at wide distances apart. It came up hot at about my time every day, and many a day did I dine off it. When I dined regularly and handsomely, I had a saveloy and a penny-loaf, or a fourpenny plate of red beef from a cook's shop; or a plate of bread and cheese and a glass of beer, from a miserable old public-house opposite our place of business, called the Lion, or the Lion and something else that I have forgotten. Once, I remember carrying my own bread (which I had brought from home in the morning) under my arm, wrapped in a piece of paper, like a book, and going to a famous alamode beef-house near Drury Lane, and ordering a 'small plate' of that delicacy to eat with it. What the waiter thought of such a strange little apparition coming in all alone, I don't know; but I can see him now, staring at me as I ate my dinner, and bringing up the other waiter to look. I gave him a halfpenny for himself, and I wish he hadn't taken it.

"We had half-an-hour, I think, for tea. When I had money enough, I used to get half-a-pint of ready-made coffee and a slice of bread and butter. When I had none, I used to look at a venison-shop in Fleet Street; or I have strolled, at such a time, as far as Covent Garden Market, and stared at the pineapples. I was fond of wandering about the Adelphi, because it was a mysterious place, with those dark arches. I see myself emerging one evening from some of these arches, on a little public-house close to the river, with an open space before it, where some coal-heavers were dancing; to look at whom I sat down upon a bench. I wonder what they thought of me!"

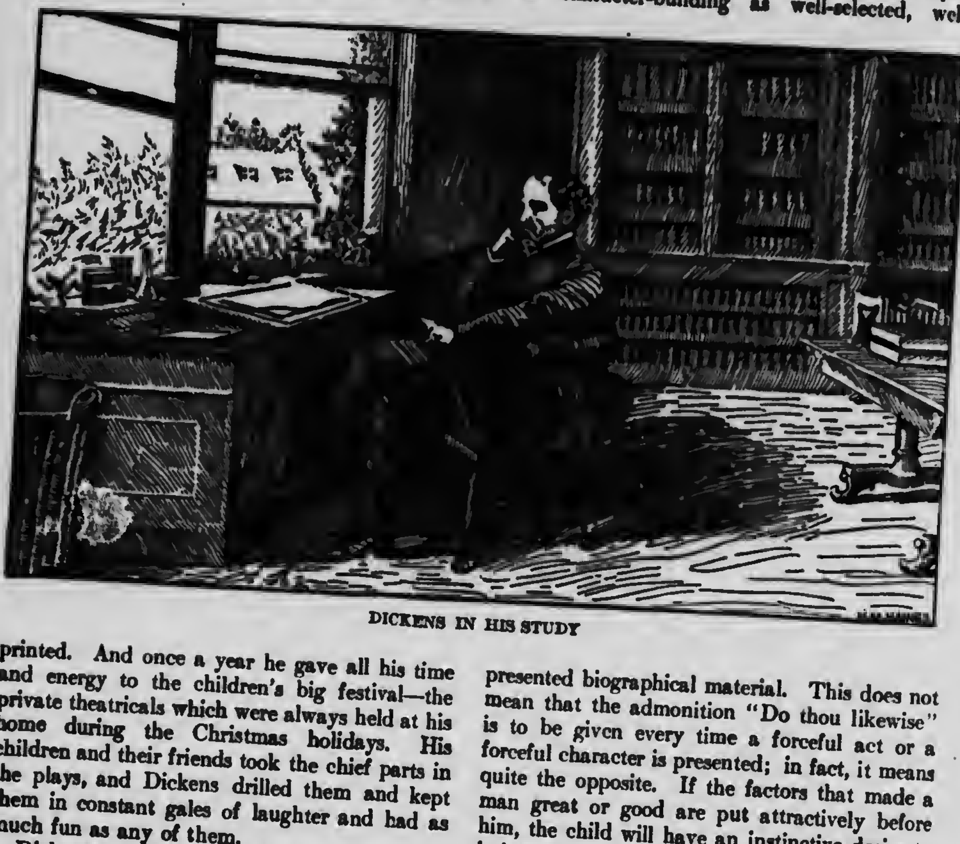
. . . .

"I know I do not exaggerate, unconsciously and unintentionally, the scantiness of my resources or the difficulties of my life. I know that if a shilling were given me at any time, I spent it in a dinner or a tea. I know that I worked from morning until night, with common men and boys, a shabby child. I know that I lounged about the streets, insufficiently and unsatisfactorily fed. I know that but for the mercy of God, I might easily have been, for any care that was taken of me, a little robber or a little vagabond."

But the wretched days did come to an end after about a year, while Charles was still young enough to enjoy the things that other boys enjoy. He was sent to school, and of that school and his comrades there he has written again in *David Copperfield*.

It is a joy to us to know that Charles did have good times—real "boy" good times—after all his hard days. We like to read of the fun he had with a secret language which he made up, and which sounded like mere gibberish to those who did not know it; we like to hear about the little toy theater, all bright with paint and red fire, in which he made his toy actors act out the stories he was always so fond of writing; and we are sorry that the school days were so short, and that Charles was so soon back at work again. But this time it was more pleasant work. To be sure, he was little more than office-boy in a lawyer's office, but he was at least among people who saw that he was an unusual boy; he had a chance to learn, and time to learn. And he used the time and the chance with all his might. It does not sound unusual to say that he learned shorthand by himself, but it was a long, hard task, to which the boy set himself like a young hero. In his own bright way he has made David tell us some of the hard things about this shorthand learning. He had learned the alphabet, he says, but "there then appeared a procession of new horrors, called arbitrary characters—the most despotic characters I have ever known; who insisted, for instance, that a thing like the beginning of a cobweb meant 'expectation' and that a pen-and-ink skyrocket stood for 'disadvantageous.'" When the learning period was over, one of his friends said of him, "There never *was* such a shorthand writer."

Dickens was now a man, more than ready to do a man's work. When you are older you will read his wonderful books, with their characters that everybody knows and remembers as if they were real people. But what we care most about now is the man Dickens. He was a very lovable man, a little quick and excitable and nervous, sometimes, but always bright and entertaining. His children must have been very happy and very proud of their father. He spent much time with them, playing, walking, reading. When he was away he wrote them funny letters; and the *Child's History of England* he wrote just for his own children, never meaning to have it



DICKENS IN HIS STUDY

printed. And once a year he gave all his time and energy to the children's big festival—the private theatricals which were always held at his home during the Christmas holidays. His children and their friends took the chief parts in the plays, and Dickens drilled them and kept them in constant gales of laughter and had as much fun as any of them,

Dickens lived to be only fifty-eight years old. And when he died, people mourned for him as scarcely any other man has been mourned for. For hundreds of thousands of people had read his books, and all of these readers felt as if they had lost a personal friend. His own family wanted him buried near his own home at Gad's Hill; but Dickens had not belonged just to his own family, but to the public which had so loved him and his works. And that public felt that Dickens should be buried in the place where the most famous Englishmen have been buried—in Westminster Abbey. So there, in the Poets' Corner, they placed the body of the great writer whom Englishmen and Americans, grown people and children, loved while he lived and have gone on loving since his death.

Biography in the School. The teacher finds many uses for biography besides the merely intellectual one. There is nothing so helpful in character-building as well-selected, well-presented biographical material. This does not mean that the admonition "Do thou likewise" is to be given every time a forceful act or a forceful character is presented; in fact, it means quite the opposite. If the factors that made a man great or good are put attractively before him, the child will have an instinctive desire to imitate them. Perhaps the clearest way to present this matter is to give a brief sketch of the characteristics of one of the heroes of every Canadian school child. The teacher might take General Wolfe as an example. The children should first know the main facts of his life in order that in the later study the emphasis may be upon character.

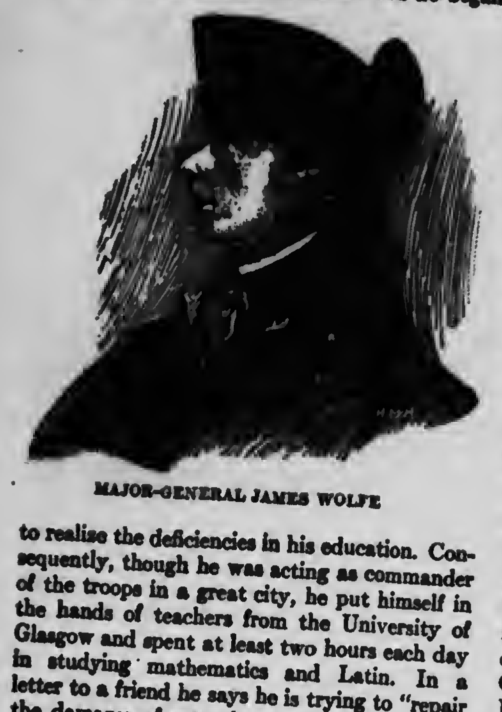
Life of General Wolfe. James Wolfe, the hero of Quebec, was born at Westerham, in Kent, England, on the 2d of January, 1727. At Westerham, in a fine old mansion, James and his brother Edward, a year younger, used to romp about. Comparatively little is known of these childhood days, but one seems to see the small eager children, scampering through the house, playing in the garden with the dogs, or sailing a fleet of toy boats on the waters of a neighboring brook. Or again they might be sitting at the fireside just before bed-time, listening to their father, the stout, gouty colonel, as he told them stories of the battles in which he had fought under Marlborough and Prince Eugene of Savoy. It is little wonder that little red-haired James and his chum, George Warde, who later became a famous cavalry general, roamed the neighborhood on foot or on horseback, fought mimic battles, ambushed each other and solved all sorts of military problems. James' brother, Edward, was supposed to be more interested in books than in battles, but when the time came he followed his brother's example and entered the army. For a short time the two brothers were together in Flanders, but in the autumn of 1744, Edward's regiment was ordered to a new post. Here his health rapidly went to pieces and he died of consumption after a few weeks of suffering. He was only sixteen years old. In writing to his parents about Edward's death, James speaks of his brother as follows:

"He was an honest and a good lad, had lived very well, and always discharged his duty with the cheerfulness becoming a good officer. He lived and died as a son of you two should, which, I think, is saying all I can. I have the melancholy satisfaction to find him regretted by his friends and acquaintances. His Colonel is particularly concerned for him, and desired I would assure (you) of it. There was in him the prospect (when ripened with experience) of good understanding and judgment, and an excellent soldier. You'll excuse my dwelling so long on this cruel subject, but in relating this to you, vanity and partiality are banished. A strong desire to do justice to his memory occasions it."

Written in the formal style of the day, this letter nevertheless helps us to form some idea of Wolfe's character. His respectful devotion to his parents is apparent. Fifteen years later, when he was ordered to Canada, he preferred to leave without seeing his mother, because he felt that she would suffer more from the formality of a farewell visit. This desire to avoid show or display of any kind was especially characteristic of Wolfe, even as a boy. All that he says about his brother may equally well be said of him. A strong desire to do justice to everybody, not only to his brother and parents, is also noteworthy. The story is told that after the battle of Culloden Moor, Wolfe and his commander, the Duke of Cumberland, were riding over the battlefield, when the Duke observed a wounded Highlander smiling defiance at him. Turning to Wolfe, the Duke said, "Wolfe, shoot me that Highland scoundrel who dares look on us with such contempt and insolence." Whereupon the young aide replied: "My commission is at your Royal Highness's disposal, but I can never consent to become an executioner." This was Wolfe at the age of nineteen, daring to disobey because justice and humanity were strong in him. Such qualities as these made his soldiers love him.

Yet Wolfe was a strong disciplinarian. In 1749, when he was major in command at Stirling, he issued the following order: "The Major desires to be acquainted in writing with the men and the companies they belong to, and as soon as possible with their characters, that he may know the proper objects to encourage and those over whom it will be necessary to keep a strict hand. The officers are enjoined to visit the soldiers' quarters frequently; now and then to go round between nine and eleven o'clock at night, and not trust to sergeants' reports. They are also requested to watch the looks of the privates and observe whether any of them were paler than usual, and that the reason might be inquired into and proper means used to restore them to their former vigour." Wolfe's care was always for the men in his charge. To this fact must be attributed much of his success; he always knew the condition of his men, and this, thanks to his foresight, was nearly always perfect. The responsibilities of his command weighed upon him. "You can't conceive," he writes to his mother, "how difficult a thing it is to keep the passion within bounds, when authority and immaturity go together. Fancy you see me, one that must study the tempers and dispositions of many men, in order to make their situation easy and agreeable to them, and should endeavor to oblige all without partiality, a mark set up for everybody to observe and judge of." He was less concerned with his personal affairs than with the affairs of his soldiers. It was always his men of whom he was thinking.

Wolfe was not lacking in self-confidence and independence when these were necessary, as the anecdote of his reply to the Duke of Cumberland shows. Though he was much younger than most of his fellow-officers, he felt that he was wasting his time in Scotland and constantly chafed under the restraints of garrison life. Yet he made the best of matters. An episode illustrating this may be mentioned. After spending only a few weeks at Stirling, he was ordered to Glasgow. It was now over six years since Wolfe had attended school and he began



MAJOR-GENERAL JAMES WOLFE

to realize the deficiencies in his education. Consequently, though he was acting as commander of the troops in a great city, he put himself in the hands of teachers from the University of Glasgow and spent at least two hours each day in studying mathematics and Latin. In a letter to a friend he says he is trying to "repair the damages of my education." For several years he continued his studies, until, as he humorously remarks in a letter to his father, he had "grown perfectly stupid."

The outbreak of the Seven Years' War in 1756 gave Wolfe his great opportunity. He took part in an expedition against Rochefort, a seaport of France. Though the expedition failed miserably, he distinguished himself by his good sense and decision, when all the other officers threw away their opportunities in useless argument. The failure of the expedition disgusted Wolfe the more because the chances of success had been so good. Now Wolfe turned his attention to America. Like Pitt, he realised that in America was to come the real struggle. "In America," wrote Pitt, "England and Europe were to be fought for." The French under Montcalm had just captured Fort William Henry and were driving the English before them. At this crisis radical measures were necessary. Three expeditions, against Fort du Quesne, Ticonderoga and Crown Point, and Louisburg, were to save the English cause. Wolfe was created brigadier-general and in May, 1758, arrived at Halifax. The expedition against Louisburg succeeded, as Wolfe had confidently expected. The fortress was unable to withstand the fire of the enemy and after a short siege surrendered. The engineer who directed the approaches at Louisburg was a very formal man and Wolfe did not hesitate to complain of his slowness. "My maxim," said the engineer, "is 'slow and sure.'" "And mine," instantly replied Wolfe, "is 'quick and sure'—a much better maxim." The retort is characteristic of Wolfe. He himself could be formal, but when the time came to strike, he struck and struck hard. He was more than a mere machine; he was one of the most brilliant soldiers England ever had. Though only a subordinate officer, he was generally hailed as the hero of Louisburg and Pitt had already marked him out to lead the expedition against Quebec.

On the 14th of February, 1759, the expedition against Quebec set sail from England, and on the 30th of April it reached Halifax. Every child knows the rest of the story—the preparations, the disappointments and setbacks, the quarrels with his brigadiers, and the final victory on the Plains of Abraham. Hot-headed and independent by nature, at the supreme crisis of his life, Wolfe was hampered by difficulties which only served to bring out his sterling qualities. On the night of the 12th of September the British army climbed the steep path from Wolfe's Cove and on the morning of the 13th stood on the Plains of Abraham ready to give battle. A conspicuous figure was Wolfe—over six feet high, in his bright new uniform, a man daring, impetuous, absolutely without fear. Leading the charge, he was mortally wounded. Just before he died he heard the words, "They run—they run." "Who run?" he asked earnestly. "The enemy, sir," came the answer. Wolfe gave a brief command in regard to his troops, then turned on his side, and murmuring, "Now God be praised, I die happy," in a few moments passed away.

Method of Studying Biography. The New Practical Reference Library has a very complete department of biography, including, as it does, the lives of over three thousand men and women of all times and of all nations. In the case of many of these, of course, it has been possible to give only the chief facts of the life, the outstanding reason for which the man or woman is remembered. But in the case of persons who are recognized as really great in any field, who have seriously affected history, more is given; interesting facts and anecdotes, little personal touches are introduced, which make the reader feel that such people really lived.

The field of biography is so wide that no one would think of beginning its study with no more definite idea than to "learn biography." Each student is interested primarily in great men and women of some particular class or classes; and the Classified Index in this volume makes possible and easy a systematic study of biography according to departments. The names in the Index are, moreover, not only divided by departments, but subdivided by countries, so that a student who wishes to learn about English novelists, for example, does not need to look up all the novelists whose names appear in the five volumes.

It is not necessary that we give here any list, even partial, of the biographies contained in this work. To show, however, the comprehensiveness of the field covered we give here a list of the classes into which the department of biography is divided in the Index:

Actors and Actresses
Adventurers
Aeronauts
Anarchists
Archaeologists
Architects
Artists, Miscellaneous
Astronomers
Authors, Miscellaneous
Botanists
Capitalists
Chemists
Churchmen
Colonists
Criminals
Critics
Dramatists
Economists
Editors
Educators
Engineers
Essayists
Explorers
Financiers
Geographers
Geologists
Historians
Humorists
Indians
Inventors
Journalists
Labor Leaders
Lawyers
Librarians
Mathematicians
Merchants
Missionaries
Musicians
Naturalists
Naval Leaders
Novelists
Orators
Painters
Patriots
Philanthropists
Philosophers
Physicians and Surgeons
Physicists
Physiologists
Pioneers
Poets
Presidents—American
Pretenders
Printers
Psychologists
Publishers
Reformers
Religious Leaders
Revolutionists
Rulers
Saints
Satirists
Scholars
Sculptors
Socialists
Soldiers
Statesmen and Politicians
Miscellaneous

Such a classified list of biographies should be of the greatest service to teachers. In connection with the subject of geology, for example, it is possible to find out in a moment, by mere reference to the Index, who the men are who have contributed most to the science; with the expenditure of a little time and labor, it is easy to learn just what the contribution of each man was. Such information is not always available in handy form. In the department of literature the classification makes of the five volumes really a supplementary textbook. Most textbooks treat authors chronologically, by periods; this arrangement makes possible a survey of each great department of literature, poetry, the drama, the novel, etc., separately.

No distinction has been made in the Index between men and women—poets have been classed as poets, whether they were men or women. Since it may easily happen that one may wish to know just how many of our famous people have been women, just how many women would be considered worthy of a place in such a work of reference, we give here a list of those whose biographies are included in The New Practical Reference Library:

Adams, Maude K.
Addams, Jane
Albani, Emma
Alboni, Marietta
Alcott, Louisa M.
Alden, Isabella M.
Alexandra
Anderson, Mary
Anna Ivanovna
Anne
Anthony, Susan B.
Arnim, Bettina von
Aspasia
Austen, Jane
Barbara, Saint
Barr, Amelia E.
Barton, Clara
Bernhardt, Sarah
Blackwell, Elizabeth
Blessington, Countess of
Bloomfield-Zeisler, Fanny
Boadicea
Boleyn, Anne
Bonheur, Rosa
Booth, Maud Ballington
Bradstreet, Anne
Bremer, Fredrika
Bridgman, Laura
Bronté, Charlotte
Browning, Elizabeth Barrett

Burdett-Coutts, Angela
Burnett, Frances Hodgson
Calve, Emma
Caroline Amelia Elizabeth
Cary, Alice
Cary, Phoebe
Catalani, Angelica
Catharine I
Catharine II
Catharine de Medici
Catharine of Aragon
Cecilia, Saint
Cenci, Beatrice
Chaminade, Cecile Louise
Child, Lydia Maria
Cleopatra
Colonna, Vittoria
Corday d'Armont, Charlotte
Corelli, Marie
Cornelia
Cotes, Sara J. Duncan
Craigie, Pearl Richards
Craik, Dinah M.
Curie, Madame
Cushman, Charlotte
Cushman, Pauline
Darling, Grace
Darrah, Mrs. Lydia
Davenport, Fanny
Davis, Rebecca Harding
Deland, Margaret W.
Dickinson, Annie Elizabeth
Dix, Dorothea Lynde
Dodge, Mary Abigail
Dodge, M. E. M.
Dora D'Istria
Doremus, Mrs. Sarah Platt
Du Barry, Countess
Duse, Eleanora
Eames, Emma
Eaton, Margaret O'Neill
Eddy, Mary Baker
Edgeworth, Maria
Edwards, Amelia Blandford
Elizabeth
Eugenie, Marie de Montijo
Fiske, Minne Maddern
Foote, Mary Hallock
Freeman, Mary E. Wilkins
French, Alice
Fry, Elizabeth G.
Gadski, Johanna
Godwin, Mary
Gore, Catharine Grace
Gould, Helen Miller
Greenaway, Kate
Grey, Lady Jane
Harraden, Beatrice
Harrison, Constance Carey
Hemans, Felicia D.
Hosmer, Harriet
Howe, Julia Ward
Howitt, Mary
Hungerford, Mrs. Margaret
Hunt, Mary Hannah
Hutchinson, Anne
Hypatia
Ingelow, Jean
Isabella II
Isabella of Castile
Jackson, Helen Hunt
Janauschek, Fanny
Jewett, Sarah Orne
Johnston, Mary
Josephine
Kauffman, Angelica
Keene, Laura
Keller, Helen Adams
Kellogg, Clara Louise
Kemble, Frances Anne
Kendal, Mrs.
Langtry, Lillie
Larcom, Lucy
Liliuokalani
Lind, Jenny
Livermore, Mary A.
Lockwood, Belva Ann Louisa
Lyon, Mary
Macdonald, Flora
Maintenon, Marquis de
Malibran, Maria Felicita
Margaret
Margaret of Anjou
Margaret of Navarre
Marlowe, Julia
Maria Christina
Maria Louisa
Maria Theresa
Marie Antoinette
Mary I
Mary II
Mary Stuart
Melba, Nellie
Mitchell, Maria
Mitford, Mary Russell
Modjeska, Helena
Montagu, Mary Wortley
More, Hannah
Morris, Clara
Mott, Lucretia
Moulton, Ellen Louise Chandler
Murfree, Mary N.
Nethersole, Olga
Nightingale, Florence
Nilsson, Christine
Nordica, Madame
Octavia
Oliphant, Mrs. Margaret
Ossoli, Sarah Margaret Fuller, Marchioness
Palmer, Alice Freeman
Patterson, Elizabeth
Patti, Adelina
Pocahontas
Porter, Jane
Procter, Adelaide Anne
Rachel, Mademoiselle
Radcliffe, Ann Ward
Ramée, Louise de la
Rehan, Ada
Repplier, Agnes
Rice, Alice Hegan
Riggs, Kate Douglas Wiggin
Ristori, Adelaide
Rives, Amelie
Rohlfs, Anna Katharine Green
Rosamond
Rossetti, Christina Georgina
Sand, George
Sappho
Schumann-Heink, Ernestine
Sedgwick, Catherine Maria
Sembrich, Marcella
Semiramis
Siddons, Mrs. Sarah
Sigourney, Mrs.
Somerville, Mary
Sontag, Henriette
Stael-Holstein, Baroness de
Stanton, Elizabeth Cady
Stowe, Harriet Beecher
Stuart, Ruth McEnery
Tarbell, Ida M.
Terhune, Mary Virginia
Terry, Ellen
Theresa, Saint
Urso, Camilla
Ursula, Saint
Veronica, Saint
Victoria
Walpurga
Ward, Elizabeth Stuart Phelps
Ward, Mrs. Humphrey
Warner, Susan
Washington, Martha
Wharton, Edith
Whitney, Adeline Train
Wilcox, Ella Wheeler
Wilhelmina
Willard, Emma Hart
Willard, Frances E.
Yonge, Charlotte M.
Young, Ella Flagg
Xanthippe
Zenobia

In addition to this long list, the biographies of a number of distinctively Canadian women have been added to this volume, as follows:

Arthur, Julia
Blewett, Jean
Cameron, Agnes Dean
Carlyle, Florence
Crawford, Isabella
Dougall, Lily
Laut, Agnes Christina
Machar, Agnes
Parlow, Mary Kathleen
Secord, Laura
Traill, Catherine Parr
Wetherald, Agnes

All the biographies in this volume are listed in the Correlative Index, beginning on page 763, as well as in the special index for the Educator.

Canadian Biography

Besides the many hundreds of biographical sketches in the first five volumes, the editors have added a special department of Canadian biography. The lives of nearly 400 eminent Canadians are here presented, some briefly, some at length, but all in such a way that the important facts are made clear. It has been the aim of the editors to include men and women in all walks of life—statesmen, explorers, poets, novelists, artists, musicians, capitalists, soldiers, scientists, churchmen and educators. People who are making history have been included as well as people who have made history. Lack of space has made it necessary to limit the biographies to such as would be needed in the work of the average public school. Whenever possible the biography of an individual has been related to others in such a way that the student may appreciate the true significance of his career. At the same time these biographies provide an up-to-date work of reference. The reader who wishes to read the life of only one man at a time will find it as satisfactory for his purpose as it is for the student.

Abbott, John Joseph Caldwell, Sir (1821-1893), statesman, born at St. Andrew's, Quebec. He was educated at McGill University, where later he became dean of the faculty of law and one of the governors. His first appearance in public life was in 1857, when he contested the representation of his native county of Argenteuil; after an investigation that lasted two years he obtained the seat and was successively reëlected till 1874. In 1862, as solicitor-general, he introduced the use of stamps in the payment of judicial and registration fees in Lower Canada, he remodeled the jury law, and he drafted and carried through Parliament an insolvency act which is the basis of Canadian law today. From 1887 to 1889 he was mayor of Montreal and at the same time a member of the Dominion Senate In the cabinet of Sir John Macdonald he became a member without portfolio, and after Macdonald's death in 1891, he became premier. Old age and the cares of office overburdened him, however, so that he resigned on December 5, 1892. He died on May 24, 1893. (For portrait, see illustration facing page 210.)

Aberdeen, John Campbell Gordon, Seventh Earl of (1847-), a prominent English Liberal statesman, was born on August 3, 1847, and was educated at St. Andrew's University and at University College, Oxford. Since 1880 he has been lord-lieutenant of Aberdeenshire. In 1886 and again from 1906 to 1911 he was lord-lieutenant of Ireland. From 1893 to 1898 he was governor-general of Canada, where his excellent qualities made him very popular. He was an honorary officer of several regiments and received honorary degrees from the University of Aberdeen, Queen's, McGill, Ottawa, Toronto, Laval and other universities.

Adams, Frank Dawson, Ph.D., D.Sc. (1859-), educator, born at Montreal. He attended the Montreal High School and McGill University; later he studied at Yale and at Heidelberg, Germany, where he received the degree of Doctor of Philosophy in 1892. He was appointed professor of geology at McGill in 1893 and became dean of the faculty of applied science in 1908. Dean Adams is a member of numerous scientific societies and is well-known for his published reports and papers on the geology of Canada.

Aikins, James Cox, LL.D. (1823-1904), a statesman, born in Toronto, Ontario, and educated at Victoria College, Cobourg. He began life as a farmer, but at the age of twenty-one was elected to represent his native county in the legislature. At the formation of the Macdonald government he entered the cabinet as secretary of state and registrar general, and held these offices until 1873. He was the author of the public lands act, and also organized the Dominion lands bureau, which is now a branch of the department of the interior. On the return of his party to power in 1878, Mr. Aikins was again appointed secretary of state, but he exchanged the office for that of minister of inland revenue in 1880. Two years later he resigned from the cabinet and was appointed lieutenant governor of the province of Manitoba. On the expiration of his term of office he was called to the Senate.

Allan, Hugh, Sir (1810-1882), financier, was born at Saltcoats, Ayrshire, Scotland, on the 29th of September, 1810. Emigrating to Canada at the age of sixteen, he soon entered the employ of the principal ship-building and grain-shipping firm of Montreal, of which he became a junior partner in 1835. In 1853 he organized the Allan Line of steamships and until his death he was intimately connected with the growth and commercial prosperity of Canada. He was one of the original promoters of the Canadian

Pacific Railway, but the company, which had already received a charter, was dissolved as the result of disclosures with reference to political influence.

Allan, Hugh Montagu, Sir (1860–), K.B., C.V.O., son of Sir Hugh Allan, was born at Montreal. He was educated at Bishop's College, Lennoxville, Quebec, and in Paris, France. He was created a Knight Bachelor by His Majesty King Edward VII in 1904 and made a Commander of the Victorian Order in 1906. Sir Hugh is vice-chairman of the Allan Line Steamship Company and a director in many other corporations.

Allard, Jules (1859–), lawyer and statesman, born at St. Francois du Lac, Quebec; educated at Nicolet College. He was called to the bar in 1883 and soon rose to distinction in his native town; he was president of the school commissioners from 1892 to 1898, mayor of the village from 1895 to 1898, and registrar of Yamaska county, 1890-97. He was elected to the legislature of Quebec in 1898 and reëlected at each election since. In 1905 he became minister of public works for the province, in 1906 minister of agriculture and in 1909 minister of lands and forests.

Allen, Grant (Charles Grant Blairfindie), (1848-1899), author, born at Kingston, Ontario. He was educated in America and France and later at King Edward's School, Birmingham, and at Merton College, Oxford. He was a voluminous writer on scientific subjects, which he treated in popular fashion, but is best known as the author of numerous novels and books of travel.

Amherst, Jeffrey, Baron (1717–1779), English soldier, born in Kent, England. He entered the army in 1731 and served in various capacities until, in 1758, he was appointed major-general and was put in command of the expedition against Louisburg, which surrendered after a short siege. In September he became commander-in-chief of the British forces which won the victories of Crown Point and Ticonderoga. For his services in winning Canada for Great Britain he was made governor-general and was formally thanked by Parliament. After his return to England in 1763 he held a number of important offices and for several years was commander-in-chief of the British army.

Angers, *angh'eir,* Auguste Real, LL.D. (1838–), statesman, born in the city of Quebec and educated at Nicolet College. He began the practice of law in 1860, and was appointed queen's counsel in 1874. The same year he entered the Quebec assembly and held his seat for five years. Later he was solicitor and attorney-general in the Boucheville ministry. On the dismissal of the government in 1878 he became leader of the opposition in the assembly and retained this position for three years. In 1880 he was elected to the House of Commons, and the same year was appointed judge of the superior court of the province of Quebec, which position he resigned in 1887 to assume the duties of lieutenant-governor of the province. In 1892 he entered the Thompson administration at Ottawa as minister of agriculture, and continued in the office under Sir Mackenzie Bowell until 1895, when he resigned and resumed his practice of law. The following year he entered the government formed by Sir Charles Tupper, as president of the council, but resigned after a few months.

Anglin, Francis Alexander (1865–), lawyer and judge, educated at St. Mary's College, Montreal, and at the University of Ottawa. He was called to the bar in 1888, became judge of the Ontario High Court in 1904, and judge of the Supreme Court of Canada in February, 1909.

Archibald, Adams George, Sir (1814–1892), statesman, born at Truro, Nova Scotia; educated at Pictou College. He was called to the bar in 1839 and entered public life in 1851, when he was elected to the House of Assembly of Nova Scotia. He became in turn solicitor-general for the province, attorney-general, advocate-general in the vice-admiralty court of Halifax, and member of the Dominion Parliament. He was a member of the Quebec Conference and played an important part in the work preceding Confederation. He resigned from Parliament in 1870 to become the first lieutenant-governor of Manitoba, a position he filled with great success for two years. In later years he was lieutenant-governor of Nova Scotia and from 1888 to 1891 again a member of the House of Commons.

Argyll, John Douglas Sutherland Campbell, Duke of Argyll, Marquis of Lorne, etc., (1845–), born in London, educated at Eton and at Trinity College, Cambridge. From 1868 to 1878 and again from 1895 to 1900 he was a Unionist member of the British Parliament. From 1878 to 1883 he was governor-general of Canada in succession to the Marquis of Dufferin and Ava. He married H. R. H. Princess Louise, daughter of Queen Victoria, in 1871. He is the author of numerous books, including *Canadian Pictures, Memories of Canada and Scotland, Life of Palmerston* and *Life and Times of Queen Victoria.* (For portrait see illustration facing page 209.)

Armstrong, Hugh (1858–), a business man and legislator, born in New York. He went to Manitoba in 1883, and engaged in business. He was elected to the legislature in 1892 and resigned in 1896 to contest the election for a seat in the House of Commons, but was defeated. He was again elected to the legislature in 1902, was reëlected in 1903 and in 1907, and became provincial treasurer in the Roblin cabinet.

Arthur, George, Sir (1784–1854), British colonial governor, was born at Plymouth, England. At the age of eighteen he entered the army, in which he served with great distinction. He was appointed successively lieutenant-governor of British Honduras, of Tasmania and of Upper Canada. In Canada he used every means to punish those who had taken part in the rebellion of 1837, but interference by the home government prevented excesses.

Arthur, Julia (1869–), an actress, born in Hamilton, Ontario. Her real name is Ida Lewis. She began amateur dramatic work when only eleven years old, and three years later made her professional debut as the Prince of Wales in Daniel E. Bandmann's presentation of *Richard III.* She went to England and Germany, where she studied violin music and dramatic art and returned to America and made her first public appearance at Union Square Theater in New York. She developed unusual histrionic powers and later became one of Sir Henry Irving's company, playing with him and Miss Ellen Terry in various Shakespearean roles. She has written numerous articles for the press, some of which have attracted wide attention.

Auden, Henry William (1867–), educator, graduated at Shrewsbury School and Christ's College, Cambridge, where he took several prizes for excellence in the classics. He is the editor of a number of Latin and Greek textbooks. He came to Canada in 1903 and is now principal of Upper Canada College, Toronto.

Aylesworth, Allen Bristol, Sir, K.C., K.C.M.G., (1854–), statesman, born at Newburgh, Ontario; educated at the Newburg High School and Toronto University. He was called to the bar in 1878. In 1903 he was appointed one of the commissioners for the settlement of the Alaska boundary dispute with the United States. He entered Parliament in 1905 and was appointed postmaster-general. In 1906 he became minister of justice, but resigned in 1911, when he was defeated for reelection to Parliament.

Aylmer, Lord, The Rt. Hon. Sir Matthew (1842–), born at Richmond, Quebec; educated at Montreal High School and McGill University. He served six years as lieutenant in the 7th Royal Fusiliers and thirty-five years on the staff of the Canadian forces. He retired from the service in 1907 with the rank of major-general and has since been engaged in fruit farming in British Columbia.

Bagot, Charles, Sir (1781-1843), British diplomatist and colonial governor. At various times from 1814 to 1834 he represented Great Britain at Paris, Washington, St. Petersburg, The Hague and Vienna. While at Washington he negotiated the Rush-Bagot treaty, which limited the number and size of war vessels on the Great Lakes. In 1842 Sir Charles was appointed governor-general of Canada, but he died before he had time to leave an impress on Canadian history.

Baker, Alfred, M.A., an educator, prepared at the Toronto grammar school and the University of Toronto. He became a teacher of mathematics in the Upper Canada College, and in 1875 was appointed tutor of mathematics, and the next year registrar of the University College, Toronto. In 1885 he was appointed dean of residence in the University, and two years later succeeded to the chair of mathematics. He was elected senator of Toronto University in 1895, and the following year president of the Ontario Educational Association and member of the Educational Council in Ontario. In 1897 he was elected a member of the Council of American Mathematical Societies. Professor Baker is the author of many articles and books on geometry, trigonometry and mechanics.

Baldwin, Robert (1804–1858), statesman, born in Toronto; educated under the direction of Bishop Strachan. He served in the Assembly of Upper Canada, became solicitor-general for Upper Canada in 1840 and was attorney-general and premier, 1842-1843. Baldwin's first cabinet marks the introduction of a responsible ministry into Canadian government. From 1848 to 1851 he was again at the head of the cabinet; during this second period the amount of constructive legislation was unprecedented, including the organization of the municipal system as it now exists, the establishment of Toronto University on a non-sectarian basis, the creation of the courts of common pleas and chancery, the opening of the St. Lawrence to commerce

HON. ROBERT BALDWIN

after the repeal of the British navigation acts, and the abolition of the old preferential tariff. Never physically robust, failing health compelled his retirement from political life at the early age of forty-seven.

Barnard. GEORGE HENRY, K.C. (1868–), legislator, born at Victoria, British Columbia; educated at Trinity College School, Port Hope, Ontario. He was called to the bar in 1891, became alderman in Victoria in 1902 and was mayor 1904-05. Since 1908 he has represented Victoria in the House of Commons.

Barr, ROBERT (1850–), an author, born in Glasgow, Scotland, educated in the Normal School of Toronto. He began his career as a teacher, and in 1875 was appointed head master of the Windsor, Ontario, Central School. While in this position he wrote a humorous sketch of a journey made by himself and a friend in a small boat along the southern shores of Lake Erie. This was published in the Detroit (Mich.) *Free Press* and was quoted far and wide. As a result, Mr. Barr was invited to join the staff of that paper, which he did in 1876. In 1881 he went to England and established the weekly edition of the *Free Press* in London. His writings, under the pen name of Luke Sharp, became widely popular throughout the United Kingdom. In 1892 he established the *Idler Magazine*, under the dual editorship of himself and Jerome K. Jerome. In addition to his newspaper and magazine writings Mr. Barr has published a number of books: chief among these are *Strange Happenings in a Steamer Chair, From Whose Bourne, The Face and the Mask, In the Midst of Alarms, A Woman Intervenes, The Mutable Many and One Day's Courtship.*

Beck, ADAM (1857–), manufacturer and legislator, born at Baden, Ontario; educated there and in Galt. He was elected to the Ontario legislature in 1902 and was returned at the general elections in 1905 and 1908. He was appointed a minister without portfolio in the Whitney administration in 1905, and was mayor of London, Ontario, 1902-04. He is the originator of the hydro-electric power legislation and a member of the commission which controls the sale of power to the cities.

Beck, NICHOLAS DOMINIC, LL.B. (1857–), jurist, born at Cobourg, Ontario; educated at the University of Toronto. He has been identified with Catholic educational affairs for many years and has been a member of the Educational Council. He has taken an active interest in the University of Alberta and is its vice-chancellor. His present official position is judge of the Supreme Court of Alberta.

Begin, LOUIS NAZAIRE, Mgr. (1840–), prelate, born at Lewis, Quebec; educated at Quebec Seminary and the French Seminary at Rome. He was ordained priest on June 10, 1865, became bishop of Chicoutimi, 1888, and archbishop of Quebec, 1898. He is the author of *The Rule of Faith, The Infallibility of the Sovereign Pontiffs* and other books on religious questions.

Bell, ROBERT, F.R.S., D.Sc. (1841–), geologist, born at Toronto; educated at McGill and Edinburgh universities. Dr. Bell is one of Canada's most distinguished geologists and has done much to add to our knowledge of Canadian conditions. He made the first surveys of many of the western rivers and lakes, among them Lake of the Woods, Winnipeg, both lake and river, Great Slave Lake and the Athabasca, Slave, Nelson and Moose rivers. He is a member of many scientific societies and has published numerous reports and papers of great value.

Bell-Smith, FREDERICK MARLETT (1846–), artist, was born in London, England, and studied drawing at South Kensington. He arrived in Canada in 1867 and became a charter member of the Society of Canadian Artists, organized in that year. He is a member of the council of the Royal Canadian Academy of Arts, president of the Ontario Society of Artists and has been director of fine arts in Alma College since 1881. Among his principal paintings are *Queen Victoria's Tribute to Canada*, for which Her Majesty gave personal sittings, *Landing of the Blenheim*, in the national collection at Ottawa, and *Lights of a City*, in the Ontario collection.

Bengough, *ben goff*, JOHN WILSON (1851–), a caricaturist, lecturer and poet, born in Toronto and educated at the Whitby district and grammar schools. He prepared for the practice of law, but changed to journalism. He established in Toronto in 1873 *The Grip*, a humorous weekly illustrated by himself. His political cartoons in this paper showed a high degree of artistic talent and attracted wide attention, the New York *Herald* pronouncing him the greatest cartoonist living upon this side of the continent. In 1892 he severed his connection with *The Grip* and was employed for a time as caricaturist by the Montreal *Star;* later he joined the staff of the Toronto *Globe* in the same capacity. Mr. Bengough is also widely known as a humorous lecturer and as a poet. He is the author of the famous election song, *Ontario, Ontario.* Among his publications are *Popular Readings, Original and Selected; Caricature History of Canadian Politics; Motley Verses, Grave and Gay; The Up-to-Date Primer, A First Book of Lessons for Little Political Economists.* He was appointed an associate of the Royal Canadian Academy of Arts upon the formation of that institution in 1880; in 1891 he was elected president of the Single Tax Association.

Betts, CRAVEN LANGSTROH (1853–), author, born at St. John, New Brunswick. Since 1879 he has resided in New York and has devoted himself to literature. He has published many poems in magazines; among the collections of his verse are *Songs from Beranger, The Perfume Holder, A Persian Love Story* and *A Garland of Sonnets.*

Blake, EDWARD (1833–1912), born in Adelaide, Ontario, educated at Upper Canada College and the University of Toronto. He was called to the bar in 1856 and soon became prominent. In 1867 he was elected to the Ontario assembly, where he was leader of the Liberal Opposition till 1871, when he became premier of the province. He resigned after a year, but again came into prominence in Hon. Alexander Mackenzie's ministry. In 1875 he became minister of justice, in the same month declining the chief justiceship of the Dominion. From 1867 till his retirement from political life in 1891 he served almost continuously in the

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House of Commons. From 1892 until 1907 he was a Nationalist member of the British House of Commons; he resigned because of ill health and returned to Toronto, where he died.

Blewett, JEAN (1862–), an author, whose maiden name was Jean McKishney, born at Scotia, Ontario, and educated at St. Thomas Collegiate Institute. Her success in literature began with the publication of *Cabinet Articles*, a series of pen pictures which appeared in various magazines and newspapers. These sketches were unique and attracted wide attention. At seventeen she wrote *Out of the Depths*, a book of some merit, but inferior to her later works. She is best known by her poems, which have led to her being called the sweetest of Canada's poets. These were collected and published by the Lippincotts of Philadelphia.

Bonar, JAMES, M.A., LL.D. (1852–), economist, born at Collace, Portshire, Scotland, educated at Glasgow, Tubingen, Leipzig, and Balliol College, Oxford. From 1881 to 1895 he was junior examiner in H. M. Civil Service Commission, and from 1895 to 1907 senior examiner. He came to Canada in 1907 to become deputy master of the Canadian branch of the Royal Mint. Dr. Bonar is well-known as a writer on financial and economic subjects. He is the author of *Malthus and His Work, Philosophy and Political Economy* and *Elements of Political Economy.*

Borden, Frederick William, Sir, K.C.M.G., P.C., M.D. (1847-), statesman and physician, born at Cornwallis, Nova Scotia; educated at King's College, Windsor, and Harvard Medical School, Boston. He began practicing medicine at Canning, Nova Scotia, where he was also agent for the Halifax Banking Company. He was first elected to the House of Commons in 1874, and has been a member most of the time since, serving his constituency continuously from 1887 to 1911. In 1896 he was sworn in as a member of the Privy Council and was appointed minister of militia and defence, a position he held till the resignation of the Laurier administration in 1911. In 1869 he was appointed assistant surgeon of the 68th Battery and is now honorable colonel of the army medical corps. Sir Frederick is a member of a number of distinguished orders.

Borden, Robert Laird, D.C.L., K.C. (1854-), statesman, cousin of Sir Frederick Borden, was born at Grand Pré, Nova Scotia, and educated at Acadia Villa Academy, Horton. He was admitted to the bar in 1878 and was the head of the firm of Borden, Ritchie and Chisholm, Halifax, for a number of years. He was elected to the House of Commons for Halifax in 1896 and 1900; in 1904 he was defeated for Halifax but was elected for Carleton, Ontario, after Edward Kidd, member for Carleton, had resigned. At the next general election he was returned for Halifax, which he still represents. From 1901 to 1911 he was leader of the conservative opposition and following the general election of 1911 he was made premier and formed a new ministry on October 10.

Bourassa, Henri (1868-), journalist and legislator, born at Montreal; educated by private tutors. He was mayor of Montebello, 1890-94, and mayor of Papineauville, 1897. He was first elected to the House of Commons in 1896; he resigned in 1899 in order to seek reelection as a vindication of his position on the participation of Canada in the South African War, and was returned by acclamation in January, 1900, and again in 1904. Since 1908 he has been a member of the Quebec legislative assembly. He is the editor of *Le Devoir,* founded in 1910, the organ of the Nationalist party.

Bourinot, *boo' re no,* John George, Sir (1837-1902), historian and parliamentarian. After his graduation from Trinity College, Toronto, he established the *Halifax Reporter,* of which he was the editor for many years. His first historical and political papers, many of which were later expanded into books, appeared in the proceedings of the Royal Society of Canada. He was the recognized authority on questions of parliamentary procedure and constitutional history. Among his best-known books are *Parliamentary Procedure and Practice, Manual of Constitutional History, Parliamentary Government in Canada, How Canada is Governed, Canada under British Rule* and *Canada's Intellectual Strength and Weakness.*

Bowell, Mackenzie, Sir, K.C.M.G., P.C. (1823-), statesman, born at Rickinghall, Suffolk, England, educated at the Belleville (Ontario) public schools. At the age of eleven he entered the office of the Belleville *Intelligencer,* of which he later became editor and proprietor. He was elected to the House of Commons as a Conservative in 1867 and served continuously till he was called to the Senate in 1893. In 1878 he entered the cabinet of Sir John Macdonald as minister of customs; he was minister of militia under Sir John Abbott, and later, as minister of trade and commerce, he was instrumental in securing the Pacific Cable to Australia. In December, 1894, he became premier, but resigned in April, 1896. Until 1906 he was leader of the opposition in the Senate. Sir Mackenzie took an early interest in the militia and in 1857 assisted in raising a rifle company. He was in active service on the frontier during the American Civil War and in the Fenian troubles in 1866, retiring with the rank of colonel. He has served as one of the governors of Toronto University and as senator of Albert College. (For portrait see illustration facing page 210.)

Bowser, William J., K.C. (1867-), barrister and legislator, born at Rexton, New Brunswick; educated at Dalhousie University, Halifax. He was called to the bar of New Brunswick in 1890 and to that of British Columbia, 1891. He was chosen Grand Master of the Free Masons in 1904 and was elected to the provincial assembly in 1903, 1907, 1909. In 1907 he was appointed attorney-general and commissioner of fisheries of the province in the McBride government.

Boyd, John (1864-), journalist and author, born at Montreal; educated at Montreal High School and McGill University. He began newspaper work in 1881 and was successively connected with the Montreal *Herald,* Montreal

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Witness, Toronto *Mail and Empire*, and Montreal *Gazette*. He is the author of *On the Quebec Battlefields*, an ode on the occasion of Quebec's Tercentenary Celebration, and has translated many of the best French-Canadian poems into English. He was honored with a prominent part in the St. Jean Baptiste celebration, in Montreal, June, 1909, and read a poem dedicated to the Association. Other well-known poems include a sonnet on Poe, read at the centennial celebration held by the University of Virginia, a sonnet on the death of Swinburne, and a poem on the centenary of the birth of Tennyson.

Brent, Charles Henry, Rev. (1862–), Episcopal clergyman, born at Newcastle, Ontario; educated at the University of Trinity College, Toronto. He was ordained clergyman in 1887, and was rector of St. John Evangelist, Boston, 1888-1891, and associate rector of St. Stephens, Boston, 1891-1901. He was consecrated bishop of the Philippine Islands in 1901. He was offered one of the richest bishoprics in the United States a few years later but refused it because he felt that his work in the Philippines was a greater mission. Bishop Brent is the author of *With God in the World*, *The Splendor of the Human Body*, *Liberty and Other Sermons* and other books on ethical and religious subjects.

Brodeur, *bro dure,* Louis Philippe, K.C., LL.D. (1862–), statesman and judge, born at Beloeil, Quebec; educated at St. Hyacinthe College and Laval University. He was admitted to the bar in 1884 and was elected to the House of Commons in 1891. In 1900 he was chosen speaker of the House but resigned in 1904 to become minister of inland revenue; in 1907 he became minister of marine and fisheries. He accompanied Sir Wilfrid Laurier to England as a delegate to the Colonial Conference of 1907 and was delegate to the Imperial Defence Conference in 1909. Together with Hon. W. S. Fielding he negotiated the first treaty ever negotiated by a British colony—the French-Canadian treaty of 1907. In 1911 he was appointed justice of the Supreme Court of Canada.

Brown, George (1818–1880), statesman, born at Edinburgh, Scotland; educated at Edinburgh High School and at the Southern Academy. He went to New York in 1838 and to Toronto in 1843, where he founded *The Globe*, soon to become one of the leading Canadian papers. In the Canadian legislative assembly, to which he was elected in 1851, he became the leader of the radicals. On July 31, 1858, after the defeat of Sir John A. Macdonald, he and Hon. A. A. Dorion formed a ministry but held office for only four days, resigning because the governor-general refused to dissolve Parliament. He took a leading part in the effort to secure Confederation, was a member of the Charlottetown and Quebec conferences and president of the Council in the coalition ministry of Sir Etienne Taché (see page 187). In December, 1873, he was called to the Senate. He declined the lieutenant-governorship of Ontario in 1875 and the decoration of K.C.M.G. in 1879.

Brown, George William (1860–), lawyer and legislator, born at Holstein, Ontario; educated at Brantford Collegiate Institute and Toronto University. He went west in 1882, was admitted to the bar and practiced law in Regina. For twelve years he was a member of the local board of education and from 1894 to 1906 he sat in the legislature. On October 5, 1910, he became lieutenant-governor of Saskatchewan.

Bruchesi, *broo ke' se,* Louis Paul Napoleon, The Most Rev., D.D. (1855–), Roman Catholic archbishop of Montreal, born in Montreal and educated at St. Sulpice College in that city, and in Paris and Rome, where he was ordained priest in 1878. Upon his return to Canada he was appointed to a chair in Laval University. In 1887 he was appointed canon of the cathedral of Montreal and in the same year professor of Christian apologetics at Laval. He prepared the educational exhibits of his native province for the World's Fair in Chicago, and was for some years chairman of the Catholic school board of Montreal. He was appointed archbishop of Montreal in 1897.

Bryce, George, Rev., M.A., D.D., LL.D. (1844–), clergyman and author, born at Brantford, Ontario; educated at Brantford High School, University of Toronto and Knox College, Toronto. Dr. Bryce played an important part in the development of Manitoba; he was selected by the General Assembly of the Presbyterian Church to organize a church and college at Winnipeg in 1871. He was one of the founders, councillor and examiner of the University of Manitoba; he was also head of the faculty of science and lecturer in biology and geology. He was senior professor and financial agent of Manitoba College, also professor of English. He is the author of many articles and books on Canadian history; among the best known are *Manitoba; Infancy, Progress and Present*

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Condition, Short History of the Canadian People, and *Remarkable History of the Hudson's Bay Company.*

Brymner, William (1855–), painter, born at Greenock, Scotland; educated at St. Francis College, Richmond, Quebec, and St. Therese College, St. Therese, Quebec. Later he studied art in Paris under Bouguereau and T. Robert Fleury. He received a gold medal for painting at the Pan-American at Buffalo and at the Louisiana Purchase Exposition at St. Louis. Since 1886 he has conducted the advanced art classes of the Art Association of Montreal. He was elected president of the Royal Canadian Academy of Art in 1910.

Bucke, Richard Maurice (1837–1902), physician, born at Methwold, England; educated at the London (Ont.) grammar school, McGill University and in London and Paris. After completing his studies he went to California but later entered on the practice of his profession at Sarnia, Ontario. In 1876 he was appointed medical superintendent of the asylum for the insane at Hamilton and a year later was transferred to a similar position in London. During his lifetime he was regarded as one of the highest authorities in America on the subject of mental diseases.

Bulyea, George Headley Vickers, B.A., LL.D. (1859–), statesman, born at Gagetown, New Brunswick; educated in the grammar school of Gagetown and the University of New Brunswick. He went to Winnipeg in 1882 and the following spring to Qu'Apelle, Saskatchewan, where he engaged in business. He was elected to the Northwest Council in 1894 and for many years was a member of the executive council. In the territorial government he was commissioner of agriculture and of public works (1899-1905), and on the organization of Alberta as a province he was appointed lieutenant-governor, September 1, 1905.

Bureau, Jacques (1860–), lawyer and legislator, born at Trois Rivieres, Quebec; educated at Nicolet College and Laval University. He was elected to the House of Commons for Trois Rivieres-St. Maurice in 1900 and still represents that constituency. From 1907 to 1911 he was solicitor-general of Canada

Burpee, Lawrence Johnston, F.R.G.S. (1873–), librarian and author, born at Halifax, Nova Scotia. He was private secretary to the minister of justice in two Dominion administrations but resigned to become librarian of the Ottawa Public Library. Among his best-known books are *Canadian Life in Town and Country, The Search for the Western Sea,* and *Flowers from a Canadian Garden.*

Burrell, Martin (1858–), legislator, born at Faringdon, Berkshire, England; educated at St. John's College, Hurstpierpoint. He arrived in Canada in 1885, and engaged in horticultural work in the Niagara peninsula. In 1900 he went to British Columbia, where he became a member of the provincial board of horticulture. In 1907-08 he was in England as fruit commissioner for British Columbia. He was elected to the House of Commons in 1908 and in 1911 was appointed minister of agriculture in the Borden government.

Burton, George, Sir (1819–1901), lawyer and judge, was born at Sandwich, England. He came to Canada in 1836 and was admitted to the bar in 1842. He practiced his profession for over thirty years, and from 1874 to 1897 was a judge of the Court of Appeals of Ontario; from 1897 until his death he was chief justice of Ontario. He was chairman of the commission which consolidated the statutes of the province. In 1898 he was created a baronet.

Burwash, Nathaniel, Rev. (1839–), an eminent Canadian scholar, president of Victoria University since 1887. He has been one of the leaders in every prominent educational reform in Ontario during his day. Before becoming president of Victoria University he was professor of natural history and geology. In 1889, as president of the conference, he was instrumental in bringing about the confederation of the universities. He is the author of *Wesley's Doctrinal Standards* and a *Life of Egerton Ryerson*.

By, JOHN, Colonel (1781-1833), founder of Ottawa, was born in England. He came to Canada in 1802 and was stationed at Quebec for nine years as an officer in the Royal Artillery. After varied experiences in Portugal and England he returned to Canada in 1826 to superintend the construction of the Rideau Canal. After five years of pioneer work he completed his task and the first vessel passed through the locks on May 29, 1832. Instead of receiving credit and praise for his great accomplishment, Colonel By was severely and unjustly censured for extravagance. The town he founded was called Bytown for twenty years, but in 1854 it was incorporated under its present name, Ottawa.

Calder, JAMES ALEXANDER (1868–), born in Oxford County, Ontario, educated in the public schools of Winnipeg and at Manitoba College. He was principal of the Moose Jaw High School, 1891-94; inspector of schools of the Northwest Territories, 1894-1900; and deputy commissioner of education, 1901-1905. He was elected a member of the Saskatchewan assembly at the first general election in 1905 and was appointed provincial treasurer and commissioner of education in the Scott ministry. From 1908 to 1911 he was also a member of the House of Commons.

Cameron, AGNES DEAN (1863–1912), author and educator, born in Victoria, British Columbia. Miss Cameron began teaching at the age of fifteen and for twenty-five years was closely identified with the public schools of the province. During the last ten years of her service she was principal of the South Park Public School, Victoria. In 1908 she travelled from Chicago to the Arctic Ocean by way of the Athabasca, Slave and Mackenzie Rivers. She is the author of *The New North* and of numerous articles which have appeared in the *Century*, *Atlantic Monthly* and other magazines.

Campbell, ALEXANDER, Sir (1822–1892), statesman, born at Heydon, Yorkshire, England; educated at Lachine and St. Hyacinthe. He studied law and became a partner of Sir John A. Macdonald; in 1860 he was appointed dean of the faculty of law in Queen's University, Kingston. His first public office was that of alderman of Kingston (1851-2). Previous to Confederation he was speaker of the Legislative Council of Canada, but resigned in 1864 to become commissioner of crown lands. He took a prominent part in both the Charlottetown and Quebec conferences. He became postmaster-general in the first Dominion cabinet and served for six years. He was called to the Senate in 1867 and for twenty years was the Conservative leader. Under Sir John A. Macdonald he held various cabinet positions from 1878 to 1887, the most important being minister of justice. On June 1, 1887, he became lieutenant-governor of Ontario; he died on May 24, 1892, just a few days before the expiration of his term, and was buried with public honors.

Campbell, COLIN H. (1859–), legislator, born at Burlington, Ontario. He was admitted to the bar of Ontario in 1881 and the next year to that of Manitoba. He was elected a member of the Manitoba assembly and was chosen attorney-general of the province.

Campbell, WILLIAM WILFRED (1861–), poet, born at Berlin, Ontario, and educated at the University of Toronto and at Cambridge, Mass. He was ordained for the Church of England ministry in 1885 and began his duties in a New England parish. Three years later he returned to Canada and became rector of St. Stephen's, New Brunswick. In 1891 he retired from the Church and removed to Ottawa and secured a position in the civil service. His first poems appeared in a village paper; later he became a contributor to the *Atlantic Monthly*, the *Century* and *Harper's Magazine*. His poems on the Lake region have earned for him the title of The Poet of the Lakes. His first volume was *Lake Lyrics and Other Poems*. Since then there have appeared *The Dread Voyage*, *Mordred* and *Hildebrand*. His poem entitled *The Mother*, which appeared in *Harper's Magazine* in April, 1891, is said to have received more notice than any other single poem that ever appeared in the American press.

Cameron, GEORGE FREDERICK (1854–1885), poet, was born at New Glasgow, Nova Scotia, and educated at Queen's University, Kingston. After spending several years in the United States he returned to Canada to become editor of the Kingston *News*. Many of his poems received praise from such exacting critics as Swinburne and Matthew Arnold. Cameron's poems may be found in *Lyrics on Freedom, Love and Death*, edited by C. J. Cameron, and in Stedman's *Victorian Anthology*.

Canniff, William (1830-1910), physician and historian, educated at the University of Victoria College, Toronto. After studying medicine for several years in Toronto and New York he traveled extensively and continued his studies in Europe. Dr. Canniff was for many years dean of the medical faculty of Victoria College. He is well-known as the author of several books, including *The Settlement of Upper Canada*, *The Medical Profession in Upper Canada*, *Canadian Nationality, Its Growth and Development* and *Account of the Upper Canada Rebellion, 1837.*

Carling, John, Sir (1828-1911), statesman, born in London, Ontario, educated in the schools of the city. He was a member of the London city council from 1854 to 1860 and a member of the old Canadian Assembly from 1857 to 1867. He was commissioner of agriculture and public works, postmaster-general, minister of agriculture, and member of the cabinet without portfolio in various cabinets. In March, 1893, the standing committee on agriculture in the House of Commons adopted a resolution recording its appreciation of the services rendered by him to the agricultural interests of the Dominion.

Carlyle, Florence, an artist of Canadian birth. When a young girl she attracted the attention of the Princess Louise, and this led to her being sent to Paris in 1890, where she studied at the Julian Atelier. She was acknowledged by her instructor to be his most prominent pupil. In 1893 she exhibited in the Paris salon her picture of *A Dutch Lady*. The next year two of her pictures were exhibited. In 1897 she was elected an associate of the Royal Canadian Academy of Art.

Carman, Albert, Rev., D.D., LL.D. (1833-), born in Dundas County, Ontario; educated at the Dundas county grammar school and Victoria University, Cobourg. He was principal of the Dundas county high school from 1853 to 1857, when he was chosen chancellor of Albert University (later united with Victoria College). He was elected a bishop of the Methodist Episcopal church in 1874 and since 1884 has been its general superintendent. Dr. Carman is widely known as a preacher and orator. (For portrait see illustration facing page 190.)

Carman, Bliss (1861-), journalist and poet, son of Rev. Albert Carman, was born at Fredericton, New Brunswick, and educated at the University of New Brunswick, Edinburgh and Harvard. From 1890 to 1892 he was office-editor of *The Independent*, New York. Among the best known volumes of his poems are *Low Tide on Grand Pre*, *Songs from Vagabondia* (with Richard Hovey), *A Winter Holiday*, and *Pipes of Pan*. He stands in the first rank of Canadian poets.

Caron, Joseph Edward (1866-), legislator, born in Sainte Louise, Quebec; educated at Saint Anne's College. He held various local offices at Sainte Louise and was elected to the Quebec legislature in 1902. He became minister of agriculture in the Gouin cabinet.

Caron, René Edouard (1800-1876), statesman and judge. He was educated at the Seminary of Quebec and at the College of Saint Pierre, and was admitted to the bar in 1826. At the age of twenty-seven he was elected mayor of Quebec, holding the office for ten years. Later he was twice elected speaker of the legislative council of Lower Canada. In 1853 he retired from active political life and became judge of the Queen's Bench. The last three years of his life he was lieutenant-governor of Quebec.

Cartier, Georges Etienne, Sir (1814-1873), Conservative statesman, was born in the province of Quebec on the 6th of September, 1814. He was called to the bar in 1835 and gained a large practice. He took an active

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part in the rebellion of 1837 but gradually changed his views so that after his election to Parliament in 1848 he soon became an acknowledged leader of the more liberal wing of the Conservatives. In 1855 he was appointed provincial secretary and two years later attorney-general for Lower Canada. From 1858 to 1862 he was joint premier of Canada with Sir John A. Macdonald. He took a prominent part in progressive legislation, such as the abolition of seigneurial tenure, the reform of civil law, and the development of the Grand Trunk Railway. He carried Quebec into the Confederation against great opposition and served till his death as minister of militia and defence in Macdonald's first cabinet.

Carter-Cotton, FRANCIS L. (1847–), a journalist and legislator, born in Yorkshire, England. He is the managing editor of the Victoria *News Advertiser*. He was first elected to the legislature of British Columbia in 1890, and reëlected in 1894 and 1898, but defeated in 1900. In 1903 he was again elected. He was provincial minister of finance from August, 1898, to February, 1900, and chief commissioner of lands and works from March, 1899, to February, 1900. In 1904 he was appointed president of the executive council.

Cartwright, RICHARD JOHN, Rt. Hon. Sir, K.C.M.G., P.C. (1835–), statesman and financier, born in Kingston, Ontario, educated at Trinity College, Dublin. He was elected to the Parliament for Upper Canada in 1863 and continued to serve till the formation of the Confederation in 1867, when he became a Liberal member of the House of Commons for Lennox. From 1873 to 1878 he was minister of finance, and after the resignation of the Mackenzie ministry became leader of the Liberal opposition. He became minister of trade and commerce in the ministry of Sir Wilfrid Laurier and was acting premier during the latter's absence at the queen's jubilee celebration and again at the Imperial Conference in 1907. In 1897 he proposed the formation of the Anglo-American Joint High Commission, of which he became a member.

Casgrain, HENRI RAYMOND, Abbé (1831–), French-Canadian historian, was born at Riviere Ouelle, Quebec. He studied for the priesthood and was ordained in 1856. He is best known for his numerous histories, in which he sought to portray the French-Canadians as they really were. Among his works may be mentioned *Legendes Canadiennes*, *Historie de l'Hotel Dieu de Quebec* and *Montcalm et Levis*. Casgrain's books are well written and entertaining but their intense partisanship occasionally makes them unsatisfactory as histories.

Challener, FREDERICK SPROSTON (1869–), painter, born at Whetstone, England; educated at St. Paul's School, Stratford, Essex. He studied at the Ontario School of Art, also in Italy, Egypt and Syria. He is a member of the Ontario Society of Artists and of the Royal Canadian Academy of Art. Among his best pictures are *Workers of the Fields*, *A Song at Twilight* (both in the National Gallery, Ottawa), *When the Lights are Low* and *A Quiet Old Road* (in the Provincial Art Gallery, Toronto).

Chamberlain, MONTAGUE (1844–), born at St. John, New Brunswick; educated in private schools there. For ten years he was an active member of the Canadian militia, retiring with the rank of captain. Mr. Chamberlain is an authority on Canadian birds; his published works include *Canadian Birds*, *Birds of Greenland*, *Systematic Table of Canadian Birds*, and *The Penobscot Indians*.

Chapleau, *shah plo'*, JOSEPH ADOLPHE, Sir, LL.D. (1840-1898), a politician and barrister, born at Ste. Therese de Blainville, Quebec, and educated at the College of his native town and at Saint Hyacinthe. He began the practice of law in Montreal, and in 1873 was created queen's counsel. He became a member of the Quebec legislature, and at the union of the provinces in 1867 became solicitor-general for Quebec. In 1878 he was chosen leader of the Conservative opposition in the Quebec assembly, and the following year was appointed premier of the province. In 1882 he became secretary of state for Canada and continued in this position with the Abbott ministry. Later, for a short time, he was minister of customs. In 1892 he was appointed lieutenant-governor of Quebec. A ready speaker and a keen debater, he was generally considered the leading French-Canadian orator of his time.

Clark, WILLIAM ROBINSON, D.D., LL.D., F.R.C.S. (1829–), born at Inverurie, Scotland; educated at King's College, Aberdeen and Hartford College, Oxford. He was curate of St. Mathias', Birmingham, 1857, of St. Mary Magdalene, Taunton, 1858. In 1887 and again in 1899 he delivered lectures at the University of Michigan. Since 1882 he has been professor of philosophy at Trinity University, Toronto. He was chosen honorary canon of St. Alban's Cathedral, Toronto, in 1907 and was president of the Royal Society of Canada in 1910. He is the author of a number of books, including *The Redeemer; The Four Temperaments; Savonarola, His Life and Times*, and *Pascal and Port Royal*.

Cochrane, FRANCIS (1852–), legislator, born at Clarenceville, Ontario; educated at St.

Thomas, Quebec. He was for many years a resident of Sudbury, Ontario, which he later represented in the Ontario assembly. He was appointed minister of lands and mines of Ontario on May 30, 1905, and on the formation of the Borden ministry was appointed minister of railways and canals in the Dominion government. He represents the Nipissing district of Ontario in the House of Commons.

Colborne, JOHN, Sir, First Baron Seaton (1778–1863), English general and colonial administrator, born in Hampshire, England. He entered the army as an ensign in 1794 and won every promotion without purchase. He served with great distinction in Egypt, Spain and Belgium, under Sir John Moore and the Duke of Wellington and was especially conspicuous at the battle of Waterloo. In 1830 Sir John became lieutenant-governor of Upper Canada. Having resigned his position, he was about to depart for England when the Upper Canada rebellion broke out. By special order of the home government he took command of the British forces and quickly crushed the outbreak. Later he held several other high offices in the service of his country and in 1860, on his retirement from the army, he was created field marshal.

Coldwell, GEORGE ROBSON, K.C. (1858–), a barrister and legislator, born in Darlington, Ontario, and educated at the public school in Kinburn and at Trinity College School, Port Hope, and Trinity College, Toronto. He removed to Manitoba in 1882 and engaged in the practice of law in Winnipeg. Soon after he removed to Brandon, in which city he took an active part in public affairs, and was a member of the city council for twenty years. In November, 1907, he was appointed municipal commissioner for Manitoba, and a year later he was also given charge of the department of education.

Colebroke, WILLIAM MACBEAN GEORGE, Sir (1787–1870), soldier and colonial governor. After graduating from Woolwich he entered the army in 1803. He served with distinction in India, was for ten years one of the commissioners to enquire into conditions in Ceylon and was lieutenant-governor of the Bahamas and of the Leeward Islands. From 1841 to 1847 he was lieutenant-governor of New Brunswick. After eight years as governor of Barbados he returned to England, was appointed lieutenant-general, and until his death was in command of the royal artillery.

Connaught, ARTHUR WILLIAM PATRIC[K] ALBERT, Duke of, (1850–), son of Quee[n] Victoria, was born at Buckingham Palace o[n] May 1, 1850. He entered the Royal Militar[y] Academy, Woolwich, at the age of sixteen an[d] at eighteen was assigned to the Royal Engineer[s]. He then served for a few months with the Roya[l] Artillery, and in August, 1869, was trans[-]ferred to the Rifle Brigade. He was promoted captain in 1871 and successively won promotion to major, lieutenant-colonel, colonel, major-general and to the rank of general in 1893. In Egypt, in 1882, he commanded the Guards Brigade at the battle of Tel-el-Kebir. He was mentioned several times in despatches, was made Companion of the Bath, and was thanked by Parliament. From 1886 to 1890 the duke was in active command of the Bombay army in India; from 1890 to 1898 he was district commander at home, first of the southern district, later of the Aldershot district. He succeeded Lord Roberts in 1900 as commander-in-chief of the forces in Ireland. Four years later, when the war office was reorganized, the duke was appointed to the newly created office of inspector-general of the forces, which he held until 1909, when he became commander-in-chief in the Mediterranean. He remained stationed at Malta for two years and then returned to England. On October 13, 1911, he became governor-general of Canada.

Costigan, JOHN (1835–), a politician, born at Saint Nicholas, Quebec, and educated at St. Anne's College. He was elected to the legislature of Nova Scotia in 1861, and upon the formation of the confederation in 1867, was elected to the House of Commons. He entered the Macdonald cabinet as minister of inland revenue in 1882, and continued to hold the office until it was abolished in 1892. He was secretary of state in the Thompson administration and later, in the ministries of Sir Mackenzie Bowell and Sir Charles Tupper, he held the portfolio of marine and fisheries up to the retirement of the party in 1896. He served continuously in the House of Commons from 1867 to 1907, when he was called to the Senate.

Cotes, SARAH JEANNETTE (1862–), author, born in Brantford, Ontario, and educated at the Collegiate Institute there. Her maiden name was Sarah Jeannette Duncan. She began her career as a public school teacher, but gave that up for journalism. Her first series of letters were descriptive of the cotton centennial exposition, New Orleans, and appeared in the

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Toronto *Globe*, the Memphis *Appeal* and other papers. Afterwards she became a member of the editorial staff of the Washington *Post*, and later returned to the Toronto *Globe*, where she wrote under the pen name of Garth Grafton. Later she was correspondent for the Montreal *Star* at Ottawa. She then made a tour round the world, writing letters for a syndicate of American and Canadian newspapers. Some of her best known works are *A Social Departure, How Orthodocia and I Went Round the World by Ourselves, The American Girl in London, A Daughter of Today, Vernon's Aunt, The Simple Adventure of Mem Sahib, The Story of Sonny Sahib* and *His Honor and a Lady.*

Cox, GEORGE ALBERTUS (1840–), a capitalist and legislator, born at Colborne, Ontario, and educated there. Mr. Cox was very successful in business enterprises, and took an active interest in all measures having for their purpose the benefit of his town and the province. He was for three years mayor of Peterborough. In 1884 he became president of the Central Canada Loan & Savings Co., and the following year a director of the Canadian Bank of Commerce, and in 1890 was chosen president of that institution. On November 13, 1896, he was called to the Dominion Senate.

Craig, JAMES HENRY, Sir (1748–1812), British soldier. He took a conspicuous part in the American Revolution, was present at the battle of Bunker Hill, at the surrender of Fort Ticonderoga, with Burgoyne at Saratoga and with Cornwallis in North Carolina. In 1791 he was in command of a British force against the Dutch colony of the Cape of Good Hope, which surrendered, and henceforth was a British colony. From 1807 to 1811 he was governor of Lower Canada, but his administration was unpopular because of his distrust of the French-Canadians.

Crawford, ISABELLA VALANCY (1851–1887), poet, born in Dublin, Ireland. She removed to Canada at an early age and lived at Peterborough and Toronto. Her verse shows considerable lyric power and originality. *Old Spookses' Pass* and *Malcolm's Katie* are her best known books.

Cross, CHARLES WILSON (1872–), lawyer and legislator, born at Madoc, Ontario; educated at Upper Canada College, Toronto University and Osgoode Hall, Toronto. He was appointed attorney-general in the first Alberta ministry in 1905 and elected to the legislative assembly the same year. He resigned as attorney-general in 1910 but continued to represent Edmonton in the assembly. On the reorganization of the Sifton ministry in May, 1912, he again became attorney-general.

Cushing, WILLIAM HENRY (1852–), business man and legislator, educated in the public schools of Ontario. He was appointed minister of public works in the first Alberta cabinet in 1905, was elected member for Calgary in the assembly in the same year, and has been returned at each election since.

Daniel, ANTONY, Father (1601–1648), Jesuit missionary, born at Dieppe, France. He accompanied Champlain to America in 1633 and for many years was one of the most faithful and courageous of the missionaries. While celebrating mass on July 4, 1648, he and his followers at St. Joseph were attacked by hostile Iroquois. The brave priest tried to rally his people, but soon fell, overwhelmed by a shower of arrows.

Davies, LOUIS HENRY, Sir, K.C., K.C.M.G. (1845–), statesman and jurist, born at Charlottetown, Prince Edward Island; educated at the Prince of Wales College in that city and at the Inner Temple, London, England. He began the practice of law in his native city in 1866 and soon became one of the acknowledged leaders of his profession. In 1869 and 1871-72 he was solicitor-general of the province; 1873-76, leader of the opposition; 1876-79 premier and attorney-general. He was elected to the Dominion House of Commons as a Liberal in 1882 and continuously returned until 1901, when he was appointed judge of the supreme Court of Canada. He was counsel for Great Britain before the International Fisheries Arbitration Commission at Halifax in 1877, joint delegate with Sir Wilfrid Laurier to Washington for the settlement of the Bering Sea controversy in 1897 and a member of the Joint High Commission for the settlement of all disputes between Canada and the United States. From 1896 to 1901 he was minister of marine and fisheries.

Dawson, GEORGE MERCER (1849–1901), geologist and explorer, son of Sir John William Dawson, was born at Pictou, Nova Scotia. He was educated at McGill University and the Royal School of Mines, London. In 1873 he was appointed geologist and naturalist to the North American boundary commission, and in 1875 became a member of the staff of the geological survey of the Dominion, later becoming assistant director and in 1895 director. He was in charge of the Canadian government's

Yukon Survey in 1887 and Dawson City is named for him. In 1891 he took an important part in the arbitration of the controversy regarding the seal fisheries in the Bering Sea. He was the author of many scientific papers and reports, especially on the surface geology and mineral formations of northern and western Canada.

Dawson, John William, Sir (1820-1899), geologist and educator, born at Pictou, Nova Scotia, and educated at the University of Edinburgh, Scotland. After his return to Nova Scotia in 1842 he several times accompanied Sir Charles Lyell on geological expeditions. From 1850 to 1853 he was provincial superintendent of education and from 1855 to 1893 he was professor of geology and principal of McGill University, which attained a high rank under his administration. In his books he declined to accept the theory of the evolution of man and stated that human beings only made their appearance on the earth in comparatively recent times. Among his many published works are *Acadian Geology, Air-breathers of the Coal Period, The Story of the Earth and Man, The Dawn of Life, Fossil Men and Their Modern Representatives, The Canadian Ice Age.*

Decarie, Jeremie L. (1870-), legislator, born in Notre Dame de Grace; educated at Montreal College and Laval University. He studied law in the office of Hon. Messrs. Gouin and Lemieux, with whom he later formed a partnership. In 1904 he was elected to the Quebec assembly as member for Hochelaga. In January, 1909, he was appointed provincial minister of agriculture and in December of the same year became provincial secretary.

De Mille, James (1837-1880), educator and author, born at St. John, New Brunswick, graduated from Brown University in 1854. From 1860 to 1865 he was professor of the classics in Acadia College (Wolfville, N. S.) and from 1865 until his death was professor of history and rhetoric in Dalhousie College at Halifax. His publications include *Andy O'Hara, The Soldier and the Spy, The Dodge Club, The Living Link* and *A Castle in Spain.*

Denison, George Taylor, Lt. Col., LL.B. (1839-), one of Canada's most patriotic citizens, was born in Toronto and educated at Upper Canada College and Toronto University, receiving the degree of LL. B. from the latter in 1861. He took an active part in the military affairs during the Fenian raid in 1866, and during the Riel Rebellion in Northwest Territory in 1885. In 1865 he won the grand prize offered by the Emperor of Russia for the best work on cavalry tactics. His book has been translated into several languages, and is accepted as authoritative in modern strategy. He has also written *Soldiering in Canada.* He has been president of the British Empire League in Canada since its organization, and has written epoch-making articles on the relationship between the motherland and the colonies.

Denonville, Marquis de, French soldier and colonial governor. In 1685 he was appointed governor of New France. Though a brave and able man he was not equal to the task of conquering the hostile Indians who threatened the colonists. He made several vigorous attacks on the Indians but only succeeded in infuriating them. In 1689 he was succeeded by Frontenac.

Devlin, Charles Ramsay (1858-), born at Aylmer, Quebec; educated at Montreal College and Laval University. He was engaged in newspaper work for many years. His public career began in 1891 when he was elected to the House of Commons. From 1897 to 1903 he was Canadian commissioner in Ireland; in the latter year he was elected to the British House of Commons as member for Galway City. He returned to Canada in 1906 and was elected to the Dominion House of Commons, but a year later resigned to become minister of colonization, mines and fisheries in Quebec. Since the by-election of Nov. 4, 1907, he has represented Nicolet county in the assembly of the province.

Doherty, Charles Joseph, D.C.L., LL.D., K.C. (1855-), jurist and legislator, born at Montreal; educated at St. Mary's College and McGill University, Montreal. He was admitted to the bar in 1877 and from 1891 to 1906 was judge of the superior court of the province of Quebec. He served as captain of the sixty-fifth Battalion during the Northwest Rebellion. He was appointed professor of civil law at McGill University in 1890, was elected to the Dominion House of Commons in 1908 and in 1911 was made minister of justice in the Borden cabinet.

Dorion, Antoine Aimé, Sir (1816-1891), lawyer and statesman, was born in the parish of St. Anne de la Pérade, in Champlain county, Quebec. He was educated at Nicolet College and then studied law in Montreal, where he was admitted to the bar in 1842. For many years a leader in his profession, he entered public life in 1854 as a member of the Canadian Assembly, in which he served until Confederation. Dorion soon became one of the leaders of the reformers who sought to secure proportionate representation. In 1856 he suggested a federal union of Upper and Lower Canada, but did not continue to advocate the scheme. On August 2, 1858 he formed an administration with George Brown, but after holding office four days the ministry resigned. A few years later when confederation was again discussed he opposed union, believing that there was nothing to be gained at the time. Previous to 1867 he was successively commissioner of crown lands, provincial secretary, and attorney-general of Lower Canada. In 1873 he was minister of justice in the Mackenzie government; the next year he became chief justice of the province of Quebec. Though a man of ability and broad mind, he never had a political following sufficiently strong to enable him to carry out his ideas.

Dougall, John Redpath, M.A. (1846–), a journalist, born in Montreal and educated at the high school of Montreal and McGill University. He became associated with his father and succeeded him in the management of *The Montreal Daily and Weekly Witness*. Later he became the sole owner and publisher of *The Witness*, and as the manager of that paper he has acquired distinction as one of the leading journalists in America.

Dougall, Lily (1858–), an author, sister of John R. Dougall, was born in Montreal. She spent her childhood in Montreal and her girlhood in New York. After completing her education she traveled somewhat extensively in Europe. She is the author of numerous stories whose scenes are laid in Canada. Among the best known of these are *Beggars All, What Necessity Knows, The Mermaid, A Question of Faith, The Madonna of a Day*, and *The Earthly Purgatory*.

Doughty, Arthur, C.M.G., Lit.D., F.R. Hist. S., born at Maidenhead, Berkshire, England; educated at Eldon School, London, and New Inn Hall, Oxford. He came to Canada in 1886 and entered the service of the Legal and Commercial Exchange at Montreal; he held several other secretarial positions before his appointment to his present position of Dominion archivist. Dr. Doughty was one of the first to realize the necessity of collecting documentary material of Canadian history. He is the author of a number of historical and other works which are standard; among the best known are *The Siege of Quebec and the Battle of the Plains of Abraham, Quebec under Two Flags*, and *Life and Works of Tennyson*.

Douglas, James, Sir (1803-1877), colonial administrator, was born at Demerara, British Guiana. He was educated in Scotland, but at the age of seventeen left that country and entered the employ of the Northwest Company. After holding numerous positions under his friend John McLoughlin, he was in 1830 appointed McLoughlin's chief assistant at Fort Vancouver and finally succeeded him as chief factor. From 1851 to 1858 Douglas was governor of Vancouver Island, then under the control of the Hudson's Bay Company; later he also became governor of British Columbia. In 1866 the union of the two colonies under the crown led to Douglas' resignation. There is no question that he had been for many years an autocrat in office. Certain forms of government were still observed, but it was the will of Douglas that ruled. With the rapid increase of population in the sixties this style of government became quite impossible. But even Douglas' bitterest enemies paid tribute to his honesty, courage and ability, and all admit that he may justly be considered as the founder of British Columbia.

Drummond, Gordon, Sir (1772–1854), British soldier. Entering the army in 1789 he rose rapidly and distinguished himself in Egypt and during the Napoleonic wars in Europe. He was second in command of the British forces in North America during the war of 1812-14 and at the close of the war remained for a year as commander-in-chief.

Drummond, William Henry (1854–1907) a physician and author, born at Currawn House, Ireland, and educated at Mohill and at the Montreal high school and Bishop's College, Lennoxville, Quebec. He engaged in the practice of medicine in Montreal, and at the same time held the chair of medical jurisprudence in the faculty of Bishop's College. He was widely known as a writer as well as a physician, his contributions of dialect poetry having given him considerable fame. Among these *The Habitant, Phil-o-rum's Canoe, Johnnie Courteau* and *The Voyageur* are the best known. He also wrote some satirical verse in English.

Duff, James Stoddart (1856–), farmer and legislator, born near Cookstown, Ontario. He was elected to the Ontario legislative assembly in 1898 and in 1908 he was appointed minister of agriculture in the Whitney administration.

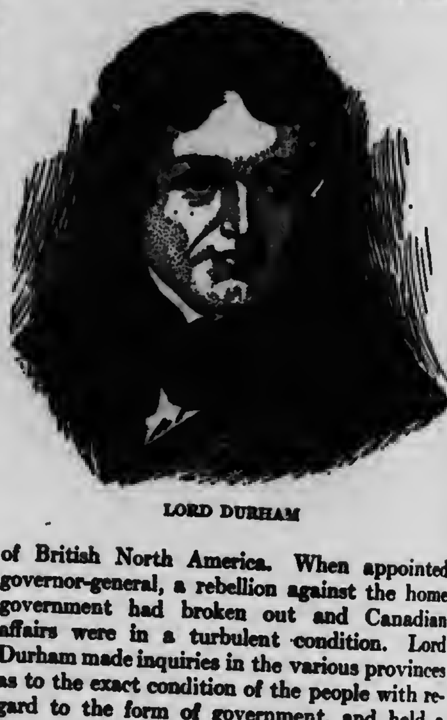
Duff, Lyman P., K.C., LL.B. (1865–), jurist, born at Meaford, Ontario; educated at Toronto University. He was called to the bar in 1893 and became judge of the Supreme Court of British Columbia in 1904. Since 1906 he has been judge of the Supreme Court of Canada.

Dufferin and Ava, Frederick Temple Hamilton Blackwood, Marquis of (1826-1902), British diplomatist and statesman, educated at Eton and Oxford. After spending several years in managing his Irish estates he soon became a prominent member of the Liberal party, was sent on a number of important foreign missions and also held several cabinet positions under Lord Palmerston, Earl Russell and Gladstone. In 1872 he was appointed governor-general of Canada. Here he was given opportunity to display his brilliant abilities in dealing with the many problems of the newly formed Dominion. His great personal charm, added to his known ability, combined to make his administration one of the most popular in the history of Canada. He returned to England in 1868 and for nearly thirty years continued in public service, successively as ambassador to Russia, British commissioner in Egypt, viceroy of India, ambassador to Italy and ambassador to France. (For portrait, see illustration facing page 209.)

Duncan, Norman (1871–), author and educator, born at Brantford, Ontario; educated at the University of Toronto. From 1897 to 1900 he was on the staff of the New York *Evening Post;* from 1901 to 1904 he was professor of rhetoric at Washington and Jefferson College; and he was also professor of English literature at the University of Kansas for a time. He is best known, however, as an author. His best books include *Doctor Luke of the Labrador, The Way of the Sea, The Cruise of the Shining Light* and *Dr. Grenfell's Parish.*

Dunsmuir, James (1851–), a business man and legislator. He was elected to the legislature of British Columbia in 1898 and again in 1900. Upon the resignation of the Martin government he was called upon to form an administration, which he did, assuming the portfolios of premier and president of the council. He resigned in 1902 and from 1906 to 1909 he was lieutenant-governor of British Columbia.

Durham, Lord John George Lambton, First Earl of, (1792-1840), an English statesman, born in London and educated at Eton. He held a commission in the army on completion of his education, but soon gave his attention to politics. In 1813 he entered Parliament for Durham as an advanced Liberal. In 1828 he was created Baron Durham. In 1833 he was appointed ambassador extraordinary to Russia, and in 1838 governor-general of Canada. While Lord Durham remained in Canada as governor-general only six months, the conditions at the time of his appointment and his able statesmanship made a lasting impression upon the history



LORD DURHAM

of British North America. When appointed governor-general, a rebellion against the home government had broken out and Canadian affairs were in a turbulent condition. Lord Durham made inquiries in the various provinces as to the exact condition of the people with regard to the form of government, and held a conference with the governors of the provinces. This conference resulted in a plan for the confederation of the provinces. Although this confederation was not effected until a later date, Lord Durham's report to the home government is one of the most masterly ever written on colonial matters. He pointed out the necessity of making the executive of the government responsible to the people. His suggestions were adopted by the home government, and as a result Upper and Lower Canada were united in February, 1841.

Edgar, James David, Sir (1841–1909), statesman, born at Hatley and educated at Lennoxville and in the city of Quebec. He began the practice of law in 1864 in Toronto, and was created queen's counsel by the Ontario government in 1890. For a time after beginning his practice he was the legal editor of the *Toronto Globe* and *Montreal Trade Review*. He was elected to the House of Commons in 1872 and became the leader of the Liberals; under his leadership the downfall of the first Macdonald cabinet was caused in 1874; he remained out of Parliament until 1884, when he was returned. At this time he had been for four years one of the directors of the Toronto *Globe*, and his writings had been influential for the reform party in Canada; in 1896 he was speaker of the House of Commons and the following year became a member of the privy council.

Elgin, James Bruce, Eighth Earl of (1811–1863), English statesman, son-in-law of the Earl of Durham, educated at Eton and at Christ

LORD ELGIN

Church, Oxford. After four years as governor of Jamaica he was appointed governor-general of Canada in 1846, while the struggle for responsible government was at its height. Though the principle had been acknowledged by Lord Sydenham in 1841, it was not until Lord Elgin summoned Lafontaine and Baldwin to form a new ministry after the general election of 1848 that the principle was really in operation. Since that date no Canadian governor has ever denied either the principle or practice of responsible government. Lord Elgin returned to England in 1854 and in 1862 became Viceroy of India.

Ellison, Price (1862–), legislator, born in England. For many years he was the largest grower of wheat in British Columbia. In 1898 he became a member of the legislative assembly, in 1909 was appointed minister of lands and two years later minister of finance and agriculture.

Emery, Joseph Edward, Very Rev., D.D. (1855–), born at New Glasgow, Quebec; educated at the College of the Assumption and St. Joseph's (now University of Ottawa). He was ordained a priest in 1881, and for three years was missionary in western Canada. He was Master of Novices and Superior at Oblate College, Tewksburg, Mass., 1884-93, then missionary in Texas for two years, and from 1895 to 1901 assistant pastor of Holy Angels Church, Buffalo, New York. Since 1901 he has been rector of the University of Ottawa.

Emmerson, Henry Robert, K.C., LL.D., D. C. L., P. C. (1853–), legislator, born at Maugerville, New Brunswick; educated at Acadia College and at Boston University, Boston, Massachusetts. He was admitted to the bar of New Brunswick in 1877 and was elected to the assembly of the province in 1888. In 1892 he was appointed chief commissioner of public works and from 1897 to 1900 was premier and attorney-general of New Brunswick. Later he became a Liberal member of the Dominion House of Commons and was minister of railways and canals from 1904 to 1907, when he resigned to engage in business.

Falconbridge, William Glenholme, Sir (1846–), jurist, born at Drummondville, Ontario; educated at the Model Grammar School for Upper Canada and at Toronto University. He began the practice of law in 1871; was appointed an examiner in Toronto University and from 1872 to 1881 was registrar. In 1885 he was created queen's counsel by Lord Lansdowne and appointed a judge of the Queen's Bench for Ontario; in 1900 he became chief justice of the King's Bench. Sir William was member of many important commissions, including that for revising the statutes of Ontario.

Fielding, William Stevens, D.C.L., LL.D., P. C. (1848–), journalist and statesman, was born in Halifax and was educated there. He became connected with the Halifax *Morning Call* in 1864 and ultimately became its managing editor. He was elected to the Nova Scotia assembly in 1882 and two years later accepted the office of premier and provincial secretary, which he held till 1896, when he became minister of finance in the Laurier administration. He served continuously till the defeat of the Liberals in 1911. As minister of finance he did much to advance the financial interests of the Dominion. He was the prime mover of the preferential tariff bill of 1897 and in the same year he visited England to float a new Canadian loan, which was obtained on very favorable terms. The act to establish a Canadian branch of the Royal Mint and important amendments to the banking and insurance acts are among the most important measures initiated by him. As acting minister of railways in 1903 he conducted the negotiations which resulted in the agreement for the construction of the Grand Trunk Pacific Railway. He was one of the delegates to the Colonial Conference in London in 1902, one of the king's plenipotentiaries appointed to negotiate a commercial treaty between France and Canada in 1907, and also a member of the royal commission (1909) to inquire into trade relations between Canada and the West Indies.

Fisher, Charles Wellington (1866-), a merchant and legislator, born at Hyde Park, London, England, and educated in London. He was elected a member of the legislative assembly of the Northwest Territories in 1903, and elected to the legislative assembly of Alberta at the first general election in 1905. At the first session of that body he was chosen speaker of the house.

Fisher, Sydney Arthur (1850-), legislator, born at Montreal; educated at McGill University and Trinity College, Cambridge. Himself a student of the scientific principles of agriculture, he has been one of the leaders in promoting the agricultural interest of Canada. He has been an officer of numerous agricultural associations, was chairman of the Canadian delegation to the North American conference for the conservation of natural resources and was a member of the Conservation Commission for the Dominion. He was first elected to Parliament in 1882; on the formation of the Laurier ministry in 1896 he became minister of agriculture, which post he held until 1911. In this position he secured the enactment of the fruit-marks act, the seed control act, the San Jose scale act, the cold storage subsidies act, the meat and canned food act and many other laws in the interest of the nation's health and prosperity. He expanded the work of the dairy commissioner's branch, organized a health of animals branch, organized the permanent census and statistics branch and also established many new experimental farms. He personally supervised the construction of a building for the archives, provided for their care, and secured the appointment of a commission of experts to arrange the material. In 1903 he visited Japan and began negotiations which resulted in a favorable commercial treaty with that nation.

Fitzpatrick, Charles, Rt. Hon. Sir, D.L., P.C., K.C.M.G. (1853-), legislator and jurist, born in Quebec, educated at St. Ann's College and Laval University. He was admitted to the bar in 1876 and became crown prosecutor for the city and county of Quebec. In 1890 he was elected member of the provincial assembly, but resigned in 1896 to represent the same constituency in the Dominion House of Commons. In the same year he was appointed solicitor-general, in 1902 was chosen minister of justice, and in 1906 became chief justice of the Supreme Court of Canada. Sir Charles is deputy governor-general and is also Canada's representative before the Hague Tribunal.

Fleming, Sanford, Sir, K.C.M.G., LL.D. (1827-), engineer and author, born in Scotland. As chief engineer he was in charge of the construction of the Intercolonial Railway. He made the first surveys for part of the Canadian Pacific and was engineer-in-chief, 1871-80. He was elected chancellor of Queen's University in 1890 and was president of the Royal Society of Canada, 1888 to 1889. He was one of the supporters of the movement for establishing a Pacific cable and it was largely due to his efforts that the present system of standard time was adopted by Canada in 1883. Among his published books are *The Intercolonial, a History; England and Canada; Time and its Notation*, and *The New Time Reckoning*.

Flemming, James Kidd (1868-), merchant and legislator, born in the parish of Woodstock, New Brunswick, educated at the common schools and in the provincial normal school. For a number of years he was a manufacturer and dealer in lumber. He was first elected to the legislature in 1900, and was returned in 1903 and 1908, in the latter year becoming provincial secretary in the Hazen cabinet. On the resignation of Mr. Hazen to become Dominion minister of marine and fisheries, Mr. Flemming became premier and surveyor-general of the province.

Forbes, John Colin (1846-), painter, born at Toronto, educated at Upper Canada College, Toronto, South Kensington Museum, and the Royal Academy, London, England. It is as a portrait painter that Mr. Forbes is best known. His portraits of King Edward and

Queen Alexandra are in the House of Commons, Ottawa. He has painted portraits of Gladstone, Campbell-Bannerman, Lord Dufferin, and many distinguished Canadians, including Sir John A. Macdonald and Sir Wilfrid Laurier.

Forget, *for'-shay,* Amadee Emmanuel (1847–), barrister and legislator, born in Marieville, Quebec, and educated in the village schools. He began the practice of law in 1871. In 1875 he was secretary of the Manitoba Half-Breed Commission; from 1876 to 1888 he was clerk of the Northwest Council. For five years he was assistant Indian commissioner for Manitoba and the territories and from 1894 to 1898 he was commissioner. He richly deserved his promotion, in the latter year, to the lieutenant-governorship of the Northwest Territories, and when the province of Saskatchewan was organized in 1905 he became its first lieutenant-governor. At the end of his term of office he was called to the Dominion Senate.

Forget, Rodolphe (1861–), banker and legislator, born at Terrebonne, Quebec; educated there, at Masson College. He is prominent in the financial and industrial world and is an officer of several public service corporations. He was first elected to the House of Commons in 1904, and has served continuously since that time.

Foster, George Eulas, Ph.D., LL.D. (1847–), statesman, born at Carleton, New Brunswick; graduated from University of New Brunswick, 1868. From 1871 to 1879 he was professor of ancient literature in his alma mater. He was elected to the Dominion House of Commons in 1882 and has served continuously since, except from 1900 to 1904. He early won recognition as a brilliant thinker and speaker, and in 1885 was appointed minister of marine and fisheries in the Macdonald cabinet. In 1888 he became minister of finance, holding office till the retirement of the Conservatives in 1896. On the return of the Conservatives to power in 1911 he was appointed minister of trade and commerce.

Foy, James Joseph (1847–), born at Toronto; educated at St. Michael's College, Toronto, and Ushaw College, Durham, England. He was called to the bar of Ontario in 1871 and was elected to the assembly in 1898. In 1905 he became commissioner of crown lands, but exchanged this office for that of attorney-general at the end of the year.

Fraser, Duncan Cameron, D.C.L., LL.D. (1845-1910), statesman, born in New Glasgow, Nova Scotia, and educated in the public and normal schools at Truro and at Dalhousie University. He began the practice of law in 1873; was mayor of New Glasgow for two terms, and in 1878 entered the legislative council of Nova Scotia, but resigned the same year to run for the assembly. He was again called to the council and also to the executive council in 1888, becoming the leader of the government. He resigned this position to contest a seat in the House of Commons as a Liberal; he was elected in 1891 and reëlected in 1896 and 1900. In 1904 he was appointed judge of the supreme court of Nova Scotia and from 1906 until his death he was lieutenant-governor of the province.

Fraser, Simon, an explorer. He was for many years in the employ of the Northwest Fur Company. He it was who first (1808) followed the entire course of the river now known by his name.

Fréchette, *fra shet',* Louis Honoré (1839-1908), a French-Canadian poet, was born at Levis, Quebec, was educated at Quebec Seminary and Laval University, and was called to the bar

LOUIS FRÉCHETTE

in 1864. As editor of the *Journal de Levis,* which he founded, he came into public notice for his revolutionary doctrines and was compelled to leave Canada. After several years spent in newspaper work in Chicago, he returned to Levis. In 1874 he was elected to the House of Commons but after defeats in 1878 and 1882 he retired from politics and devoted himself to literature. His principal works, all in French, are *Mes Loisirs, La Voix d' un Exile, Pêle-mêle, Les Oiseaux de Neige,* crowned by the French

Academy, and two historical dramas, *Papineau* and *Felix Poutré*. He stands unquestioned as the greatest French-Canadian poet.

Gagnon, Ernest (1834–), author and musician, born at Louisville, Quebec, educated at Joliette College. He studied music in Paris in 1857-58 and was made organist at the Basilica, Quebec, in 1864. In 1876 he was made secretary of the department of public works for Quebec, a position he held for over thirty years. He has published a number of books of a historical character, including *Chansons Populaire du Canada, Le Comte de Paris a Quebec, Le Fort et le Chateau St. Louis*, and *Louis Joliet, discoverer of the Mississippi.*

Galt, Alexander Tilloch, Sir (1817–1893), statesman, youngest son of John Galt. He was born in London, but emigrated to Canada at the age of eighteen. He entered the Canadian

SIR ALEXANDER GALT

Assembly in 1849 as Liberal member for Sherbrooke county, Quebec, but he opposed the rebellion losses bill, the chief measure of his party. He retired from the Assembly before the end of the year, but reëntered it in 1853 and for twenty years was the leading representative of the English Protestants of Quebec. In 1858 he was called on to form a minis ;, but declined. From 1858 to 1862 and again from 1864 to 1867 as minister of finance he did much to reduce the chaotic finances of Canada to order. To him are due the introduction of the decimal system of currency and the system of protection to Canadian manufacturers. He was one of the men whose influence led to the coalition ministry of 1864-67. He became minister of finance in the first Dominion ministry, but resigned after a few months. In 1877 he rendered brilliant service as Canadian representative on the Anglo-American Fisheries Commission at Halifax. He was Canadian high commissioner to Great Britain, 1880-1883, being succeeded by Sir Charles Tupper. The last ten years of his life were spent in retirement. "No Canadian statesman has had sounder or more abundant ideas, but a certain intellectual fickleness made him always a somewhat untrustworthy colleague."

Galt, John (1779–1839), Scottish novelist, born at Irvine, Ayrshire, and educated at Irvine and Greenock. In 1804 he went to London, where he made unsuccessful attempts to enter business. His early works are the *Life and Administration of Wolsey, Voyages and Travels, Letters from the Levant*, a record of travel. *The Ayrshire Legatees* (1820) first showed his real power as a novelist; this was followed by his masterpiece, *The Annals of the Parish*, and later by *Sir Andrew Wylie, The Entail* and *The Steam-Boat.* These are humorous studies of Scottish character, all in his happiest manner. In 1826 he came to America as secretary of the Canada Land Company. He carried out extensive schemes of colonization and opened up a road through what was then forest country between Lake Erie and Lake Huron. In 1827 he founded Guelph, but two years later returned to England. The remainder of his life was devoted to writing.

Garneau, Francois Xavier (1809–1866), historian, born in Quebec. He was clerk of the Quebec assembly for a few years and of the municipal council of Quebec from 1844 to 1864. He published a number of historical sketches, poems, etc., but is remembered chiefly for the *Histoire du Canada.*

George V, George Frederick Ernest Albert (1865–), king of the United Kingdom of Great Britain and Ireland, and emperor of India, the second son of Edward VII., was born at Marlborough House, London, June 3, 1865. At the age of 12, with his elder brother, Albert, Duke of Clarence, he entered the navy as a cadet, on the ship *Britannia*. Here for two years the princes were subject to the same discipline and drill as their shipmates with whom they messed. In 1879 they were transferred to the *Bacchante* and began their first long voyage. The following year Prince George was promoted to midshipman. This was but a beginning in the prince's advancement in his naval career. In 1884 he became sub-lieutenant and the following year he became full lieutenant. In 1889 he was given command of a torpedo boat during the naval maneuvers; while in command of the boat he rendered valiant service to a vessel in distress. In 1890 he commissioned the first gunboat, *Thrush*, and spent a year on it, visiting Canada and the West Indies.

In 1892 Albert, Duke of Clarence, died and George became heir-apparent to the throne. As the direct heir he now became Duke of Cornwall and of York. The following year he married Princess May of Teck, the ceremony taking place in the Chapel Royal, St. James, July 6. There are six children in the royal household—Prince Edward Albert, generally known as Prince David, born 1894; Prince Albert Frederick, born 1895; Princess Victoria Alexandra, called Princess Mary, born 1897; Prince Henry William, born 1900; Prince George Edward, born 1902, and Prince John Charles, born 1905.

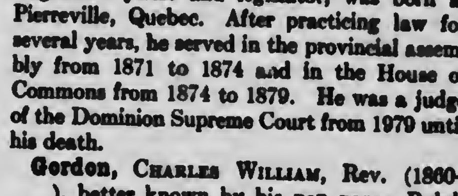
In March, 1901, the Duke and Duchess of Cornwall and York began their journey around the world in the battleship *Ophir*, which had been luxuriously fitted our for their comfort. The prince and princess reached Australia in season to participate in the events connected with the opening of the first parliament of the Commonwealth. New Zealand and Tasmania were also visited. The next objective point was South Africa, and from there the journey was continued to India and thence to Canada by way of the Pacific, to Victoria, British Columbia. At this time the prince spent more than a month in the Dominion and made a study of Canada's resources and possibilities. The prince was again in the Dominion in 1908 as the king's representative at the Quebec Tercentenary celebration.

On the death of Edward VII, May 6, 1910, Prince George was proclaimed King as George V. The new king has had excellent training for his position. His years in the navy gave him an acquaintance with foreign countries and when his father ascended the throne he imposed many duties upon the Prince of Wales, and he was a daily visitor at Buckingham Palace, where, during the transaction of business, he occupied a room adjacent to that of the king, with open doors between them. Moreover, he was frequently called in consultation with the king and his ministers. By these means he became familiar with the affairs of the empire and the duties of the sovereign. When George V became king, therefore, he was well prepared to assume the duties of his great office. Both king and queen are popular with their subjects and are well known in all the leading colonies of the empire, and they began their reign under favorable auspices. (For portrait, see Volume II.)

Gervais, Honoré Hippolyte Achille, K.C., LL.D. (1864-), lawyer and legislator, born at Richelieu, Quebec; educated at the Seminary of Sainte Marie de Monoir and Laval University. In his profession he has stood high for many years. He is professor of international law and civil procedure at Laval University and is governor of the provincial school for higher commercial studies. He served in Parliament from 1904 to 1911, as Liberal representative of St. James' division of Montreal.

Gill, Charles Ignace (1844–1901), a distinguished jurist and legislator, was born at Pierreville, Quebec. After practicing law for several years, he served in the provincial assembly from 1871 to 1874 and in the House of Commons from 1874 to 1879. He was a judge of the Dominion Supreme Court from 1979 until his death.

Gordon, Charles William, Rev. (1860-), better known by his pen name, Ralph Connor, author and Presbyterian minister, was



REV. CHARLES W. GORDON

born in Glengarry county, Ontario. He received his education at various public schools, at Toronto University and Knox College, Toronto, and at New College, Edinburgh, where he studied theology. From 1883 to 1893 he was a missionary in the Rocky Mountains, but in 1894 retired from missionary work to become pastor of St. Stephen's Church, Winnipeg. His short stories and novels, mostly of western life, are very popular. *Black Rock*, his first book, is probably the best known, but *The Sky Pilot*, *The Man from Glengarry*, *The Prospector*, *The Doctor*, *Glengarry School Days* and *Corporal Cameron* are all read and liked by thousands.

Gordon, Daniel Miner, The Very Rev. (1845-), clergyman and educator, born at Pictou, Nova Scotia; educated at Pictou Academy, University of Glasgow and University of Berlin. He was ordained to the ministry in 1866, was pastor of St. Andrew's Church, Ottawa, for fifteen years, and pastor of Knox College, Winnipeg, 1882-1887. In 1885, as honorary chaplain of the 90th Regiment, he accompanied the fighting column under General Middleton throughout the Northwest Rebellion. In 1887 he became pastor of St. Andrew's Church and professor in Presbyterian College, Halifax. In 1903 he was chosen principal of Queen's University, Kingston.

Graham, George Perry (1859-), journalist and statesman, born at Eganville, Ontario, and educated at the Iroquois high school and Morrisburg Collegiate Institute. For twenty-five years he was a journalist, being associated with the Morrisburg *Herald* and with the Brockville *Recorder* as editor. He was elected to the Ontario legislative assembly in 1898, 1902 and 1905, and was provincial secretary for six months in 1904. In 1907 he was sworn as member of the privy council of Canada and appointed minister of railways and canals in the Laurier administration. In the general elections of 1911 he was defeated, but was reëlected at a spectacular by-election early in 1912.

Grant, George Monro, The Very Rev., D.D., LL.D. (1835-1902), a Presbyterian clergyman and educator, born at Albion Mines, Nova Scotia, and educated at Pictou Academy, West River Seminary and the University of Glasgow. He returned to Nova Scotia in 1860 and in 1863 became pastor of St. Mathew's Church, Halifax, where he remained for fourteen years. In 1877 he became principal of Queen's University, Kingston, which through his influence expanded from a small denominational college into a large and influential educational center. During his incumbency of this office he succeeded in raising $250,000 as an endowment fund for the institution. He was the author of *Ocean to Ocean*, *New Year's Sermons*, *Our Five Foreign Missions* and *National Objects and Aims*. Dr. Grant was one of the leaders of opinion in

REV. GEORGE MONRO GRANT

Canada, and used his influence in the interests of public education and in developing sentiment for a united Canada.

Grant, James Alexander, M.D., K.C.M.G., (1831-), legislator and physician, was born at Inverness, Scotland, and educated at Queen's University, at London, and at Edinburgh. From 1863 to 1867 he served in the Canadian Assembly; from 1867 to 1873 and again from 1892 to 1896 he was a member of the House of Commons. He began the practice of medicine in Ottawa, where he soon became one of the acknowledged leaders of his profession. When Ottawa became the seat of the Dominion government he was appointed honorary physician to the governor-general, Lord Monck, and was reappointed by each succeeding governor-general. Dr. Grant wrote extensively for the periodical literature of his profession and his articles are regarded as of great value.

Greenway, Thomas (1838-1908), statesman, was born at Cornwall, England, and educated in the public schools at Huron, Ontario. He was a member of the Dominion Parliament from 1875 to 1878. He removed to Manitoba in 1878 and became representative from that province in 1879. He was premier of Manitoba for several years.

Grenfell, Wilfred Thomason, C.M.G., M.D. (1865-), physician and surgeon, educated at Marlborough and at Oxford University. He fitted out the first hospital ship for the North Sea fisheries, and cruised with the fishermen from the Bay of Biscay to Iceland. He went to Labrador in 1892 and has since spent his life in helping the inhabitants of that desolate coast. He has built and equipped hospital ships and hospitals on land, and has started numerous industrial schemes, such as coöperative stores. Dr. Grenfell is a fluent speaker and writer and through his work, addresses and writings has become widely known not only in Canada and the United States, but over the world. He is the author of *Vikings of Today*, *Off the Rocks*, *Labrador and its Possibilities*, *The Harvest of the Sea*, and of many articles and short stories on the fishermen and his work among them.

Grey, Albert Henry George, Earl (1815-), British colonial administrator, educated at Harrow and Trinity College, Cambridge, where he graduated with honors. He was a Liberal member of the British Parliament from 1880 to 1886, administrator of Rhodesia, 1896-1897, and a director of the British South African Company, 1898-1904. From 1899 to 1904 he was also lord-lieutenant of Northumberland. In 1905 he succeeded Lord Minto as governor-general of Canada. He returned to England in 1911 and was succeeded by the Duke of Connaught. (For portrait, see illustration facing page 209.)

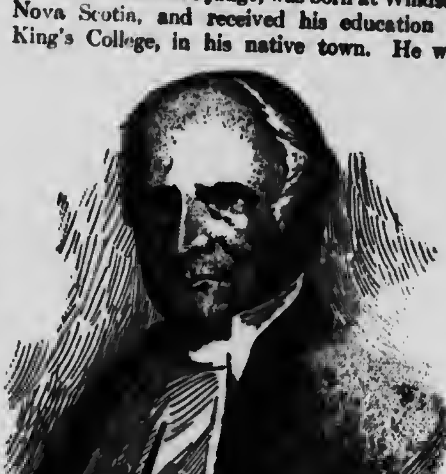
Griffin, Martin Joseph, LL.D., C.M.G. (1847-), born at St. Johns, Newfoundland, educated at St. Mary's College, Halifax. He began the practice of law in 1868 and in 1873 was chosen assistant counsel for Nova Scotia before the Halifax Fisheries Commission. He was for a number of years editor of the Halifax *Herald* and from 1881 to 1885 editor-in-chief of the Toronto *Mail*. On August 6, 1885, he was appointed parliamentary librarian, a position he still holds. Mr. Griffin has for many years edited the literary column "At Dodsley's," a feature of the Montreal *Gazette's* Saturday edition.

Grisdale, John, Rt. Rev., D.D., D.C.L. (1845-), clergyman and educator, born at Bolton, Lancashire, and educated at London, England. He arrived in Canada in 1873, was canon of St. John's Cathedral, Winnipeg, from 1874 to 1878, and dean from 1878 to 1896. In that year he was made bishop of Qu'Appelle, Saskatchewan. He is an examiner of the University of Saskatchewan and was one of the original members of its senate.

Haggart, John Graham (1836-), legislator, born at Perth, Ontario, educated in his native town. He began business as a miller but soon turned his attention to politics. From 1867 to 1872 he was mayor of Perth; since 1872 he has served continuously in the House of Commons. He was postmaster-general in Sir John A. Macdonald's cabinet and also in Sir John Abbott's administration until 1892, when he became minister of railways and canals. While in charge of this department he supervised the construction of the Sault Ste. Marie Canal and won high praise by his management of the Intercolonial Railway.

Haldimand, Frederick, Sir (1718-1791), soldier of fortune, born in Switzerland. He served in several European wars and in 1756 came to America, where he took part in the French and Indian wars. From 1778 to 1784 as governor of Canada, he played an important part in the American revolution. His collection of papers and official correspondence are especially valuable for information concerning the history of North America.

Haliburton, Thomas Chandler (1796-1865), humorist and judge, was born at Windsor, Nova Scotia, and received his education at King's College, in his native town. He was



THOMAS CHANDLER HALIBURTON

called to the bar in 1820 and soon distinguished himself. At the age of thirty-two he was appointed chief justice of the Court of Common Pleas for Nova Scotia and in 1840 was promoted to the Supreme Court. After two years, however, he resigned and removed to England, where he was for six years a Conservative member of Parliament. Despite his brilliant career as a jurist it is as a humorist and satirist, under the pen name of "Sam Slick," that he is best remembered. The Sam Slick sketches, which first appeared in a local paper, pictured a Yankee clockmaker, whose shrewd sayings and knowledge of human nature won immediate recognition. These sketches were collected and published in 1837 under the title of *The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville.* A second series of Slick stories appeared in 1838, and a third in 1840. He also wrote *The Old Judge, The Letter Bag of the Great Western* and *Traits of American Humor.*

Hamilton, Charles, Most Rev., M.A., D.D. (1834-), archbishop of Ottawa and metropolitan of Canada, born at Hawkesbury, Ontario, educated at Montreal High School and University College, Oxford. He was ordained deacon in 1857 and priest in 1858. In 1885 he was chosen bishop of Hamilton, a post he held for eleven years. He was then transferred to the diocese of Ottawa and in 1909 was chosen metropolitan of Canada by the House of Bishops.

Hanna, William John, K.C. (1862-), a Canadian barrister and statesman, born at Adelaide, Ontario, and educated in the public schools of the townships of Brooke and Lambton. He was first elected to the legislature of Ontario in 1902 as a Conservative and reëlected in 1905, in which year he was appointed provincial secretary. Mr. Hanna is a distinguished orator and debater.

Harcourt, Richard (1849-), educator and legislator, born in Haldimand, Ontario; educated at Toronto University. He began his career as teacher in the high school and later was high school principal and inspector. He was admitted to the bar in 1876. He served continuously in the legislative assembly of Ontario from 1878 to 1905, and for the last seventeen years of the period was a member of the Liberal cabinet, his most important position being minister of education. From 1888 to 1898 he was also treasurer of the province.

Hardy, Arthur Sturgis (1837-1899), statesman, born at Mount Pleasant, Ontario. He studied law, was called to the bar in 1865 and practiced with great success. In 1873 he was elected as a Liberal member of the Ontario assembly, where his influence was soon felt. He held several positions in Sir Oliver Mowat's cabinet and succeeded him as premier of Ontario. Mr. Hardy was active in securing useful legislation on railways, legal procedure, sanitation, liquor licenses and matters of general importance.

Harris, Robert, R.C.A. (1849-), an artist, born in Wales, and educated at the Prince of Wales College, Charlottetown, Prince Edward Island, and at the University College of London. Later, he studied his profession in Paris, Italy, Belgium and Holland. After this he returned to Canada and spent two winters in Toronto and was elected a member of the Royal Canadian Association of Artists. He again went to Paris for further study and while abroad exhibited at the Royal Academy, London, the Paris Salon and in other galleries. In 1883 he took up his residence in Montreal and became the director of the Art School of the Montreal Art Association. He was awarded a medal at the World's Fair in Chicago in 1893. He is known chiefly as a figure and portrait painter. Two of his pictures which have attracted most attention are *The School of Trustees* and *The Fathers of the Confederation,* which were painted under commission from the Dominion government.

Harriss, Charles Albert Edwin (1862-), conductor and composer, born in London, England; educated at St. Michael's College, Tenbury, England. He is one of Canada's best known musicians. In 1883 he became organist and director of the choir at Montreal Cathedral. He directed the Canadian-British Festival in London, 1906, in the presence of the King, was guest conductor at the London Symphony orchestral concert in honor of premiers of Europe attending the Colonial Conference in 1907, and has lectured and played in many parts of the world. He is composer of *Daniel before the King, Pan, The Sands of Dee* and numerous anthems, songs and pianoforte pieces.

Harvey, Horace (1863-), born in Elgin County, Ontario, educated at Toronto University. He was called to the bar in 1889 and practiced for four years, when he removed to Calgary. In 1896 he was appointed registrar of land titles at Calgary and in 1900 became deputy attorney-general for the Northwest Territories. In June, 1904, he was appointed judge of the superior court of the territories and on the organization of the province of Alberta became judge of the superior court. In 1910 he succeeded Hon. Arthur Sifton as chief justice of the provincial supreme court.

Harvey, John, Sir (1778-1852), British soldier and administrator. After service in many parts of the world he was sent to Canada in 1812. During the War of 1812 he was conspicuous, especially for his victory at Stony Creek over General Dearborn. He served in the Waterloo campaign on the staff of the Duke of Wellington. In 1836 he returned to America as governor of Prince Edward Island. He was governor of New Brunswick from 1837 to 1841 and of Nova Scotia from 1846 until his death. Sir John was one of the most popular of the governors who have served in Canada. That this popularity came in a period when most of the governors were disliked by the people is a high tribute to his character.

Haultain, *ho tain'*, FREDERICK WILLIAM GORDON (1857-), barrister and statesman, born at Woolwich, England, educated in Woolwich, Peterborough and at Toronto University. He began the practice of law in 1882 and later went to the Northwest Territories, where he engaged in practice at Fort McLeod. He was elected member of the Northwest Assembly in 1888, where he gradually grew in influence until he became territorial premier in 1897; he continued to hold this office until the organization of the provinces of Alberta and Saskatchewan. Since 1905 he has been leader of the Conservative opposition in the legislative assembly of Saskatchewan.

Hays, CHARLES MELVILLE (1856–1912), born at Rock Island, Illinois, educated in the public and high schools of that city. At the age of seventeen he entered the passenger department of the Atlantic and Pacific Railroad Company at St. Louis, Missouri. From 1878 to 1884 he was private secretary to the general manager of the Missouri Pacific; from 1884 to 1886 he was secretary to the general manager of the Wabash; and in 1886 he himself became first assistant general manager and then general manager. In 1894 he was chosen general manager of the reorganized Wabash Railroad. He next accepted the position of general manager of the Grand Trunk at Montreal. He remained here four years, during which he reorganized the Central Vermont Railway Company, a subsidiary of the Grand Trunk, and double-tracked the line of the Grand Trunk from Montreal to Chicago. In January, 1901, he became president of the Southern Pacific, but in the autumn of that year he was recalled to Montreal to become second vice-president and general manager of the Grand Trunk. It was largely due to his efforts that the Grand Trunk Pacific Railway Company, of which he was president, was organized. (See page 449.) On January 1, 1910, he became president of the Grand Trunk Railway Company. While returning from a trip to England, where he had made arrangements with the directors for further expansion, he lost his life in the Titanic disaster on April 15, 1912. Mr. Hays was one of the great constructive railway men of the country, a man of executive ability and large views. He raised the Grand Trunk to a position of prominence, and there is no doubt that had he lived he would have made the combined Grand Trunk and Grand Trunk Pacific one of the world's greatest railway systems.

Hazen, JOHN DOUGLAS (1860-), lawyer and statesman, born at Oromocto, New Brunswick, educated in the common schools of Fredericton and the University of New Brunswick. For three years he was an alderman of Fredericton and for two years mayor. In 1890 he removed to St. John and the following year was elected to the House of Commons, where he served till 1896. At the general elections of 1899 he was elected to the New Brunswick legislature and immediately became leader of the Conservative opposition. In 1908 Mr. Hazen was called on to form a ministry, in which he became premier and attorney-general. After the general elections of 1911, he was appointed Dominion minister of marine and fisheries in the Borden cabinet and took his seat in the House of Commons for St. John.

Head, EDMUND WALKER, Sir (1805–1868), English colonial-governor and writer on art, was educated at Winchester School and Oriel College, Oxford. At his father's death in 1838 he succeeded to the baronetcy. For six years he was poor-law commissioner, a position in which he showed great administrative ability. Then, in 1847, he was appointed lieutenant-governor of New Brunswick and in 1854 he became governor-general of Canada. In 1861 he returned to England, where he died after holding minor public offices. In spite of his many official duties he found time to write and edit several volumes of criticism on painting. He was a student of political and economic affairs, a man of real learning and ability.

Head, FRANCIS BOND, Sir (1793–1875), English soldier, author, statesman, was born at Hingham, Kent, England, and was educated at the Rochester Grammar School and Royal Military Academy. He was for some years after 1811 stationed in the Mediterranean, and he served in the Waterloo campaign. In 1825 he went to South America to take charge of some gold and silver mines. He remained only two years and then again became an active officer in the British army. He was appointed lieutenant-governor of Canada in 1835, at a time when the political situation was very difficult to handle. A short time after the rebellion of 1837 he returned to England in consequence of a disagreement with the home government. Thereafter he devoted himself to writing. His books of travel, written in a clever and graphic style, show keen though superficial observation. His most important works are *Bubbles from the Brunnens of Nassau, The Emigrant, Stokers and Pokers, Faggot of French Sticks* and *The Royal Engineer.*

Hearne, Samuel (1745-1792), explorer. He was for several years in the employ of the Hudson's Bay Company at Prince of Wales Fort, at the mouth of the Churchill River. In 1770 he set out on a long voyage which finally led to the discovery of the Coppermine River and its exploration to the Arctic Ocean. Considering the difficulties of the country through which they passed the achievement of Hearne and his company was a notable one.

Heavysege, Charles (1816-1876), poet, born in Liverpool, England. He came to Canada in middle life and for a time followed his trade of cabinet-making. His first work, *The Revolt of Tartarus,* was published anonymously, but *Saul,* his next poem, established his reputation. *Count Filippo, The Dark Huntsman* and *The Owl* are other well-known productions of his pen.

Herbert, Louis Philippe (1830-), a sculptor, born in Sainte Sophie d'Halifax. At the age of 21 he went to Massachusetts and engaged in work on a farm, but during this time exercising his inclination for carving in wood. Soon after this he began to study with Bourssa, a painter and sculptor of Montreal. After five years he went to Paris and spent one year in study there, when he returned to Canada. He has designed a number of public statues for Canada, among which is that of Sir Georges Cartier in the Parliament Square at Ottawa, and that of Sir John Macdonald at the same place. In 1886 he was commissioned by the government of Quebec to design a number of historical statues for the legislative buildings of that province.

Hincks, Francis, Sir (1805-1885), statesman, was born at Cork, Ireland. In 1832 he engaged in business in Toronto, where he became a friend of Robert Baldwin. In 1835 he was chosen to examine the accounts of the Welland Canal, whose management was being attacked by William Lyon Mackenzie. His attention being thus turned to political life, he founded the *Examiner,* a weekly paper supporting the Liberals, and in 1841 he was elected to Parliament.

SIR FRANCIS HINCKS

In two of Baldwin's ministries he was inspector general (minister of finance) and in 1851, after Baldwin's retirement, he became premier of Canada. After three years, however, the opposition led by George Brown became too strong and Sir Francis resigned. In 1855 he was chosen governor of Barbados, and later of British Guiana. Returning to Canada in 1869 he became minister of finance in the cabinet of Sir John Macdonald. He resigned in 1873 but continued to take an active part in public life until his death on the 18th of August, 1885.

Hodgins, John George, LL.D. (1821-), educator and historian, born in Dublin and educated at the Upper Canada Academy and Victoria College, Cobourg. In 1855 he was appointed deputy superintendent of education for Upper Canada; from this appointment he went abroad to study the methods in the normal and model schools of Dublin. On his return to Canada he introduced as much of the Irish system into the schools of this country as seemed practicable and in connection with his chief, Dr. Ryerson, perfected a system of public education for Upper Canada. Aside from his work as an educator, Dr. Hodgins has been a prolific writer; he was for a long time editor of the *Upper Canada Journal of Education,* and one of the pioneers in preparing school books in Canada.

He is the author of the *School History of Canada and Other British North American Provinces; Lectures on School Law; The School House and Its Architecture; The Documentary History of Education in Upper Canada* and *The Legislation and History of Separate Schools in Upper Canada.*

Hopkins, John Castell (1864–), journalist and author, born at Dyersville, Iowa, educated at Bowmanville, Ontario. In 1886 he formed at Ingersoll the first branch of the Imperial Federation League in Ontario; three years later he became honorary secretary of the League in Canada. In 1890 he became associate editor of the Toronto *Daily Empire.* He began literary work in 1895 with a *Life of Sir John Thompson* and has since contributed an immense amount to the history and biography of Canada.

Howe, Joseph (1804–1873), was the leader in Nova Scotia in securing responsible government. He learned the trade of printer and afterwards became a publisher and editor. He refused to unite with Mackenzie and Papineau in the Upper

JOSEPH HOWE

and Lower Canada Rebellion of 1837, though he vigorously attacked the existing evils in the government. In 1835 he was prosecuted for libel and defended himself. He won his case and became the idol of the province. He was elected to the legislature and aided in securing the liberties which he demanded as an editor. Mr. Howe remained in public life until his death in 1873. During his career he was successively speaker, secretary of state and premier of Nova Scotia. After the confederation he became a member of the Dominion government, and at the time of his death was governor of Nova Scotia. On several occasions he represented his province in England. He was noted as an orator and was the author of *Speeches and Public Letters, Life and Times of Howe, Western and Eastern Rambles* and *Legislative Reviews.*

Hughes, *huze,* James Laughlin (1846–), educator, born in Durham county, Ontario. He lived on a farm till he was twenty years old; then, after teaching for a year, entered the Toronto Normal School. He taught at Frankford for six months after leaving the Normal School and then was appointed assistant in the Model Training School in connection with the Normal School. After three years he became principal, and in 1874, at the age of 28, was elected chief inspector of schools for the city of Toronto. Mr. Hughes was the leader in the movement for school cadet corps, the Toronto cadets being known throughout the Dominion. He resigned from his position of inspector of schools in 1912 in order to devote the remainder of his life to a wider field of activity in educational matters. Mr. Hughes is well known as a lecturer and writer, among his publications being *Froebel's Educational Laws, Dickens as an Educator,* and *Mistakes in Teaching.*

Hughes, Samuel, Col. (1853–), legislator, brother of James L. Hughes, was born at Darlington, Ontario, and was educated at the Toronto Model and Normal Schools and Toronto University. He was lecturer in English language, literature and history in Toronto Collegiate Institute till 1885, when he became editor of the Lindsay *Warder.* He has been for many years actively interested in the militia, and has been prominent in military organizations. He served in the Fenian Raid and in the South African Transvaal campaigns and was mentioned several times in despatches. He declined the position of deputy minister of militia in 1891 and that of adjutant-general of Canada in 1895. Since 1892 he has been a prominent Conservative member of the House of Commons; and in 1911, on the formation of the Borden ministry, became minister of militia and defence.

Hunter, Gordon (1863–), lawyer and jurist, born at Beamsville, Ontario; educated at Brantford College and Toronto University, where he graduated in 1885. He was called the same year accepted the professorship of civil law at Laval University. For twenty years he was a member of the provincial council of public instruction and resigned only when he became lieutenant-governor of the province in 1898. It was his distinction to serve two terms as lieutenant-governor, finally retiring from office in August, 1908. Less than a year later he was appointed chief justice of the superior court for the province of Quebec. In 1903 Sir Louis was a member of the Alaskan Boundary Commission which settled the dispute between the United States and the Dominion.

Johnson, Pauline E. (1862-), a poet, born at Chiefswood, Ontario, and educated by private tutors and at the Brantford model school. She has been a frequent contributor to Canadian and American periodicals. Her best poems are on Indian subjects and Canadian scenery. Among those best known are *The Death Cry, A Cry From an Indian Wife, As Red Men Die, The Idler, In the Shadows* and *In April.* She is also widely known as a reader and has recited her own poems in many Canadian and American cities.

Joly De Lotbiniere, Henri Gustave, Sir (1829-1908), statesman, was born at Epernay, France. His father, Gaspard Joly, was the owner of famous vineyards at Epernay. The son was educated at Paris but came to Canada

British North America Act which won him the name of Haul-down-the-flag Jones. He was for many years a member of the House of Commons, and it was largely owing to his influence that the Liberal party refused in 1878 to abandon its policy of free trade, a position which led to its defeat. From 1900 until his death he was lieutenant-governor of his native province.

Joussard, Celestin, Rt. Rev. (1851-), missionary and priest, born at Grenoble, France; educated at the Seminary of Grenoble. He came to Canada in 1880 and for twenty-eight years was a missionary among the Indians in the Athabaska district. In 1909 he was named coadjutor to the vicar apostolic of Athabaska and was consecrated bishop in September of the same year.

Kemp, Albert Edward (1858-), manufacturer and legislator, born at Clarenceville, Quebec; educated at Clarenceville and at Lacolle Academy. He has been president of the Canadian Manufacturers' Association and of the Toronto Board of Trade. From 1900 to 1908 he was a Conservative member of the Dominion House of Commons. In 1911 he was again elected to represent Toronto and was appointed a minister without portfolio in the Borden cabinet.

Kernighan, Robert Kirkland (1857-), a poet and journalist, born at Rushdale Farm, near Hamilton, Ontario, and educated in the

King, (William Benjamin) Basil (1859–), born at Charlottetown, Prince Edward Island; educated at St. Peter's school, Charlottetown, and King's College, Windsor. Mr. King is known as a poet and novelist; among his books are *Griselda*, *In the Garden of Charity*, *The Giant's Strength* and *The Inner Shrine*.

King, William Lyon Mackenzie (1874–), economist and statesman, grandson of William Lyon Mackenzie, born at Berlin, Ontario; educated at the University of Toronto, Harvard University and University of Chicago. From 1896 to 1900 he was instructor in political economy, first at University of Chicago, later at Harvard. He has represented Canada as special commissioner in matters relative to industrial questions; he has been secretary and chairman of the Royal Commission, and government conciliator in over forty industral strikes. From 1900 to 1908 he was deputy minister of labor and from 1909 to 1911 minister of that department. He resigned with the Laurier cabinet in the fall of 1911, and failed of reëlection to the House of Commons.

Kingsford, William (1819–1898), historian, born in London, England. He studied architecture but his personal tastes soon led him into the army. In 1837 he came to Canada with his regiment, from which he resigned in 1841. He then became a surveyor, taking part in work on the Grand Trunk Railway and Rideau Canal. He wrote numerous books on canals and roads

...Congress at The Hague in 1907 and at Zermatt in 1909.

La Coste, *lah cost'*, Alexander, Sir (1842–), an eminent jurist, born in Boucherville, Quebec; educated at St. Hyacinthe College and Laval University. He selected the profession of law and was made queen's counsel in 1880. He was a member of the legislative council of Quebec from 1882 to 1884, when he was called to the Dominion Senate. In 1891 he was chosen Speaker of the Senate, but resigned in the same year to become chief justice of the court of appeals. He retired from the bench in 1907.

Lafontaine, Louis Hypolite, Sir (1807–1864), statesman, born in Chambly, Quebec; educated at Montreal. As a law clerk he very soon established a reputation and after his call to the bar quickly became a leader. In 1830 he was returned to the legislative assembly for Lower Canada. At first a follower of Papineau, he soon became a rival and eventually succeeded to Papineau's position as leader of the French party. Elected to the joint assembly after the Act of Union, he was recognized as the leader of the French-Canadians and in 1842 joined with Robert Baldwin in forming a ministry. During the struggle for responsible government Lafontaine was one of the leaders of reform and after the election of 1848 again formed a Lafontaine-Baldwin ministry, the first ministry really acknowledged to be responsible to a majority of the people. Naturally to the bar of Ontario in 1888 but soon removed to British Columbia, where, in 1891, he became the first official law reporter to the Supreme Court. Later he became crown solicitor and on March 18, 1902, was sworn in as chief justice of the Supreme Court of British Columbia.

Idington, John (1840–), lawyer and judge, born at Wellington, Ontario. He was called to the bar in 1864 and practiced in Stratford, Ontario. He was appointed county crown attorney for Perth in 1879 and continued in office until 1904, when he became judge of the Exchequer Division of High Court of Justice for Ontario. On February 10, 1905, he was sworn in as a justice of the Supreme Court of Canada.

Jette, Louis Amable, Sir, K.C., K.C.M.G. (1836–), judge and statesman, born at L'Assomption, Quebec; educated at L'Assomption College. He was called to the bar in 1857 and gradually became one of the leaders of his profession in Canada. He was at one time editor of various legal journals and treasurer of the Bar Association. He was appointed puisne judge of the Superior Court of Quebec and in the same year accepted the professorship of civil law at Laval University. For twenty years he was a member of the provincial council

as a young man and began to practice law in the city of Quebec. In 1861 he was elected to the Canadian Assembly as Liberal member for the county of Lotbiniere, and from 1867 to 1874 he represented the same county in the House of Commons. He was opposed to Confederation, and took an active part in the opposition to the ministry formed by Sir John Macdonald. In 1878 he was premier of Quebec; then for four years was leader of the opposition. He retired from public life in 1885, but ten years later, in response to party appeals, took an active part in the campaign and was again elected to the House of Commons. On the formation of the Laurier ministry he accepted the portfolio of inland revenue. From 1900 to 1906 he was lieutenant-governor of British Columbia. He rendered special service in the promotion of Canadian agriculture and forestry.

Jones, Alfred Gilpin (1824–1906), legislator, was born at Weymouth, Nova Scotia. He became prominent as an opponent of federation in 1865 and later made a speech in criticism of the British government's refusal to repeal the British North America Act which won him the name of Haul-down-the-flag Jones. He was for many years a member of the House of Com-

common schools of that city. When twenty years of age he was appointed to the staff of the *Hamilton Spectator* as local editor and later became editor of the *Winnipeg Sun*. He is widely known as the author of many patriotic and humorous songs, written under the pen name of "The Khan." These have been published in a volume entitled *"The Khan's Canticles."* The most popular of these songs is *The Men of the Northern Zone.*

Kerr, James Kirkpatrick, K.C. (1841–   ), statesman, born at Guelph, Ontario; educated in the Hamilton and Guelph schools. He began the practice of law in 1862, and in 1881 was created queen's counsel by the government of Ontario and in 1896 by the Dominion government. He became a member of the Senate in 1902 and was its speaker from 1909 to 1911. Mr. Kerr is prominent in Masonic circles and has held some of the most important offices in the gift of that order. In 1883 he was created a Knight of the Grand Cross of the Temple by King Edward VII., then Prince of Wales.

King, (William Benjamin) Basil (1859–   ), born at Charlottetown, Prince Edward Island; educated at St. Peter's school, Charlotte-

and on the west in general, but he is best remembered for his *History of Canada*, in ten volumes, an accurate and straightforward account of the story of Canada.

Kirby, William (1817–1906), author, born at Kingston-upon-Hull, England. At the age of fifteen he came to Canada with his parents and soon engaged in newspaper work. He wrote *The Golden Dog,* dealing with the struggle of the French to hold Canada against the English and considered the best Canadian historical romance. He also wrote *A. E.*, an epic poem, and a volume of verse called *Canadian Idylls.*

Klotz, Otto Julius (1852–   ), astronomer, born at Preston, Ontario. From 1875 to 1885 he was engaged in explorations and surveys in every part of Canada; in the latter year he became Dominion astronomer. He completed the first astronomic girdle of the world in 1904 and has published many articles and reports on surveying, terrestial force, seismology, etc. He represented Canada at the International Seismological Congress at The Hague in 1907 and at Zermatt in 1909.

La Coste, *lah cost'*, Alexander, Sir (1842–

made chief justice for Lower Canada in 1853 and on August 28, 1854, he was created a baronet. He continued to hold the office of chief justice until his death in Montreal, February 26, 1864.

Lamont, John Henderson (1865–), lawyer and legislator, born in Dufferin county, Ontario; educated at Orangeville High School and Toronto University. He studied law in Toronto, was admitted to the bar in 1893 and practiced in Toronto for six years. He then removed to Prince Albert, Sask. He was elected to the House of Commons in 1904, but resigned in the following year to become the first attorney-general of the province of Saskatchewan. In September, 1907, he became a judge of the Supreme Court for the province.

Lampman, Archibald (1861–1899), a Canadian poet, born in Kent county, Ontario, and educated at Trinity University, Toronto. On the completion of his education he entered the civil service department at Ottawa. While in college he began to write poems, but did not publish his first work until 1888. He now ranks among the best of American poets. His published volumes are *Among the Millet, and Other Poems* and *Lyrics of Earth.*

Landry, Charles Philippe Auguste Robert, Col. (1846–), born at Quebec; educated at

was a member of the Quebec assembly and from 1884 to 1898 he was in the House of Commons. He served eight years as mayor of Quebec and for a short time was acting chief justice of the superior court of Quebec. In 1911 he was appointed lieutenant-governor of Quebec.

Langevin, Hector Louis, Sir (1826–1906), statesman, born at Quebec. He early took up the profession of law and quickly became prominent. From 1858 to 1861 he was mayor of Quebec. Previous to Confederation Sir Hector held several offices in the Canadian ministry, including those of solicitor-general for Lower Canada and postmaster-general. He was one of the delegates to the London conference which drafted the British North America Act, and on his return became secretary of state in the first Dominion cabinet. After the defeat of his party in 1873 he continued to be one of its leaders in opposition to the Liberal government formed by Alexander Mackenzie. From 1879 to 1891 he was minister of public works in the Macdonald cabinet. He retired from Parliament in 1896, after a continuous service of thirty-nine years.

Langevin, Louis Philippe Adelard, The Most Rev. (1855–), Roman Catholic archbishop of St. Boniface, born at St. Isidore, Quebec, and educated at the Sulpician College, Montreal. After completing his education he was for a time professor of classics in the college from which he graduated. In 1881 he entered

House of Lords during the discussion of the Lloyd-George budget in 1909. (For portrait, see illustration facing page 209.)

Laurier, Wilfrid, Sir (1841–), statesman, born at St. Lin, Quebec, educated at L'Assomption College and McGill University, where he took the course in law. At graduation he delivered the valedictory address, which, like so many of his later speeches, closed with an appeal for sympathy between the French and English peoples as the secret of Canada's future. After a number of years of law practice and journalism he was elected to the Quebec assembly in 1871 and three years later to the House of Commons, where he quickly rose to prominence. In 1877 he became minister of inland revenue in the Liberal government of Alexander Mackenzie. After the defeat of the Mackenzie government in 1878 because of its low tariff platform, Sir Wilfrid became one of Hon Edward Blake's chief lieutenants in the opposition and on Blake's retirement in 1887 he became the recognized leader of the Liberal party. From the first he won great popularity and showed unusual capacity for leadership. In 1896 his party carried the country and Laurier was called to form a ministry; he was the first French-Canadian to be premier of the Dominion. During his long term in power, 1896–1911, he saw Canadian prosperity advance by leaps and bounds. The chief features of his administration were the enactment of special tariffs for goods imported from Great Britain, the sending

later was correspondent for United States, Canadian and English publications. Miss Laut is well known as the author of a number of books on Canadian history and biography; among these are *Lords of the North*, *Heralds of Empire*, *Pathfinders of the West*, *Vikings of the Pacific*, *Canada*, *Empire of the North* and *Freebooters of the North*.

Leacock, Stephen Butler (1869–), author and educator, born in England; educated at Upper Canada College and Toronto University. From 1891 to 1899 he was instructor in Upper Canada College; he is now head of the department of economics and political science at McGill University. In 1907-08 he delivered a series of lectures throughout the British Empire on imperial problems, under the auspices of the Rhodes trust. Mr. Leacock is the author of *Elements of Political Science*, of biographies of Baldwin, Lafontaine and Hincks in the *Makers of Canada* series and of numerous pamphlets.

Le Jeune, Paul (1592–1664), French Jesuit missionary. He came to Canada in 1632 as superior of the Jesuit house in Quebec. He wrote a *Brieve relation du voyage de la Nouvelle France*, the first of the collected works known as the *Jesuit Relations in New France*.

Le Moine, *le mwahn'*, James MacPherson, Sir (1825–), historian and naturalist, born at Quebec and educated there at Le Petit Seminaire. He was admitted barrister in 1850, and for a number of years was collector, later inspector of inland revenue at Quebec. His an aristocrat and conservative, Lafontaine felt himself out of accord with the younger reformers and in 1851 retired from political life. He was

SIR LOUIS H. LAFONTAINE

made chief justice for Lower Canada in 1853

Quebec Seminary. He was first elected to the Quebec legislative assembly in 1875, and to the Dominion House of Commons in 1878 and 1882. He was called to the Senate ten years later and in 1911 became its Speaker. He was president of the council of agriculture of Quebec and was the province's commissioner to the World's Fair at Chicago in 1893. He takes great interest in military affairs, served in the Fenian raid and was for seventeen years colonel in command of the sixty-first regiment.

Landry, DAVID V. (1866-), physician and legislator, born in Memramcook, New Brunswick. He was elected to the New Brunswick assembly in 1908 and was immediately appointed commissioner of agriculture in the Hazen cabinet.

Langelier, FRANCOIS XAVIER, Sir (1838-), lawyer, educator and statesman, educated at St. Hyacinthe College, Laval University and University of Paris. He was professor of Roman law, later also of civil law and political economy, at Laval University. In 1873-75 he was a member of the Quebec assembly and from 1884 to 1898 he was in the House of Commons. He served eight years as mayor of Quebec and the order of Oblates and was ordained priest the following year. In 1885 he was appointed to the chair of theology in the university of Ottawa and kept this position for eight years, when he went to Manitoba and became superintendent of all the Oblate missions of the Northwest Territories. In 1894 he became pastor of St. Mary's Church at Winnipeg and the next year was elected archbishop of St. Boniface.

Lansdowne, Henry Charles Keith Petty-Fitzmaurice, Marquis of (1845–), a British statesman, educated at Eton and Balliol College, Oxford. When a young man he entered upon a political career as a Liberal. Between 1868 and 1883 he held successively the offices of lord of the treasury, under-secretary of war and under-secretary for India. In 1883 he was appointed governor-general of Canada, to succeed the Marquis of Lorne, and from 1888 to 1893 was viceroy of India. In 1895 he became secretary of war, and in 1900 secretary of state for foreign affairs. He was leader of the opposition in the House of Lords during the discussion of the Lloyd-George budget in 1909. (For portrait, see illustration facing page 209.)

of Canadian troops to South Africa during the Boer War, the contract with the Grand Trunk Railway for the construction of a new transcontinental railroad, the appointment of a federal commission with power to regulate freight and express charges and telephone rates, the reduction of the postal rate from three to two cents for domestic postage and from five to two cents for Great Britain, United States and Mexico and the formation of the provinces of Alberta and Saskatchewan. In 1910 he arranged a reciprocity treaty with the United States, but when the question was submitted to the voters the Liberals were defeated and the treaty failed of ratification. The Laurier ministry resigned on October 6, 1911. (For portrait see illustration facing page 210.)

Laut, Agnes Christina (1871–), author, born at Stanley, Ontario, educated at Manitoba University. She became an editorial writer on the Manitoba *Free Press* in 1895 and later was correspondent for United States, Canadian and English publications. Miss Laut is well known as the author of a number of writings on early Canadian history won for him a reputation for carefulness in his investigations and impartiality in his conclusions. Much of his time was devoted to the study of natural history, especially birds. Among the numerous books which gained for him a standing as a naturalist and historian are *Legendary Lore of the Lower St. Lawrence*, *The Fisheries of Canada*, *Quebec Past and Present*, *Canadian Heroines*, *Birds of Quebec* and *Annals of the Port of Quebec.*

Lighthall, William Dover (1857-), a poet and novelist, born in Hamilton, Ontario, and educated at the Montreal high school and McGill University. He began the practice of law in 1881, but in connection with his profession he has been a student of Canadian history and was one of the founders of the Society of Canadian Literature. He originated the series of historical tablets placed in the streets of Montreal and was a leader in the movement which secured the erection of the Maisonneuve monument. He has also been a prolific writer of poems as well as books on psychology and ethics. He is the author of *Thoughts, Moods and Ideals*, a volume of poems, *Songs of the Great Dominion*, and *Canadian Poems and Lays.*

Lisgar, Lord, Right Hon. Sir John Young (1807–1876), an English diplomat and statesman, born in Bombay, India, and educated at Eton and Oxford University. He prepared for the practice of law, but while still a student was elected to the House of Commons, where he continued to represent his constituency for nearly twenty years. In 1852 he was appointed chief secretary for Ireland, and three years later, lord high commissioner for the Ionian Islands. In 1860 he became governor of New South Wales, and in 1868 succeeded Lord Monck as governor-general of Canada, holding the position until 1872. During his administration in Canada, Manitoba and British Columbia entered the confederation, the Treaty of Washington was signed, and plans for the construction of the Canadian Pacific railway were perfected. In 1870 Sir John was created Baron Lisgar. When he left Canada he retired to his estates in Ireland, where he died Oct. 6, 1876. (For portrait see illustration facing page 209.)

Lloyd, George Exton, Rev. (1861-), clergyman and educator, born in London, England; educated at Wycliffe College, Toronto, and at the University of New Brunswick. He was ordained in 1885, and in 1890 organized and became principal of Rothesay College for Boys in New Brunswick. In 1905 he was appointed archdeacon in the diocese of Saskatchewan; he resigned in 1909 to become principal of Emmanuel College, Saskatoon.

Lorne, Marquis of. See Argyll, John Douglas Sutherland Campbell, Duke of.

Lougheed, James Alexander (1854-), born at Toronto, where he was educated and practiced law till 1883, when he removed to the Northwest Territories. He was called to the Senate of Canada in 1889 and for many years was leader of the Conservatives. In 1911 he became a minister without portfolio in the Borden cabinet.

Lurton, William Fisher (1844-1905), a Canadian journalist, born in England. He came to Canada when eleven years of age and settled in Saint Thomas, Ontario. He began his career as a teacher but later changed to journalism. In 1871 he went to Winnipeg and established the *Free Press*, which he edited for twenty-one years. He is regarded as the father of journalism in western Canada. Mr. Lurton took an active interest in education and agriculture. He was a member of the board of education, chairman of the school board, and also held other important offices, the last being that of superintendent of public buildings for Manitoba.

Mabee, James Pitt (1859–1912), lawyer and judge, born at Port Rowan, Ontario; educated in the high school of his native town and at Toronto University. He practiced law at Listowel, later at Stratford and Toronto. He was appointed one of the judges of the High Court of Justice for Ontario in 1905 and in 1908 became chief commissioner of the board of railway commissioners. As chief commissioner his work was of untold value in securing recognition for the rights of the private citizen as well as justice for the railroads.

McBride, Richard, Sir, LL.D., K.C., K.C. M.G. (1870-), a barrister and statesman, born in the city of New Westminster, British Columbia, and educated at the public and high schools of New Westminster and at Dalhousie University, Halifax, Nova Scotia. He was elected to the legislature of British Columbia in 1898, 1900 and 1903 and again in 1907. In 1900 he was appointed minister of mines in the Dunsmuir administration. He resigned the following year because of disagreement with the premier. In 1903 he became leader of the opposition in the House, and on June 1st of that year was called upon to form a ministry, which he did, becoming premier and chief commissioner

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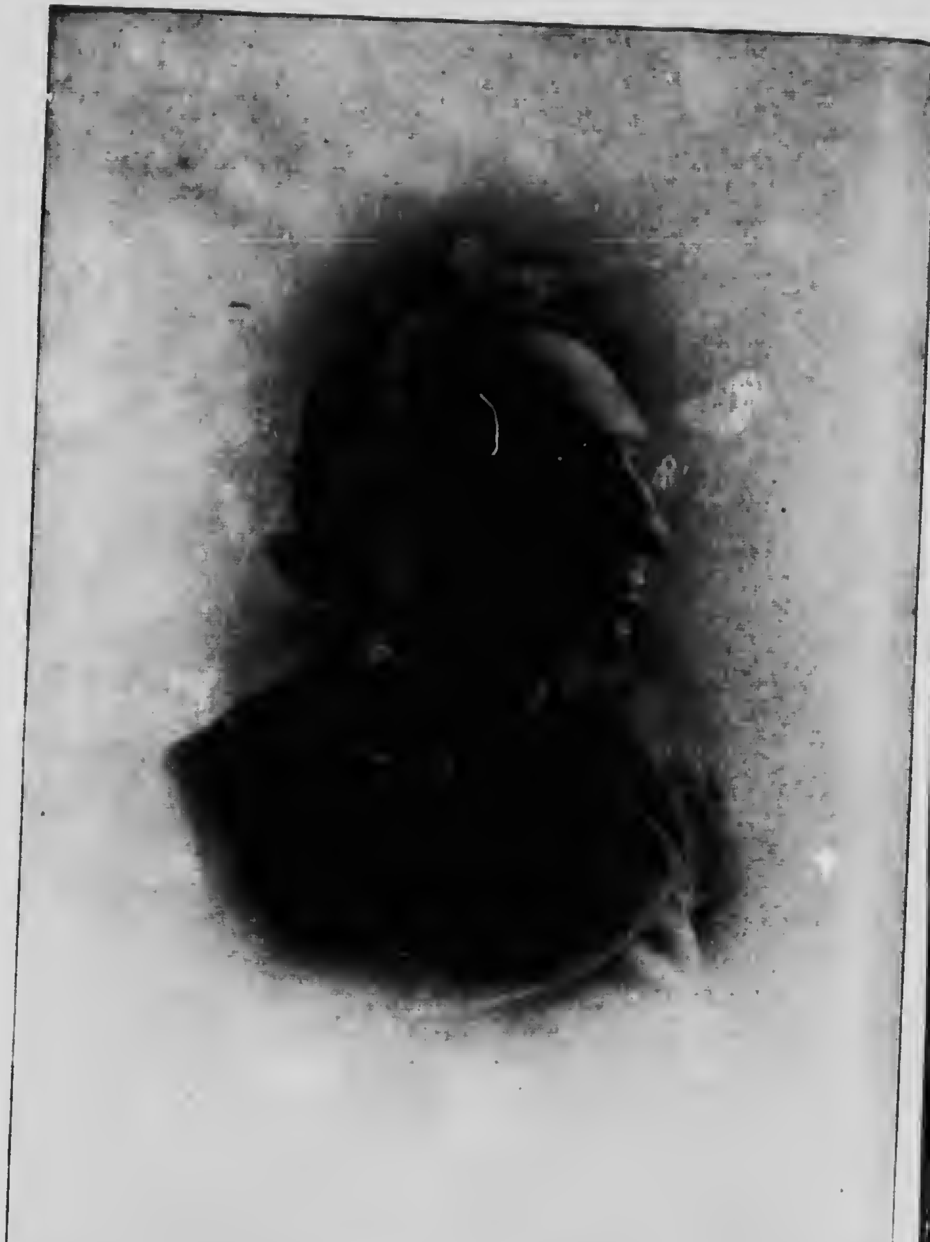

SIR JOHN ALEXANDER MACDONALD

of lands and works. In 1907, 1910 and again in 1912 he reorganized the ministry.

Macdonald, Hugh John (1850–), lawyer and legislator, son of Sir John A. Macdonald. He was educated at Queen's College, Kingston, and at Toronto University, where he graduated at the age of nineteen. He practiced law in Toronto from 1872 to 1882, when he removed to Winnipeg. In 1891 he was elected to the House of Commons and in 1896 became minister of the interior in the Tupper cabinet, which resigned in the same year. Later he became the Conservative leader in Manitoba, and in 1899-1900 was premier of the province. On December 12, 1911, he was appointed a police magistrate in Winnipeg.

Macdonald, James Alexander (1858–), legislator and judge, born in Huron county, Ontario; educated at the Collegiate Institute, Stratford, and Toronto University. He practiced law in Toronto for a number of years, but in 1896 removed to Rossland, British Columbia. In 1903 and 1907 he was elected to the provincial assembly, where he became leader of the Liberal opposition. He resigned from the assembly to become chief justice of the court of appeals for the province.

Macdonald, John Alexander, Sir (1815–1891), first premier of the Dominion of Canada, was born in Glasgow, Scotland, on the 11th of January, 1815. His family came to Canada in 1820 and settled in Kingston, Ontario, where the future premier became a lawyer. In 1844 he was elected to the assembly as Conservative member for Kingston. A sentence in his first public address struck the keynote of his career: "I therefore need scarcely state my firm belief that the prosperity of Canada depends upon its permanent connection with the mother country, and that I shall resist to the utmost any attempt (from whatever quarter it may come) which may tend to weaken that union." During his first years in the Canadian assembly he spoke little, but he mastered the details of parliamentary business. His abilities attracted attention and he became receiver-general and then commissioner of crown lands. Macdonald was in opposition until 1854, but he gradually became the real, if not yet the acknowledged, leader of the Liberal-Conservatives, as distinguished from the Radicals and the Tories. In the ministry of Sir Etienne Taché he was attorney-general and on Taché's retirement in 1858 he became premier. For more than thirty years Macdonald continued to be the dominant figure in the government of Canada. The confusion in the sixties, due to the Fenian raids and other political causes, gave a great impulse to the movement for a union of all the provinces. In 1864 delegates from Ontario, Quebec and the Maritime provinces met at Charlottetown, and the outline of union as there agreed upon was worked out at the Quebec conference in the next year. The actual framing of the British North America Act, the result of these conferences, was carried out in London during December, 1866, and January, 1867, by delegates from the provinces in coöperation with law officers for the Crown. As the leader in the preliminary discussions Macdonald naturally became the first premier of the Dominion in 1867.

The difficulties of organizing the Dominion called for infinite tact and resource on the part of the new premier. The jealousies of the provinces had to be smoothed over, yet the federal rights had to be maintained. The Northwest Territories were secured by purchase of the Hudson's Bay Company's territorial rights, and Manitoba was organized as a province. The Pacific scandals of 1874, in connection with the building of a transcontinental railroad, forced the Macdonald ministry to resign, but in 1878 the Liberals were swept out of office and Macdonald again undertook the building of the railroad. "The faith of Sir John," says one of his biographers, "did more to build the road than the money of Mount-Stephen." During the remaining years of his life the history of Sir John is practically the history of Canada. Most of his efforts were directed to the organization and development of the great Northwest, one of his greatest reforms being the formation of the Royal Northwest Mounted Police. Until his death he retained the office of premier. The excitement and anxiety of the contested election of 1891 brought on a stroke of paralysis, which caused his death.

The career of Sir John Macdonald cannot be studied apart from the history of Canada. He was a man of strong will and great ambition; but his foresight and political sagacity enabled him to submit to the leadership of smaller men without impatience. "He had the gift of living for the work in hand without feeling the distraction of other interests." Few political leaders have had so many opposing elements to reconcile, so many factions to hold together. The man who could rule a mixture of jealous factions, including "Irish Catholics, and Orange-

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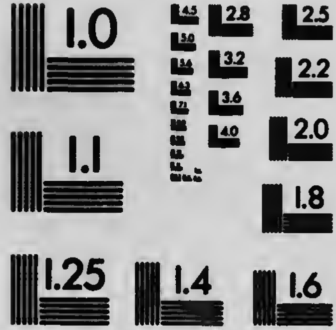

men, French and English anti-federationists and agitators for independence, Conservatives and reformers, careful economists and prodigal expansionists, was manifestly a man of unusual power," without prejudice towards any creed or party. He stands out as the one man whom everybody trusted. His singleness of purpose and personal independence, combined with his inexhaustible energy, enabled him to triumph where others could see nothing but defeat.

Macdonald, John Sandfield (1812–1872), statesman, born at Saint Raphael, Ontario. He was admitted to the bar in 1840 and soon after was elected to the Canadian Parliament, in which he served continuously for sixteen years. He was leader of the reform party, but his party allegiance was uncertain when mere names were at stake. For two years he was speaker of the House and from 1862 to 1864 was premier of Canada, though his ministry was not a strong one. He opposed Confederation, but after the passage of the British North America Act was called on by the Conservatives to organize the provincial government of Ontario. After four years, during which he governed with economy and efficiency, he was defeated by the Liberals and resigned in December, 1871.

Macdonald, William C., Sir (1831–), a philanthropist, was born in Prince Edward Island and was educated at Charlottetown. He gave a large amount of money to McGill University, and through his efforts scientific agricultural education was established throughout the provinces. He founded the Macdonald schools for elementary technical education. Perhaps his greatest charitable enterprise was his interest in and gifts to Victoria Hospital, Montreal.

Macdonell, Alexander (1762–1840), the first Roman Catholic bishop of Upper Canada, was born in Scotland. He became a priest in 1787 and was missionary to his native land for a number of years. Through his influence the first regiment of English Roman Catholics since the Reformation, the Glengarry Fencibles, was organized. After it disbanded in 1803 he organized a colony for its members in what is now Glengarry county, Ontario. Bishop Macdonell also raised a regiment which played a gallant part in the war of 1812-14. From 1820 until his death he was bishop and apostolic vicar of Upper Canada.

McDougall, William (1822–1905), journalist and statesman, was born at Toronto, January 25, 1822, and was educated at Victoria College, Cobourg. He studied law and was admitted to the bar in 1847. In 1858 he was elected to the Canadian assembly and after Confederation in 1867 he served until 1882 in the House of Commons. From 1862 to 1864 he was commissioner of crown lands, then provincial secretary, chairman of the West Indian Trade Commission and minister of public works. McDougall was present at both Charlottetown and Quebec conferences and took a prominent part in the discussions. In 1868 he was sent to England to negotiate with the Hudson's Bay Company for the purchase of the Northwest Territories and on his return became the first lieutenant-governor of Rupert's Land, as the west was then known. On his arrival at the boundary line he was turned back by the half-breeds under Louis Riel (see page 179), thus giving the signal for the outbreak of the revolt. In 1871 he was one of the commissioners to settle the boundaries of Ontario. He continued to serve Parliament until 1882, when he retired from public life.

McEachran, Duncan McNab (1841–), veterinary surgeon, born in Campbelltown, Argyleshire, Scotland, educated at Edinburgh. He was the founder of the Montreal Veterinary College, in connection with the medical college of McGill University; in 1890 this became the faculty of comparative medicine and veterinary science and Dr. McEachran was appointed dean, a position he held until 1903. He organized the cattle quarantine system, which he conducted so successfully that contagious diseases of animals are practically unknown in Canada. After twenty-six years he retired and became honorary veterinary adviser to the Dominion government.

McGee, Thomas D'Arcy (1825–1868), poet, orator and statesman, was born in Louth, Ireland. He came to the United States in 1842 and in three years made an international reputation as a poet and editor on the staff of the Boston *Pilot*. Daniel O'Connell induced him to return to Ireland as editor of the *Freeman's Journal* when he was only twenty years of age. McGee became associated with the "Young Ireland" party and was forced to escape to the United States in 1848. He became one of the editors of the New York *Nation* and the *Celt*, which was first published in Boston and afterward in Buffalo. In 1857 he removed to Montreal and started the *New Era*. Here he became widely known as an orator, entered Parliament and became president of the council. He afterward held cabinet offices as secretary of state and minister of agriculture. In 1868 he was assassinated by a Fenian. His published works are *History of the Irish Settlers in America, History of Attempts to Establish the Protestant Reformation in Ireland* and *Popular History of Ireland.*

Machar, AGNES, Canadian poet and writer of short stories, was born at Kingston, Ontario. From early youth she has been a contributor to periodical literature at home and abroad, especially to the *Canadian Monthly, Century Magazine* and *Westminster Review.* Among her publications are *For King and Country, Katie Johnson's Cross, Stories of New France,* and *Lays of the True North.*

Machray, ROBERT, The Most Rev., M.A., D.D. (1831-1909), archbishop of Rupert's Land and primate of all Canada, was born in Aberdeen, Scotland, and educated at King's College in that city and at Sidney Sussex College, Cambridge. After occupying a number of important positions in his native country, he was appointed the second bishop of Rupert's Land, in 1865, his diocese comprising what now constitutes the provinces of Manitoba, Alberta, Saskatchewan, and all of the Northwest Territories. On the subdivision of this diocese in 1874, Bishop Machray became the metropolitan, under the primacy of the archbishop of Canterbury, and upon the union of the Anglican churches in 1893 he was elected primate of Canada.

SIR ALEXANDER MACKENZIE

Mackenzie, ALEXANDER, Sir (1755-1820), a North American explorer, was born at Inverness. He began his career with the North-West Company, and in 1784 was sent to Detroit with a small party. He spent several years traveling the unknown region far to the northwest. In 1789, with a small party, he traveled the region about the Great Slave Lake and discovered the outlet, since named the Mackenzie River. Here setting up a post bearing his name and date, he returned to Fort Chippewyan in September. In July, 1792, he again set out with the purpose of crossing the Rocky Mountains and finding the Pacific Ocean, which he finally reached on July 22, 1793. Devoting a number of years to the fur trade at Fort Chippewyan, he finally organized the firm known as Alexander Mackenzie & Co. in 1802, which became a rival for the fur trade of the country. This company was absorbed by the North-West Company in 1804. Mackenzie later settled in Scotland, where he died.

Mackenzie, ALEXANDER (1822-1892), Liberal statesman, was born in Perthshire, Scotland, on January 28, 1822. He emigrated to Canada in 1842 and worked at Sarnia, Ontario, as a stonemason. In 1852 his interest in political reform led him to become editor of the Lambton *Shield,* a local Liberal paper. In 1861 he was elected to Parliament, where he quickly rose to distinction as a follower of Hon. George Brown. He was elected to the first Dominion House of Commons in 1867; from 1871 to 1872 he also sat in the Ontario provincial assembly and was provincial treasurer. In 1873, after the defeat of the Macdonald government, Mackenzie formed a new ministry and became the first Liberal premier of Canada. He remained in office till 1878, when industrial depression and the Conservative platform of protection led to Macdonald's return to power. Though ill health forced him to resign the leadership of his party in 1880 he continued to serve in the House of Commons until his death on April 17, 1892. "While perhaps too cautious to be the ideal leader of a young and vigorous community, his grasp of detail, indefatigable industry, and unbending integrity won him the respect even of his political opponents." (For portrait, see illustration facing page 210.)

Mackenzie, PETER SAMUEL GEORGE (1862-), legislator, born at Cumberland House, Northwest Territories. After studying at St. Francis College and McGill University, he was called to the bar in 1884. In 1900 he was elected to the Quebec assembly and in 1911 became provincial treasurer in the Gouin cabinet. He was chosen a member of the Quebec council of public instruction in 1906.

Mackenzie, William, Sir (1849–), born at Kirkfield, Ontario, educated in the schools of that town. He began to earn his living as a school teacher, but later became a storekeeper. He soon went west and became a contractor on the Canadian Pacific Railway. His association with Sir Donald Mann began in 1886; since that date the firm of Mackenzie, Mann & Co. has built many important lines, including the Calgary and Edmonton Railway and the Qu'Appelle, Long Lake and Saskatchewan Railway. In 1896 they commenced building on their own account, with 100 miles of the Lake Manitoba Railway and Canal Company. This was the beginning of the Canadian Northern, a system which now includes nearly 5,000 miles. Sir William has financed all the Canadian Northern lines, while his partner has been chief engineer in charge of construction; he is president of the Canadian Northern and of many subsidiary railways and other public service corporations.

Mackenzie, William Lyon (1795–1861), political leader, was born near Dundee, Scotland, on March 12, 1795. His father died before he was a month old and left the family in poverty.

WILLIAM LYON MACKENZIE

In 1820 Mackenzie came to Canada, where he engaged in business, first at York (Toronto), Dundas, and later, Queenston. In 1824 he began the publication of the *Colonial Advocate*, in which the Tories were violently attacked; most of the changes he recommended have since been adopted, but the bitterness of his attacks roused great opposition among the extreme Conservatives, headed by Sir John Robinson. In 1828 he was elected member of the House of Commons for York, but he was expelled on the technical ground that he had published accounts of the proceedings of the House without permission. He was elected five times and five times expelled, till the government refused to issue a writ and York remained without one of its representatives. In 1832 he visited England, where he secured many important reforms for Canada; on his return in 1834 he was elected mayor of Toronto. Then he served in Parliament for a year, but in 1836 the Tories won a complete victory and Mackenzie and most of the other reformers were defeated for reëlection. The bitterness of the unexpected defeat was one of the causes of the revolt in 1837. Mackenzie gathered a mob to set up a provisional government, but the attempt resulted in failure and he was forced to flee to the United States. He returned to Canada in 1849 and in 1851 was again elected to Parliament, but he refused all offers of government positions. In 1858 he resigned his seat because of ill health. He was a born agitator, and tended to exaggeration and misrepresentation, but "he could neither be bribed, bullied or cajoled."

MacKinnon, Donald Alexander, K.C., LL.B. (1863–), a barrister and legislator, born at Uigg, Prince Edward Island, and educated at the Uigg grammar school, Prince of Wales College and Dalhousie University and Law School. He began the practice of law in 1887 and was appointed queen's counsel in 1900. He was elected to the legislative assembly of Prince Edward Island in 1893 and again in 1897. In 1899 he was appointed attorney-general for the province, and in 1900 was elected to the House of Commons. From 1904 to 1911, he was lieutenant-governor of Prince Edward Island.

Maclean, William Findlay (1854–), journalist and legislator, born in the township of Ancaster, Ontario, educated in the public school and at University College, Toronto. In 1880 he founded the *Toronto World*, of which he is still editor and proprietor, and has made it one of the best known papers in Canada. In 1891 he contested East York, Ontario, with the late Hon. Alexander Mackenzie, but was defeated by twenty-six votes. Since 1892 he has represented South York in the House of Commons.

McLeod, Henry Fulton (1871–), legislator, born at Fredericton, New Brunswick; educated at the University of New Brunswick. He was mayor of Fredericton, 1907-08, and has been a member of the assembly and solicitor-general since 1908.

McMaster, William (1811–1887), banker and legislator, was born at Tyrone, Ireland. He founded the Canadian Bank of Commerce and became its president. He entered political life in 1862, taking a seat in the Legislative Council of Canada. Later he was elected as a senator. In the year 1865 he became a member of the old Council of Public Instruction. When the Senate of Toronto University was reconstructed in 1873, he became one of its members. He was a liberal patron of literature and art, and was well known for his benefactions to the Baptist Church, of which he was a life-long member. He founded McMaster University.

McMillan, Daniel Hunter, Sir, K.C.M.G. (1846–), a military officer and legislator, born at Whitby, Ontario, and educated at Collingwood. He was in active service in 1864 and in 1866 during the Fenian Raid. He was also engaged in the Red River expedition in 1870, and was major of the 95th Battalion with the Northwest Field Force in 1875, and two years later was appointed to the command. He settled in Winnipeg and ran for the legislature in 1879, but was defeated. He was elected the following year and represented his constituency until 1900, when he became a member of the Greenway administration as provincial treasurer. He resigned with the government and was appointed lieutenant-governor in that same year. He was created knight commander of the Order of St. Michael and St. George on the occasion of the coronation of the king.

McNab, Alan Napier, Sir (1798–1862), soldier and statesman, was born at Niagara, Ontario. He served first in the navy and later in the army during the War of 1812, after which he studied law and was admitted to practice. He came into the public eye in 1830, when he refused to testify in regard to disturbances in Hamilton f[illegible]g the parade of Sir John Colborne's [illegible] through the streets. He was elected to the assembly for Upper Canada and from 1837 to 1841 was speaker. As colonel of militia he took a leading part in the suppression of the rebellion of 1837. After the downfall of the Baldwin-Lafontaine ministry in 1844, McNab was again speaker of the assembly for four years. From 1854 to 1857 he was joint premier with Morin. He then spent three years in England but returned to Canada in 1860 and was immediately elected to the assembly, of which he was speaker during the last session before his death.

McNab, Archibald Peter (1864–), a business man and legislator, born at Glengarry, Ontario, and educated in the public schools of that place. He became a resident of Saskatoon, where he became a miller and grain merchant and was chosen president of the Saskatoon Milling & Elevator Co. He was first elected to the Saskatchewan legislature in 1908 and appointed to the cabinet as municipal commissioner in that year. Later he became minister of public works and is now minister of municipal affairs.

Macpherson, David Lewis, Sir (1818–1896), financier and politician, was born at Castle Leathers, near Inverness, Scotland. At the age of seventeen he emigrated to Canada and settled in Montreal, where he built up a large fortune as a forwarder of merchandise. After his removal to Toronto in 1853 he became one of the contractors on the Grand Trunk Railway. In 1864 he was elected to the assembly for the United Canadas and in 1867, on the formation of the Dominion, was called to the Senate. In the following years he wrote a number of pamphlets on economic subjects. From 1880 to 1883 he was speaker of the Senate and for the next two years was minister of the interior in the Conservative ministry.

McPhillips, Albert Edward (1861–), lawyer and legislator, born at Richmond, Quebec. He was called to the bar of Manitoba in 1882 and of British Columbia in 1891. He served throughout the Northwest Rebellion in 1885 and retired with the rank of captain. He was elected a member of the legislative assembly of British Columbia in 1891, and in 1903 became attorney-general in the Conservative ministry formed by Sir Richard McBride. Later he became president of the council.

Mair, Charles (1838–), soldier and poet, born at Lanark, Ontario, and educated at the Perth grammar schools and Queen's University, Kingston. At an early age he began to write for the press, and in 1868 published a volume entitled *Dreamland and Other Poems.* His second volume, *Tecumseh,* a drama, appeared in 1886 and showed a very clear insight into Indian character. Two other works of importance are *The Fountain of Bemini* and *The Conquest of Canada.* He lost many of his valuable manuscripts in the Northwest Rebellion. During that outbreak he served as an officer of the governor-general's bodyguard. During his residence in the northwest he wrote for the *Military Gazette* a ser:'s of papers entitled *Canada in the Far West.*

Maisonneuve, *ma zoN növ,* PAUL DE CHOMEDER, Sir (? -1676), a French colonial governor in Canada, born in Champagne, France. He was interested in the attempt to found a religious colony in New France, and in 1641 with others came to Quebec. The next year the city of Montreal was founded. He was made governor of the colony, but was removed by De Tracy in 1665 and sent to France. He was a brave pioneer whose enthusiastic spirit was well suited to his day and task.

Mann, DONALD, Sir (1853-), was born at Acton, Quebec, and educated in the public schools there. He went to Winnipeg in 1879 and became a contractor for the Canadian Pacific Railway. The firm of Mackenzie, Mann & Co. was established in 1886 and has since taken a great part in the development of the west, especially through its construction of the Canadian Northern Railway, of which Sir Donald is vice-president. His work has chiefly consisted in directing construction, in which he has a unique reputation for speed, efficiency and economy. (See the sketch of Sir William Mackenzie in this department.)

Marcil, CHARLES (1860-), legislator, born at Sainte Scholastique, Quebec; educated in the common schools and at Ottawa College. Since 1880 he has been connected with various newspapers in Montreal. He was elected to the House of Commons for Bonaventure (Quebec) in 1900, and was reëlected in 1904 and 1908. In January, 1905 he became deputy Speaker and from 1909 to 1911 he was Speaker.

Marshall, DUNCAN MCLEAN (1872-), legislator, born in Bruce county, Ontario; educated at Walkerton high school and Owen Sound Collegiate Institute. His early life was spent on a farm in the Olds district. He was one of the organizers and workers in the Patrons of Industry movement in Ontario from 1891 to 1898. He removed to Alberta in 1905 and became manager of the Edmonton *Daily Bulletin.* In 1909 he was elected to the Alberta legislature and has since been minister of agriculture and provincial secretary.

Matheson, ARTHUR JAMES (1845-), a Canadian barrister and legislator, born at Perth, Ontario, and educated at Upper Canada College and Trinity University, Toronto. He began the practice of law in 1870. He became a member of the town council at Perth, and was mayor of that city in 1883 and 1884. He was elected to the legislature of Ontario in 1894, and reëlected in 1898, 1902 and 1905, in which year he was appointed provincial treasurer in the Whitney administration. Mr. Matheson was lieutenant-colonel, commanding the 42d Battery from 1886 to 1898, and in 1900 was appointed brigadier, commanding the 6th Infantry Brigade at the Kingston camp.

Matheson, SAMUEL PRITCHARD, Most Rev. (1852-), born in Manitoba; educated at St. John's College, Winnipeg. After graduation he held various offices both in St. John's College and in the St. John's Cathedral, of which he was canon and later dean. He was also headmaster of St. John's College School. In 1909 he was elected archbishop and primate of all Canada, in succession to Rev. Robert Machray.

Mavor, JAMES (1854-), economist and educator, born at Stranraer, Scotland, and educated at the high school and the University of Glasgow. In 1888 he was appointed professor of political economy and statistics in Saint Mingo's College, Glasgow, and during his teaching and lecturing he had extensive experience in technical journalism and took an active part in numerous schemes for social progress. In 1892 he was appointed one of a committee of four to proceed to Germany and inquire into the working of the labor colonies there. In the following year he was commissioned by the board of trade of England to continue his investigations on the Continent, and his report was published as a parliamentary paper. In 1892 he was appointed professor of political economy and constitutional history in the University of Toronto. He has written extensively on social and economic topics, and in addition to many reports and magazine articles he is the author of *Wages, Theories and Statistics, Scottish Railway Strike, The English Railway Rate Question* and *Labor Colonies and the Unemployed.*

Mercier, *mair sya',* HONORÉ (1840-1894), lawyer and statesman, born in France and educated at the Jesuit College of St. Mary, Montreal. He began the practice of law in 1865 and was for many years editor of the *Courier de St. Hyacinthe,* one of the leading papers of the province of Quebec. He opposed confederation on the ground that the French-Canadians would lose their distinctive position. He was a member of the House of Commons from 1872 to 1874, but it was not until 1883 that he became leader of the Liberals in Quebec and was the dominant figure in provincial politics. From January, 1887, to the end of 1891 he was premier. A man of commanding presence, firm yet courteous in manner, and convincing in argument, he was a popular idol for a few years; but in 1891 serious charges of misuse of public funds were brought against his ministry. Though he was personally acquitted on trial and was reëlected to the assembly, the power of his party was broken.

Meredith, WILLIAM RALPH, Sir (1840–), jurist, born in the province of Ontario and educated at the University of Toronto. For twenty-four years, 1872–96, he was member for London in the provincial legislative assembly. In 1904 he was appointed chief justice of the common pleas court of Ontario. Sir William has been for many years an honorary lecturer to the law school as well as chancellor of the University of Toronto.

Metcalfe, CHARLES THEOPHILUS, Baron (1785–1846), governor of Canada, was born at Calcutta, India, on the 30th of January, 1785. After graduating from Eton, he returned to India in 1800 in the service of the East India Company. Here he remained until 1838, holding various positions of increasing importance. For a year he was acting governor, but some of his reforms, including the liberation of the press, though universally popular, led to unpleasantness with the directors, so that he resigned all connection with the company in 1838. In 1839 he was appointed governor of Jamaica, where he showed great tact and executive ability. After an administration of four years he was appointed governor of Canada. Personally a man of great popularity, he was unfortunate in coming into conflict with the movement for responsible government. In view of his past career and other evidence, it seems that his opposition to Baldwin, Lafontaine and other reformers was the result of instructions from the home government and not of personal inclination. After three years Metcalfe resigned and returned to England.

Middleton, FREDERICK DOBSON, Sir (1825–1898), soldier, born in Belfast, Ireland. He saw active service in Australia and India, where he won the Victoria Cross for gallantry. He was in Canada from 1868 to 1870 and again in 1884 and 1885, when he was commander in chief of the Canadian militia and was active in suppressing the Riel rebellion in the Northwest. His services were rewarded by a grant of $20,000 from the Canadian parliament and the honor of knighthood.

Mills, DAVID (1831–1903), Canadian lawyer and statesman, born in Kent county, Ontario. He served in the House of Commons continuously from 1867 to 1896, at which time he was elected to the Senate. He was chosen professor of international and constitutional law in the University of Toronto in 1888. In 1897 he became minister of justice and attorney-general and in 1901 was chosen judge of the supreme court. He was an acknowledged authority on constitutional and international law.

Minto, GILBERT JOHN MURRAY KYNYNMOND ELLIOT, Fourth Earl of, (1845–), British soldier and statesman, educated at Eton and at Trinity College, Cambridge. He served in the Scots Guards from 1867 to 1870, with the Turks in 1877 in their war against Russia, and with Lord Roberts in the second Afghan War (1878–79). Later he was military secretary to Lord Lansdowne during his governor-generalship of Canada and was also chief of staff to General Middleton in the Riel rebellion. From 1898 to 1904 he was governor-general of Canada and from 1905 to 1910 was viceroy of India. (For portrait, see illustration facing page 209.)

Monck, CHARLES STANLEY, Viscount (1819–1894), a British statesman, born at Templemore, Ireland, and educated at Trinity College, Dublin. He began his career as a lawyer, and in 1852 was elected to Parliament. From 1855 to 1858 he was lord of the treasury. In 1861 he was appointed governor-general of Canada, and was reappointed in 1867, on the formation of the Confederation. He resigned the following year. (For portrait, see illustration facing page 209.)

Monk, FREDERICK DEBARTZSCH, K.C., D.C.L. (1856–), educator and legislator, born at Montreal; educated at Montreal College and McGill University. He began the practice of law in 1878. He served as school commissioner for Montreal for twelve years and since 1896 has been a member of the House of Commons. For a number of years he was professor of constitutional law at Laval University, but resigned in 1911 to become minister of public works in the Borden government.

Monts, PIERRE DU GUAST, Sieur de (1560–1611), French explorer and founder of Acadia. In 1603 the King of France made him governor of the French Company of Canada, which had the exclusive rights to trade in furs in certain territory. Together with Champlain and several other leaders, de Monts sailed for Canada and in 1605 founded Port Royal, on the present site of Annapolis. De Monts' privileges were taken away from him by the next king and he died a poor man. But his aid led Champlain to found Quebec and was of great encouragement to French colonization in general.

Morin, Auguste Norbert (1803–1865), statesman, first came into public notice in 1830, when he was elected to the assembly for Lower Canada. Elected to Parliament in 1840, Morin was a prominent follower of Lafontaine and Baldwin, in whose first ministry he was commissioner of crown lands. Throughout the long struggle for responsible government he labored faithfully for reform, and after the general election of 1848 was elected Speaker of the Assembly. After the retirement of Lafontaine, Morin, as leader of the Liberals, joined with Sir Francis Hincks in forming a new ministry, which remained in office for three stormy years. He then united with Sir Allen McNab to form a new coalition ministry, but in January, 1855, ill health led him to resign. He then accepted a judgeship of the superior court of Quebec, holding this post until his death.

Morrissey, John (1855–), legislator, born at Newcastle, New Brunswick. He was elected to the legislature in 1889 but was defeated in 1890. He was again elected in 1903, and in 1908 became chief commissioner of public works.

Moss, Charles, Sir (1840–), lawyer and judge, born at Cobourg, Ontario. Even as a law student he gained a reputation for clearness and brilliance of his opinions. He was prominent in many legal organizations and was for many years bencher of the Ontario Law Society. He became judge of the court of appeal for Ontario in 1897, was appointed chief justice in 1902 and five years later was knighted.

Mount Stephen, Lord, The Right Hon. Sir George Stephen (1829–), financier, was born at Dufftown, Scotland, and educated in his native parish. When quite young he acted as a herd boy and later served his apprenticeship in the drapery business. Afterwards he went to London and entered the employ of J. F. Pawson & Co. He came to Canada in 1850 and entered his uncle's establishment in Montreal, later forming a partnership with him. In 1860 he purchased his uncle's interest in the business and entered largely into the manufacture of woolen goods. He was elected a director of the Bank of Montreal, and in 1873 became vice-president and three years later was chosen president of that institution. He was a leader in the formation of the company which in 1880 undertook the construction of the Canadian Pacific Railway, and the successful completion of that gigantic enterprise is due largely to his energy, foresight and faith in the future of Canada. As a reward for his services in connection with the building of this railway, the queen created him a baronet of the United Kingdom in 1886 and in 1891 raised him to the peerage with the title of Lord Mount Stephen.

Mowat, Oliver, Sir, LL.D., K.C.M.G., G.C.M.G. (1820-1903), judge and statesman, born at Kingston, Ontario. He studied law under Sir John Macdonald and was called to the bar in 1841. He entered Parliament in 1858 as a Liberal, became postmaster-general in 1863, and vice-chancellor of Canada in the following year. In 1872 he succeeded Hon. Edward Blake as premier of Ontario. A strong supporter of the rights of the provinces, Mowat gave to Ontario an excellent body of laws and able execution of them. In 1896 he was called to the Dominion Senate and appointed minister of justice in the Laurier administration. From November, 1897, until his death he was lieutenant-governor of his native province.

Mulock, William, Sir, M.A., LL.D. (1843–), statesman and judge, born at Bondhead, Ontario, and educated at the Newmarket grammar school and the University of Toronto. He began the practice of law in 1868, in the city of Toronto, and was created queen's counsel by the Ontario government in 1890. He was also for four years one of the examiners in and lecturer for the law society of the University of Upper Canada. In 1881 he became vice-chancelor of that institution. He was also the founder of the William Mulock scholarship in mathematics in the University. He was elected to the House of Commons in 1882, and since his connection with Parliament has shown a keen interest in all questions affecting agriculture, banking and commerce. On the formation of the Laurier cabinet in 1896, he became postmaster-general, and two years later established a new two-cent Canadian postage rate from Canada to all parts of the empire. In 1905 he became chief justice of the exchequer court for Ontario.

Murphy, CHARLES (1863-), a leading barrister and statesman, born in Ottawa and educated in the Christian Brothers School of that city, the Ottawa Collegiate Institute and Ottawa University. He was elected to the House of Commons by a large Liberal majority in 1908. From that year until 1911 he was secretary of state for the Dominion.

Murray, GEORGE HENRY, K.C. (1861-), premier of Nova Scotia, was born at Grand Narrows, Cape Breton. He was educated at Boston University, and in 1883 was admitted to the bar of Nova Scotia. In 1895 he was appointed queen's counsel and four years later was chosen as a member of the council for Nova Scotia. In 1891 he became a member of the Nova Scotia government, and in 1896 was appointed premier, taking the portfolio of provincial secretary.

Murray, JAMES (1719-1794), British governor of Canada. He entered the British army, served in the West Indies, the Netherlands and Brittany and rose to the rank of lieutenant-colonel. He commanded a brigade at the siege of Louisburg and was one of Wolfe's brigadiers in the expedition against Quebec in 1759. After the British victory Murray was left in command of the city, which he defended against the French in 1760. In the fall of that year he was appointed commander at Quebec, and became governor of Canada after this country had been formally ceded to England in 1763. Three years later he retired. From 1774 to 1781 he was governor of Minorca, which was finally surrendered to the Spaniards after a long siege. In 1783 he was made a general.

Murray, JOHN, Sir [illegible] F.R S., LL.D., D.Sc. (1841-), born a [illegible] Ontario; educated at Victoria College, [illegible] the University of Edinburgh, S[illegible] 1863 he visited the Arctic regions [illegible] ist on board a whaler; later he wa[illegible] the naturalists on the "Challenger" in the explorations of the great ocean basins and edited the fifty-volume report on the results of the expedition. He has taken part in a number of other important expeditions, has published numerous papers and reports on geography, oceanography and marine biology, and is recognized as one of the world's great authorities in his field.

Nantel, WILFRID BRUNO (1857-), legislator, born at St. Jerome, Quebec; educated at the Seminary of Ste. Therese de Blainville. For six years he was mayor of St. Jerome. In 1904 he was an unsuccessful candidate for the House of Commons, but elected in 1908 and again in 1911. After the resignation of the Liberal ministry in 1911 he was a sworn member of the privy council and assumed the portfolio of mines in the Borden ministry.

Nelson, WOLFRED (1792-1863), physician and agitator. Dr. Nelson was the son of an English officer and was born at Montreal. After practicing for a number of years he was elected to the Canadian parliament in 1827. He soon became prominent among the radical members and was one of the leaders in the rebellion of 1837. In later life he showed his ability and high character to better advantage, was several times elected to Parliament, was mayor of Montreal for two terms and was at the head of the Lower Canada College of Physicians and Surgeons.

Newcombe, EDMUND LESLIE (1859-), born at Cornwallis, Nova Scotia; educated at Dalhousie College, Halifax. He was admitted to the bar in 1883 and ten years later became deputy minister of justice for Canada. From 1887 to 1893 he was a governor of Dalhousie College and during part of the time was also lecturer on insurance law. He was one of the commissioners appointed to revise the statutes of Canada, 1902-06.

Newnham, JERVOIS ARTHUR, Right Rev. (1852-), born at Bath, England; educated at Bath College, at McGill University and at the Montreal Diocesan College. For four years he was a missionary at Onslow, Quebec; then he became curate of Christ Church Cathedral, Montreal, and from 1886 to 1890 he was rector of Westmount, Montreal. In 1893 he was consecrated Bishop of Moosonee and in 1904 Bishop of Saskatchewan. As missionary bishop he has traveled much in his diocese, especially by canoe and on snowshoes in the Hudson's Bay district.

O'Hagan, THOMAS, Ph.D. (1855-), a poet and writer, born near Toronto, and educated in the public schools and St. Michael's College, Toronto, and in the Ottawa University. Later he took a post graduate course at Syracuse University, New York, where he received the degree of Ph.D. He began his career as a teacher in 1874, and during the succeeding nine years held the principalship of some of the leading Roman Catholic separate schools in his province. His various poems were collected and published in a volume entitled *A Gate of Flowers*, in 1887. Since that date he has published *In Dreamland and Other Poems*, and in addition to his poems has been a prolific contributor to newspapers and magazines, including the Toronto *Globe*, *Canadian Monthly*, *Donahoe's Magazine* and the *Catholic World*. He is also widely known in Canada and the United States as a lecturer.

Oliver, Frank (1853-), legislator, born in Peel county, Ontario. He went west at an early age, became member of the Northwest Council in 1883 and from 1888 to 1896 was a member of the legislative assembly which succeeded the Council. Since 1896 he has been a prominent Liberal in the House of Commons. He established and still owns the Edmonton *Bulletin*, one of the most successful daily papers in western Canada. In 1905 he was appointed minister of the interior in the Laurier administration, and served till the defeat of the Liberals in 1911.

Oronhyatekha, *o ron'hy'a te"kah,* M.D. (1841-1907), was born near Brantford, Ontario, and educated at the Industrial Schools, Wesleyan Academy, Kenyon College, and University of Toronto. He belonged to the Six Nation Indians in Canada. When the Prince of Wales visited Canada in 1860, Oronhyatekha was selected by the chiefs of the Six Nations to present an address to him. He made such an impression on the Prince that he was invited to continue his studies at Oxford, which he did, under the care of Sir Hy Acland, the prince's physician. As a physician, Dr. Oronhyatekha had a remarkable career. He began his practice at Frankford, Ontario, and later moved to London. He removed to Toronto in 1889 and continued to practice medicine with great success. In 1863 he married Miss Ellen Hill, a great-granddaughter of Joseph Brant, head chief of the Mohawks.

Osler, Edmund Boyd, Sir (1845-), legislator and banker, born in Simcoe county, Ontario. Sir Edmund is one of Canada's most prominent bankers. He is president of Osler & Hammond, Toronto, brokers and financiers, president of the Ontario and Quebec Railway and a director of the C. P. R. He is also president of the Dominion Bank. He was an unsuccessful candidate for the mayoralty of Toronto in 1892, and since 1896 has been Conservative member for West Toronto in the Dominion House of Commons.

Osler, William, M.D., LL.D. (1849-), a physician, born at Bondhead, Ontario, and educated at Trinity College School, Port Hope, at Trinity University, Toronto, and McGill University. Later he studied at the University College of London and at Berlin and Vienna. He returned to Canada in 1874, and was elected to the chair of physiology and pathology in McGill University. In 1884 he went to Philadelphia as professor of clinical medicine in the University of Pennsylvania, where he remained for five years, when he was called to a professorship at Johns Hopkins University at Baltimore. He has won remarkable distinction as a lecturer and also as a physician. He is the author of numerous monographs and articles in medical journals and also has published *Cerebral Palsies of Children*, *The Principles and Practice of Medicine*, *The Teacher and Student*, and *Oliver Wendell Holmes: an Address*. While at Johns Hopkins Dr. Osler attracted wide attention by his theory that when men reached the age beyond usefulness, an end should be put to their years.

Otter, William Dillon, Brigadier-General (1843-), a military officer, born near Clinton, Ontario, and educated at Goderich grammar school, the Model School, Toronto, and Upper Canada College. He joined the militia force in Toronto in 1861, and took an active part in the Fenian raid in 1866. In 1869 he became major, and in 1874 was appointed lieutenant-colonel. He was active in suppressing the Pilgrimage riots in Toronto in 1875, and the Grand Trunk riots at Belleville two years later. In 1883 he was appointed commandant of the school of infantry in Toronto. During the Northwest Rebellion in 1885 he commanded the center, or Battleford column, and with his command made a forced march of 190 miles in five and a half days. His command was successful in preventing the junction of the forces of Big Bear with Riel, and he was largely instrumental in closing the rebellion.

Parent, Simon Napoleon (1855-), legislator and lawyer, born at Beauport, Quebec; educated at Laval Normal School and Laval University. In 1890 he was elected alderman for the city of Quebec and from 1894 to 1906 was mayor. He was called to the provincial cabinet in 1891 as minister of lands, mines and forests and in 1901 was chosen premier. He resigned in 1905 to accept the position of chairman of the National Transcontinental Railway Commission, which post he held until 1911.

Papineau, *pap"pe no',* Louis Joseph (1789-1871), orator and politician, born in Montreal and educated at the seminary in Quebec. He was elected to the assembly of Lower Canada in 1809. He commanded a company of militia during the war of 1812, but saw no real service.

He was chosen Speaker of the Assembly in 1817 and held that position until 1837. He was opposed to the policies of the royal governors,

LOUIS JOSEPH PAPINEAU

with whom he was in constant conflict, which led to open revolt in 1837. The revolt was speedily crushed and Papineau was forced to flee to the United States. He went to France from the United States, but in 1847 returned to Canada. In 1848 he was elected to a seat in the lower house of the United Canadian Parliament, but retired in 1854 and spent the remainder of his life in seclusion at his residence in Montbello, on the Ottawa River.

Parkin, George Robert (184[illegible]–), educator and author. He was born [illegible] Brunswick and educated at the universities of New Brunswick and Oxford, England. He was principal of the College School at Fredericton until 1895, at which time he became principal of Upper Canada College, Toronto. He resigned in 1902 to become the administrator of the Rhodes Scholarship Fund in Oxford. Among his published works are *Imperial Federation, Round the Empire, The Great Dominion* and a *Life of Sir John Macdonald.*

Parker, Gilbert, Sir (1862–), novelist and politician, was born at Belleville, Onta[illegible], and educated at Trinity College, Toronto. In 1886 he went to Australia and became one of the editors of the *Sydney Morning Herald.* In the early nineties he began to make a reputation as a writer of romantic fiction. By far the best of his novels are those in which he deals with the history and life of the French-Canadians; it is on his Canadian stories, such as *Pierre and His People, The Trail of the Sword, An Adventurer of the North* and *The Right of Way* that his literary reputation rests. His principal later books are *Donovan Pasha, The Weavers* and *Northern Lights.* In 1900 he was elected to the British House of Commons as member for Gravesend and soon became a leader in the Unionist party, especially by his work for tariff reform and imperial preference.

Parlow, Mary Kathleen (1890–), violinist, born at Calgary, Alberta. When but five years of age Miss Parlow commenced the study of the violin in San Francisco. In 1906 she removed to St. Petersburg, Russia, where she continued her musical studies. Since 1908 she has appeared in most European countries, Canada and the United States, and has rapidly become recognized as one of the foremost living violinists.

Paterson, William (1839–), statesman, born in Hamilton, Ontario. He was educated in Hamilton and at Caledonia. In 1872 he was elected mayor of Brantford, where he resided. The same year he was chosen to the House of Commons and continued to rep-

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reser[illegible] his constituency until 1911. In 1896 he e[illegible]tered the Laurier cabinet as controller of customs. The following year he became a member of the privy council and was appointed minister of customs, the office of controller having been abolished. On the defeat of the Laurier administration in 1911 he resigned with his chief.

Patterson, James Colebrooke (1839–), a barrister and statesman, born at Armagh, Ireland, and educated in Dublin. He came to Canada in 1857 and in 1876 began the practice of law. He was successively reeve of Windsor, warden of Essex and inspector of schools for Windsor. He was in the local legislature from 1874 to 1878, and in the latter year was elected to the House of Commons, where he remained until 1891. In January of 1892 he became secretary of state in the Abbott ministry, and in the ministry of Sir John Thompson was made minister of militia and defence. In September, 1895, he became lieutenant-governor of Manitoba and Keewatin and served until 1900.

Pelletier, *pel te ay',* Charles Alphonse Pantaleon, Sir, K.C.M.G., K.C., B.C.L., LL.D. (1837–1911), a Canadian barrister and statesman, born at Riviere Ouelle, Quebec, and educated at College Sainte Anne de la Pocatiere and Laval University. He began the practice of law in 1860, and later became city attorney of Quebec. He represented Kamouraska in the House of Commons from 1869 to 1877, in which year he was called to the Dominion Senate, and entered the Mackenzie administration as minister of agriculture. He retired the following year on the change of government. He was president of the Canadian commission at the Paris Exposition, in 1878, and speaker of the Senate from 1896 to 1901. In 1902 he was appointed judge of the superior court of Quebec, and from 1908 to 1911 was lieutenant-governor of the province.

Pelletier, Louis Philippe (1857–), born at Trois Pistoles, Quebec; educated at St. Anne College and Laval University. He was called to the bar in 1880 and has since practiced in Quebec. He was at various times a member of the Quebec legislative assembly, as well as attorney-general of the province from 1896 to 1897. In 1911 he was elected to the Dominion House of Commons by Quebec county and was appointed postmaster-general in the Conservative ministry formed by Hon. R. L. Borden.

Perley, George Halsey (1857–), educated at St. Paul's School, Concord, New Hampshire, and Harvard University He has always been in the lumber business, is a director in several banks and corporations and is prominent in the charitable work of Ottawa. Since 1904 he has been a member of the House of Commons. In the elections of 1911 he took a prominent part as organiser for the Conservatives, and on the defeat of the Laurier administration was appointed a minister without portfolio in the new cabinet formed by Hon. R. L. Borden

Perry, Aylesworth Bowen, Lieutenant-Colonel (1860–), born in Lennox county, Ontario; educated at Napanee High School and Royal Military College, Kingston. In July, 1880, he was appointed a lieutenant in the Royal Engineers, but resigned soon after on account of ill health. In 1882 he became an inspector of the Northwest Mounted Police, in 1885 was promoted to superintendent and since 1900 has been commissioner.

Peterson, William, LL.D. (1856–), educator, born in Edinburgh, Scotland, educated at the high school there and in Edinburgh University. After graduating from the University of Edinburgh he studied at the University of Göttingen. On his return from Germany he was elected to the Mackenzie scholarship in the University of Edinburgh, and soon after this gained a scholarship in Oxford. Later he was appointed assistant professor of humanity in the Edinburgh University, and in 1882, upon the opening of the University College at Dundee, was appointed principal of that institution and and professor of classics and ancient history. He held this position until 1895, then was chosen principal of McGill University, Montreal

Pinkham, William Cyprian, The Rt. Rev. (1844–), Anglican bishop of Saskatchewan, was born at St. Johns, Newfoundland, and educated at the Church of England Academy, St. Johns, and at St. Augustine's College, Canterbury, England. He was ordained deacon in 1868 and priest in 1869. From 1868 to 1882 he was rector of St. James' Church, Winnipeg, and during all but the first three years of the period he was also superintendent of education for Protestant public schools of Manitoba. For five years he was archdeacon of Manitoba and canon of St. John's Cathedral, Winnipeg. In 1887 he became bishop of Saskatchewan. Always interested in education, he has been a most influential factor in educational problems of Manitoba and Saskatchewan.

Pope, Joseph, Sir (1854–), author and administrator, born at Charlottetown, Prince Edward Island, and educated at Prince of Wales College. In 1878 he entered the civil service and four years later became private secretary to Sir John Macdonald, a position he held until Macdonald's death. In 1896 he was appointed under-secretary of state and in 1908 under-secretary for foreign affairs. He represented the government at the proceedings of the Joint High Commission in 1898 to 1900 and was secretary to the Alaska Boundary Tribunal in 1903. He is the author of the *Memoirs of Sir John Macdonald* and of biographies of Champlain and Cartier.

Poutrincourt, Jean de Biencourt (1557–1615), French colonizer, one of the founders of Acadia. He came to Canada in 1603 in company with deMonts, and a year later was given a grant of Port Royal. Instead of busying himself with the affairs of his colony he engaged in trade with the Indians. In 1606 he accompanied Champlain as far as the site of the present city of Chatham, Ontario. Meanwhile his colony was not prospering and after several years it fell into the hands of the English. It was restored to France in 1614, but Poutrincourt did not offer further assistance.

Prevost, George, Sir (1767–1816), British soldier, born in New York. He entered the army at the age of sixteen and gradually rose to be governor-general of British North America, a position which he held throughout the War of 1812. His defeat at Plattsburg led to his recall to England, where he died in 1816.

Proctor, Alexander Phimister (1862–), sculptor, was born in Ontario and studied sculpture in Paris. He has been awarded numerous prizes at public exhibitions, including a gold medal at the Paris Exposition of 1900. In consequence of the fact that he has made his home in the United States for a number of years, most of his work is found there, especially in New York, St. Louis and Denver.

Pugsley, William, K.C., D.C.L., P.C. (1850–), born at Sussex, New Brunswick, and educated there and in the University of New Brunswick. He began the practice of law in 1872, and for ten years was reporter of the supreme court of the province. In 1885 he was elected to the New Brunswick assembly and was speaker of the House from March, 1887, to May, 1889, when he was appointed solicitor-general. He resigned this office in 1892. In 1900 he became attorney-general for the province and in 1907 was chosen premier. In August of the same year he became a member of the privy council of Canada and was appointed minister of public works, a position he held until 1911, when he resigned with the Laurier ministry and became a private member.

Pyne, Robert Allan, M.D. (1855–), physician and legislator, born at Newmarket, Ontario. Previous to his election to the legislature, he held the positions of chairman of the Toronto school board and the Toronto free library board. He was elected to the legislature in 1898, and returned in 1902 and 1905, in which year he was appointed minister of education in the Whitney administration.

Reaume, Joseph O., M.D. (1856–), a physician and legislator, born at Anderton, Ontario, and educated at Assomption College, Detroit Medical College, and Trinity Medical College, Toronto. He was first elected to the legislature in 1902. In 1905 he was appointed commissioner of public works in the Whitney administration.

Reid, George Agnew (1860–), painter, born at Wingham, Ontario; studied art in Toronto, Philadelphia, Paris and Madrid. He has exhibited in the Paris Salon and at numerous exhibitions in Canada and the United States. His works include *The Pioneers*, a series of panels in the Toronto city hall; *Mortgaging the Homestead* and the *Arrival of Champlain at Quebec*, in the National Gallery at Ottawa.

Reid, John Dowsley (1859–), physician and legislator, born at Prescott, Ontario; educated at Queen's University, Kingston. He practiced medicine and was in business for a number of years. He was first elected to the House of Commons in 1891 and long continued to be the Conservative member for Grenville. In 1911 he became minister of customs.

Riel, Louis (1844–1885), agitator, was born at St. Boniface, Manitoba, on the [illegible] of October. Though generally known as a half-breed, his ancestry was mainly French. From 1866 to 1868 he worked at various occupations in Minnesota. In 1869 the transfer of the territorial rights of the Hudson's Bay Company to the Dominion government led to an armed revolt of the half-breeds under Riel's leadership. In October a party under Riel turned back the new governor (Hon. Wm. McDougall) and later captured Fort Garry (Winnipeg). After holding a convention which passed a bill of rights, a provisional government with Riel as president was formed. So far the metis or half-breeds were within their rights, but the execution of Thomas Scott, an Orangeman from Ontario, roused the whole of English-speaking Canada against them. An expedition under Colonel Wolseley captured Fort Garry, but Riel escaped. He was not arrested or prosecuted and several years later was elected to the House of Commons, from which he was expelled after a year. He was again elected in 1874, but his seat again became vacant after he was outlawed in February, 1875. For nine years he kept out of public notice, spending five years in Montana. In 1884 in response to a call from his countrymen, who had moved west to the Saskatchewan district, he returned to Canada. His own rashness and the harshness of the officials caused another rising, which was crushed after hard fighting. Riel was imprisoned at Regina, was tried and found guilty of treason, and was executed in November, 1885. (See also pages 400 and 401)

Roberts, Charles George Douglas (1860–), a Canadian poet and story writer, was born at Douglas, near Fredericton, New Brunswick, and educated at Fredericton Collegiate School and the University of New Brunswick. He was professor of English and French literature in King's College in 1885-1887, and of economics and international law in 1887-1895. In 1897-98 he was associate editor of the *Illustrated American*, New York. Among his more important writings are *Orion and Other Poems, Songs of the Common Day, New York Nocturnes, The Canadians of Old, Around the Camp Fire, A History of Canada, The Kindred of the Wild, Barbara Ladd, The Little People of the Sycamore* and *The Backwoodsman.*

Robertson, John Ross (1841–), journalist, born in Toronto and educated at Upper Canada College. While in college he learned the trade of printer, and for a time published a school paper entitled *The College Times*. In 1861 he established the *Sporting Life*, a paper devoted to athletics. Later he published *The Grumbler*, a weekly satirical paper. In 1864 he joined the staff of the Toronto *Globe* as city editor, and two years later became one of the founders of the *Daily Telegraph*. This ceased publication in 1872, and Mr. Robertson went to London, England, where he acted as resident correspondent and business manager for the Toronto *Daily Globe*. He returned to Canada in 1875, and assumed the business management of *The Nation*, a journal edited by Goldwin Smith. The next year he established the *Evening Telegram*, a publication which met with remarkable success from its foundation. Mr. Robertson is the author of *The History of the Degrees of the Cryptic Rite in Canada, Talks with Craftsmen, Landmarks of Toronto* and other volumes.

Robinson, John Beverley, Sir (1791–1863), statesman and jurist, born at Berthier, Quebec. He studied under Bishop Strachan, by whom his religious and political ideas were much influenced. He served with distinction at the beginning of the War of 1812 and later in the war was acting attorney-general of Upper Canada. From 1817 to 1829 he was the head of the Tory party in Upper Canada (known as the Family Compact). In 1829 he became chief justice of Upper Canada, and served till shortly before his death. Not one of his decisions was ever reversed on appeal. For many years he strongly advocated a federal union of British North America but he opposed Lord Durham's plan of legislative union for Upper and Lower Canada as a makeshift.

Roblin, Rodmond Palen, Sir, K.C.M.G. (1853–), a merchant and legislator, born at Sophiasburg, Ontario, and educated at Albert College, Belleville, Ontario. He began business in Winnipeg as a grain merchant. He was reeve for five years and warden of Dufferin for two years. He was elected to the legislature in 1888 and became leader of the opposition in the assembly. In 1900 he was called upon to form an administration, and assumed the offices of premier and president of the council. He has also held the position of commissioner of railways and minister of agriculture.

Roche, William James (1860–), physician and legislator, born at Clandeboye, Ontario; educated at London High School, Trinity Medical College and Toronto University. In 1883 he removed to Minnedosa, Manitoba, where he practiced medicine and was a member of the Manitoba medical council for several years. Since 1896 he has been a member of the Dominion House of Commons. In 1911 he was appointed secretary of state in the Borden ministry.

Rogers, Robert (1864–), born at Lakefield, Quebec. He was engaged in general business for many years at Charlevoix, Manitoba; later he dealt in grain and was interested in mining. In 1899 he was elected to the Manitoba legislative assembly and a year later became a member of the ministry, first without portfolio, later as minister of public works. He continued in office until 1911, when he was elected to the Dominion House of Commons and became minister of the interior and superintendent of Indian affairs in the Borden government.

Ross, Alexander (1783–1856), author and pioneer. He was born in Scotland and emigrated to Canada in 1805. After teaching school for several years in Glengarry, Ontario, he went to Oregon with John Jacob Astor's expedition (See *Astoria*, Volume I). He settled in the Red River district after many years' service with the Hudson's Bay Company. He was the author of *Adventures of the First Settlers on the Oregon or Columbia River, The Fur Hunters of the West,* and *The Red River Settlement, Its Rise, Progress and Present State.*

Ross, ALEXANDER MILTON (1832–1897), naturalist, born in Belleville, Ontario. He studied medicine in New York and during the American Civil War served in the Federal army as surgeon. After the close of the war he served in Mexico under Juarez (See *Juarez*, Volume III). He then returned to Canada and devoted himself to the study of natural history. His published works include *Recollections of an Abolitionist, Birds of Canada, Butterflies and Moths of Canada,* and *Mammals, Reptiles and Freshwater Fishes of Canada.*

Ross, GEORGE WILLIAM, Sir (1841–), educator and statesman, born near Nairn, Ontario, educated at the Toronto Normal School, Albert University, St. Andrew's (Scotland), Victoria and Queen's universities. For a number of years he was a teacher and public school inspector. From 1872 to 1883 he was a Liberal member of the House of Commons; he retired in order to become minister of education for Ontario, holding that office till 1899, when he became premier. After six years in office he resigned and two years later was called to the Senate. He is well known as a lecturer and author, among his published works being *Life and Times of Alexander Mackenzie* and a *History of Public and Separate Schools*

Ross, JAMES HAMILTON (1856–), a Canadian legislator, born at London, Ontario, and educated at the London grammar and high schools. He was elected to the Northwest Assembly in 1883 and retained his seat until 1901. He was also commissioner of public works and territorial secretary. In 1901 he was appointed commissioner of Yukon Territory, which position he held until the following year, when he became a candidate for the House of Commons. He was returned at the first federal election ever held in that territory. In 1904 he was appointed to the Dominion Senate, and soon after removed to Moose Jaw, Saskatchewan.

Rutherford, ALEXANDER CAMERON, B.A., LL.D. (1858–), barrister and legislator, born at Osgoode, Ontario, and educated at the Metcalfe high school and Woodstock College and McGill University, Montreal. He was for some time secretary-treasurer of the town of Strathcona and of Strathcona school district. He was elected to the legislative assembly in 1902 and was deputy speaker of the last legislature of Northwest Territories. Upon the formation of the province of Alberta in 1905, he was called to form a cabinet, which he did, assuming the portfolios of premier, provincial treasurer and minister of education. The government was sustained in 1909 but was defeated two years later. After his resignation as premier he continued to represent Strathcona as a private member.

Ryerson, EGERTON, Rev., D.D., LL.D. (1803–1882), a Canadian educator and divine, born at Charlotteville, Ontario, and educated in the public schools and by private tutors. At the

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age of 22 he entered the ministry of the Methodist Episcopal Church, and because of his forensic ability soon rose to prominence among the clergymen of that denomination. In 1829 he was influential in founding the *Christian Guardian*, the organ of Canadian Methodism, of which he became editor. He was one of the leaders in founding the Upper Canada Academy at Cobourg. This afterwards became Victoria University and Dr. Ryerson was its first president. In 1844 he was appointed superintendent of education for Upper Canada, which office he held for thirty-two years. During his incumbency of this office Dr. Ryerson made repeated journeys to the United States and Europe to study the educational systems of different countries. He is justly regarded as the founder of the public school system of Upper Canada (Ontario), and his work and influence in behalf of the public schools of Canada are likened to those of Horace Mann in Massachusetts. In 1874 he was elected president of the first general conference of the Methodist Church in Canada, and held the office for four years. He represented his conference in Great Britain at three different times, there being an interval of forty-four years between his first and last election. During his last years Dr. Ryerson lived in retirement. His published works are *Letters in Defense of Our School System*, *The Loyalists of America and Their Times*, and *The Story of My Life*, an autobiography which was completed after his death by Dr. J. G. Hodgins.

Sangster, CHARLES (1822–1893), poet, was born at Kingston, Ontario. For fifteen years he was a newspaper editor at Amherstburg and Kingston. In 1868 he accepted a position in the post office department at Ottawa; he resigned in 1886. Probably his best known poem is *England and America*. His poems were collected in two volumes and published under the titles of *The St. Lawrence and the Saguenay, and Other Poems*, and *Hesperus and Other Poems and Lyrics*.

Saunders, MARGARET MARSHALL (1861–), author, was born at Milton, Nova Scotia. Miss Saunders has traveled extensively and takes an active part in philanthropic work. Her best known book is *Beautiful Joe*, which has been translated into many foreign languages. Among her other books for children are *Charles and his Lamb*, *Tilda Jane*, *Beautiful Joe's Paradise* and *Nita*. Her stories are remarkable for their sympathetic treatment of dumb animals.

Scott, DUNCAN CAMPBELL (1862–), poet, born in Ottawa, Ontario, and educated at the public schools and at Stanstead Wesleyan College. After completing his education he entered the government service as a clerk in the department of Indian affairs, and in 1893 was promoted to be chief clerk and public accountant of the department. He has been a constant contributor in prose and verse to journals of Canada and the United States. In 1893 he published a volume entitled *The Magic House and Other Poems*. This work was most favorably received in England and America. He is also the author of *Labor and the Angels* (poems), *New World Lyrics and Ballads*, *Life of Simcoe*, and he is one of the editors of *The Makers of Canada*, a series of historical biographies.

Scott, FREDERICK GEORGE, M.A., D.C.L. (1861–), churchman and poet, was born in Montreal. He received his education at the Montreal High School, Bishop's College, Lennoxville, and King's College, London. He was ordained priest in 1886 and held a number of rectorates until he became canon of Quebec cathedral in 1906. His volumes of poems include *Soul's Quest*, *My Lattice*, *The Hymn of Empire* and *The Key of Life*, all of which contain many lines well worth remembering.

Scott, RICHARD WILLIAM, Sir, K.C., K.C.M.G., LL.D. (1825–), statesman, born at Prescott, Ontario, and educated by a private tutor. He began the practice of law in 1848 in Ottawa, and soon became one of the leaders of the local bar. In 1852 he was chosen mayor of Ottawa, and five years later was elected to the legislature. In 1867 he was elected to represent the federal capital in the first legislature of Ontario, and continued to hold his seat until 1873. In 1871 he was chosen speaker of the assembly and later became commissioner of crown lands in the Blake administration. On the formation of the Mackenzie administration at Ottawa in 1873, he became a member of the privy council, and the next year was appointed secretary of state and registrar-general of Canada. He was appointed to the senate by the Earl of Dufferin in 1874, and during the existence of the Mackenzie government was one of the leaders of the administration forces. After the defeat of the Liberals he became leader of the opposition. On the formation of the Liberal cabinet by Sir Wilfrid Laurier he was again appointed secretary of state and registrar-general, and was government leader in the senate until 1908, when he retired from active political life.

Scott, WALTER (1867–), a journalist and legislator, born in London township, Ontario, and educated at the public schools of Middlesex, Ontario. He was part owner of the *Standard*, Regina, 1892 and 1893. In 1894 he became proprietor and editor of the *Times* at Moosejaw, but in 1895 he relinquished this paper and purchased the *Leader* at Regina, which he edited and managed until 1900, when he became president of the Leader-Times Company, which position he held until 1906. In 1899 he was chosen president of the Western Canada Press Association. He was elected a Liberal member of the House of Commons for Assiniboia West in the general elections of 1900 and 1904, and took an active part in the negotiation and passage of the acts creating the provinces of Saskatchewan and Alberta. In 1905 he was invited to form the first ministry for the province of Saskatchewan. He became premier of that province and president of the council, and later also minister of public works.

Secord, Laura, a Canadian heroine. During the War of 1812 a force of Americans sought to surprise a small British force at Beaver Dam. News of this plan reached James Secord, a

THE LAURA SECORD MONUMENT, AT LUNDY'S LANE CEMETERY

wounded militia officer then living in Queenstown. As he himself was unable to warn the British commander, his wife undertook the dangerous mission. Driving a cow before her until she reached the woods, in order that the enemy might not suspect her purpose, she then set out on her solitary tramp of twenty miles through the dense forest. After an exhausting day, during which she was in constant danger from hostile Indians and Americans, she brought the news to the defenders of Beaver Dam. The British forces were now prepared for attack and when the Americans approached, the English immediately took the offensive and forced the Americans to surrender. While the battle in itself was not of great significance, it will live in history for the heroism of Laura Secord.

Selkirk, Thomas Douglas, Earl of (1771–1820), was born at St. Mary's Isle, Kirkcudbrightshire, England. At the time of the change of the highlands of Scotland into grazing lands and deer forests, Selkirk took deep interest in the evicted peasants and tried to organize emigration to British colonies. He founded a large colony in Prince Edward Island in 1803, but it is as a founder of the Red River settlements (now Manitoba) that he is famous. He received an immense tract of land by grant in 1811 and at once proceeded to send out settlers. But the hostility of the North-West Fur Company eventually ruined his colony. One of the most generous and disinterested men in the history of colonization, he died brokenhearted in the knowledge that his plans had failed. Much of the credit of opening the west for settlement must be awarded to him.

Semple, Robert (1766–1816), traveler and governor under Hudson's Bay Company; was born at Boston. He engaged in mercantile pursuits and traveled almost constantly. In 1802 we find accounts of him in Cape Colony; in 1803 in London; in 1805 in Spain, Italy, Smyrna and Constantinople; in 1808-1809 in Portugal, Spain and Tangier; in 1810 in Venezuela, and in 1813 he was captured as an American spy in the rear of the allied armies near Hamburg. In 1815, through the influence of Lord Selkirk, he was chosen as governor of the Hudson's Bay Company's factories and territories, and arrived at Red River in September. He was killed June 19, 1816, in a pitched battle between the forces of the Hudson's Bay Company and the North-West Company.

Service, Robert W. (1876–), poet, born in Lancashire, England; educated in Glasgow, Scotland. He came to Canada in 1897. For several years he was employed in a variety of occupations, first on Vancouver Island, later as clerk in the Canadian Bank of Commerce at White Horse and Dawson He resigned his clerkship in order to devote himself to literature. His poems, which are remarkable for their simplicity and fidelity to the conditions in the Northwest, have been collected and published in several volumes, *The Spell of the Yukon*, *Songs of a Sourdough* and *Ballads of a Cheechaco*.

Shaughnessy, Thomas George, Sir (1853–), railroad president, was born in Milwaukee, Wisconsin. At the age of sixteen he entered the employ of the Chicago, Milwaukee and St. Paul Railway, with which he remained till 1882. He then became general purchasing agent for the Canadian Pacific Railway, vice-president in 1891 and president in 1901. He is also president and director of a number of other railway corporations, all connected with the Canadian Pacific. He was knighted in 1901.

Shepherd, Francis J., M.D., LL.D., etc. (1851–), surgeon, was born at Como, Quebec; educated at Montreal High School, McGill University and University of Vienna. In 1875 he was appointed demonstrator of anatomy at McGill, in 1883 he became professor and a few years later dean of the medical faculty. Dr. Shepherd is one of America's greatest surgeons and has been honored by election to many medical organizations. His written contributions on anatomy and surgery are among the standard works on medical science.

Shortt, Adam (1859–), economist, was born near London, Ontario, and received his education at Queen's, Glasgow and Edinburgh universities. He has devoted himself especially to a study of Canadian economic and political development. He was for a number of years lecturer and professor of political science at Queen's University. Among his published writings are a life of Lord Sydenham and a series of papers on the history of Canadian currency and banking. In 1908 he was appointed a member of the Civil Service Commission for Canada.

Sifton, Arthur L. (1858–), legislator and judge, born near London, Ontario, educated at Wesley College and Victoria University. He was elected to the legislature of the Northwest Territory in 1898 and in 1901 became treasurer and commissioner of public works. In 1905, when the province of Alberta was organized, he became its first chief justice. He resigned after five years to become premier of the province. He is a brother of the Hon. Clifford Sifton.

Sifton, Clifford (1861–), legislator, born in Middlesex county, Ontario; educated at London High School and Victoria University. He was elected to the Manitoba assembly in 1888, and was attorney-general and minister of education, 1891–96. As attorney-general he carried through the act codifying and simplifying civil procedure in the province. He was called to the Dominion cabinet in 1896 as minister of the interior and superintendent of Indian affairs. In 1898 he introduced and carried legislation giving responsible government to the Northwest Territories In 1903 he was British agent before the Alaska Boundary Tribunal. He resigned from the ministry in 1905 on account of differences of opinion over education in the territories, but continued to represent Brandon in the House of Commons. He was appointed (1909) the first chairman of the Canadian Conservation Commission, a position which has enabled him to be of continued service.

Simcoe, John Graves (1752–1806), an English general and the first governor of Upper Canada, born in Northamptonshire, England, and educated at Merton College, Oxford. He came to New England during the Revolutionary War, commanding the Queen's Rangers. He took an active part in the war and surrendered with Cornwallis at Yorktown in 1781. He served as governor of Upper Canada in 1791-1794; then became governor of Santo Domingo in 1796-1797, and in 1806 was appointed commander-in-chief of India. He wrote a *History of the Operations of a Partisan Corps Called the Queen's Rangers.*

Simpson, George, Sir (1792–1860), statesman and explorer, was born in Ross-shire, Scotland. He came to America in 1820 as one of the officials of the Hudson's Bay Company, and a

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year later was appointed governor of the northern department when the Hudson's Bay Company acquired control of the Northwest Fur Company. For thirty-five years he was general superintendent of the company's affairs in America. He sent out and himself took part in many exploring parties which helped to open the West. He published an account of a trip around the world under the title *A Narrative of a Journey Round the World During the Years 1841 and 1842.*

Sproule, Thomas Simpson (1843–), legislator, born in York County, Ontario; educated at University of Michigan and Victoria University, Toronto, where he graduated in medicine in 1868. He has been a farmer for over twenty years as well as a practicing physician. He was elected to the House of Commons in 1878 and has served continuously since. On November 15, 1911, he was elected Speaker.

Squair, John (1850–), educator, born at Bowmanville, Ontario; educated at the high schools of Newcastle and Bowmanville and at the University of Toronto. Since 1883 he has been head of the department of French in University College. Mr. Squair has been active in the work of the Ontario and the dominion educational associations and has edited many French works for school use. He also collaborated in the preparation of a French reader and a French grammar.

Stanley, Frederick Arthur, Earl of Derby (1841–1908), an English statesman, born in London and educated at Eton. He was elected to Parliament at the age of 24, and during the next few years held several important offices, including that of secretary of state for the colonies. From 1888 to 1893 he was governor-general of Canada. When King Edward VII succeeded to the throne, Lord Stanley was appointed supernumerary aid-de-camp to the king.

Strachan, John (1778–1867), first episcopal bishop of Toronto, was born at Aberdeen, Scotland, and was educated at Aberdeen University, where he paid his expenses by private teaching. In May, 1803, he was ordained and was immediately appointed to the parish of Cornwall, where his school became the most noted educational institution in the country. In 1815 he was appointed to the executive council of Upper Canada. A man of great force of character and much ability, of keen ambitions and unusual shrewdness, he attained great influence in the government and was soon the leading spirit in the dominant group of extreme conservatives commonly known as the Family Compact. When the University of King's College was established he became its first president; but in 1849 when it became the University of Toronto

BISHOP STRACHAN

and lost its denominational character, he resigned and at once took steps to found another university under the control of the Episcopal Church. Trinity University, the result of these efforts, was opened in 1852. He had been appointed bishop of Toronto in 1839 and after the founding of Trinity, Bishop Strachan devoted his remaining years entirely to his episcopal duties.

Strathcona and Mount Royal, Donald Alexander Smith, Baron (1820–), statesman and financier, was born at Forres, Scotland. In 1838 he was appointed a junior clerk in the Hudson's Bay Company. For thirteen years he was stationed at Hamilton Inlet, Labrador; here, besides mastering the fur trade, he spent much of his time in introducing improvements into the conditions of life, being the first to prove that potatoes could be grown there with success. Then for ten years he was on Hudson Bay, where he rose to be a chief trader and later chief factor; and in 1868 he became resident governor at Montreal. During the disorders in 1870 in the Red River settlements he used his influence in settling the disputes without bloodshed. He was elected to the first legislative assembly of the new province of Manitoba and then to the House of Commons.

In Parliament he was prominent for his independence and his advocacy of railroad expansion. Together with his cousin, Lord Mount Stephen, he was one of the organizers of the present Canadian Pacific Railway, and it is largely due to his energy and ability that the project was completed. Except from 1882 to 1887 he continued to sit in Parliament until 1896, when he succeeded Sir Charles Tupper as high commissioner in London. Smith was raised to the peerage in 1897. He received numerous honorary degrees from colleges and universities and for many years was chancellor of Aberdeen and McGill universities. (For portrait, see illustration facing page 190).

Stringer, ARTHUR (1874–), poet and novelist, born at London, Ontario, educated at Toronto University and at Oxford, England. For several years he was editorial writer for the American Press Association and later was literary editor of *Success Magazine*. He is the author of *Watchers of Twilight*, *The Loom of Destiny*, *Lonely O'Malley*, *The Wire Tappers* and a number of other volumes of verse and fiction.

Stuart, CHARLES ALLAN (1864–), lawyer, judge and educator, born in Middlesex county, Ontario; educated at Strathroy Collegiate Institute and University of Toronto. In 1896 he was called to the bar of Ontario but soon removed to Alberta, where he became successively a member of the legislature, judge of the supreme court for the Territories and judge of the supreme court of Alberta. In 1908 he became chancellor of the University of Alberta.

Sulte, BENJAMIN (1841–), poet and historian, born at Three Rivers, Quebec. After the death of his father he engaged in business and later entered the government service, in which he was employed for thirty-five years. His most important historical work is the *Histoire des Canadiens-Francais*. Sulte is also known for his volumes of poems, *Les Paurentiennes* and *Les Chants Nouveaux*, and numerous minor essays.

Sutherland, WILLIAM CHARLES, (1865–), an attorney and legislator, born at Embro, Ontario, and educated in the Orangeville high school and McGill University. He began the practice of law in Manitoba and afterwards removed to Saskatchewan and was secretary-treasurer and councillor for the town of Saskatoon. In 1905 he was elected to the legislature of the province when it was organized, and was reëlected in 1908. He was chosen deputy speaker of the Saskatchewan legislature and chairman of the standing committee on private bills and railways and that of law amendments and municipal law in the first legislature. At the first session of the second legislature he was elected speaker.

Sweeney, JAMES FIELDING, Rev., M.A., D.D. (1857–), clergyman, born in London, England, and educated at the Montreal high school and McGill University. Upon his ordination he became rector of St. Luke's and chaplain to the Montreal General Hospital. In 1889 he was appointed an honorary canon of St. Alban's Cathedral, Toronto, and was elected rural dean of Toronto in 1895. Later he became archdeacon of York and Simcoe and in 1909 was consecrated bishop of Toronto.

Sydenham and Toronto, CHARLES EDWARD POULETT THOMSON, Baron (1799–1841), British statesman, was born in London and spent the early years of his life as assistant to his father, a

LORD SYDENHAM

merchant. In 1826 he was returned to the British House of Commons for Dover and in 1830 joined Earl Grey's ministry as vice-president of the Board of Trade. He was a member for Manchester from 1832 to 1839. A free-trader and an expert in financial matters, he was continuously occupied with negotiations affecting international commerce. From 1839 to 1841 as governor-general of Canada, he took a leading part in forming the union of Upper and Lower Canada. His services were rewarded by a peerage, which became extinct at his death for lack of heirs.

Taché, *tash a'*, ALEXANDER ANTONIN (1823–1894), a Roman Catholic archbishop, born at Riviere du Loup, Que., educated at St. Hyacinthe College, Montreal Theological Seminary and Chambly College. He became instructor of mathematics in St. Hyacinthe College in 1842 but resigned after a short time and joined the Oblate Order at Montreal, volunteering for missionary work among the Indians on the Red River He soon became known throughout Canada for his great energy and fortitude. In 1851 he was consecrated bishop of Avath, after having been summoned to France by the Superior of the Oblate Fathers In 1852 he returned to the Northwest and a year later became bishop of St. Boniface. He urged upon the government the necessity of adjusting the grievance with the Indians and half-breeds in 1869, but during his absence in Italy in 1870 the Riel rebellion broke out. Had his advice been followed in 1868–1869 this trouble could probably have been averted. In September, 1871, St. Boniface was made the metropolitan see, and Tache became archbishop of Manitoba. He died at Winnipeg, June 22, 1894, and was buried in the cathedral of St. Boniface. Taché was a brilliant scholar and an eloquent preacher; his influence in the west can hardly be overestimated.

Taché, ETIENNE PASCHAL, Sir (1795–1865), premier of Canada, was born at St. Thomas and educated at a Roman Catholic seminary. He became an ensign in the 5th battalion on the outbreak of the War of 1812. He studied medicine after the war and was admitted to practice in 1819. Taché entered the Canadian Assembly in 1841. In 1846 he resigned his seat and was appointed deputy adjutant-general of the Canadian militia. He was reëlected to the Assembly in 1848, and on March 11 was made commissioner of public works in the Baldwin-Lafontaine ministry. The next year he became receiver-general and held that office till May, 1856. Taché was appointed a life member of the legislative council in 1856. He was elected speaker in April, and in a short time became premier. His administration was wise, and Taché was noted for his efforts for economy. He sought retirement in 1858, and during that year visited England, where he was received by the queen at Windsor and knighted. He again became premier in 1864 and presided over the conference at Quebec when the great question of federation was discussed. He died at Montmagny July 30, 1865.

Talon, JEAN BAPTISTE (1625–1691), French official in Canada. After serving in the civil service in France he was appointed intendant of justice and finance in the French possessions in North America. His work was of great value in establishing permanent colonies and also in expansion. He built ships, began trade with the West Indies, sent out exploring expeditions and labored for the advancement of the colonies. His *Memoire a la majeste sur l'etat present du Canada*, published in 1667, is a valuable source of information concerning the early history of Canada.

Tarte, JOSEPH ISRAEL (1848–1907), statesman, born in Quebec and educated at L'Assomption College. He followed the profession of law for a time and later became editor of *Le Canadien*. From 1877 to 1881 he was a member of the legislative assembly of Quebec, and in 1891 was elected to the Dominion House of Commons. He was appointed minister of public works in 1896, and filled this office until 1902.

Taschereau, *tash ro'*, ELZEAR ALEXANDRE (1820–1898), prelate and cardinal, born in Quebec and educated at Quebec Seminary, with which he remained as professor of moral philosophy until 1862. In 1862 he was made vicar-general of the diocese, archbishop in 1871 and cardinal in 1886.

Taschereau, HENRI ELZEAR, Sir (1836–1911), born at St. Mary's, Quebec, educated at Quebec Seminary. He was called to the Quebec bar in 1857. From 1861 to 1867 he sat in the Canadian Assembly; later he became a judge of the superior court of Quebec In 1878 he was appointed to the Supreme Court of the Dominion and in 1902 became chief justice. After his resignation in 1906 he became dean of the law faculty of the University of Ottawa.

Taschereau, LOUIS ALEXANDER (1867–), legislator, was born at Quebec and studied law at the Quebec Seminary. He was elected to the Quebec legislative assembly in 1900 and was sworn in as minister of public works in October, 1907.

Taylor, THOMAS (1865–), legislator, born at London, Ontario; educated in the public schools and at the London Commercial College. In 1885 he removed to Winnipeg, where he entered the employ of the Canadian Pacific Railway. He moved to British Columbia in 1894 and engaged in mercantile pursuits. In 1900 he was elected to the provincial legislature and in 1908, on the formation of the department of public works, was sworn in as its minister in the McBride administration.

Templeman, William, P.C. (1844-), journalist and statesman, born in Pakenham, Ontario, and educated in the public schools of that town. Early in life he became interested in journalism and in 1867 established the Almonte *Gazette*. In 1884 he moved to Victoria, B. C., and established the Victoria *Times*, which he has since published. He became a member of the Canadian Senate in 1897, and in 1902 was sworn in as a member of the privy council In 1906 he was appointed minister of inland revenue, and upon the organization of the department of mines the next year, he became its minister. Having resigned from the Senate, in 1906 and again in 1909 he was elected to the House of Commons. In 1911 he was defeated in the general election.

Thompson, David (1770-1857), explorer, born in Westminster, England. He was educated at Oxford and in 1789 came to Canada in the service of the Hudson's Bay Company. For several years Thompson was engaged in explorations in the Great Lakes region and in 1807-1811 he explored the Columbia River Valley from source to mouth. He was employed on the boundary survey, 1816-1826, and also had charge of numerous surveying and exploring expeditions in the Northwest.

Thompson, John Sparrow David, Sir (1844-1894), jurist and statesman, was born at Halifax, Nova Scotia. At fifteen he entered a lawyer's office and at twenty-one was called to the bar. In 1877 he was elected to the local legislature as a Conservative and a year later became attorney-general; for a few weeks in 1882 he was premier of the province and in July became a judge of the provincial supreme court. In 1885 he was appointed minister of justice in the Macdonald ministry and was elected to the House of Commons for Antigonish. "Though a quiet man who did not advertise, few Canadian statesmen have done so much honest and solid work." In November, 1892, he succeeded Sir John Abbott as premier of Canada, but he died before he had time to carry out the many reforms planned for the good of his party and of Canada. (For portrait, see illustration facing page 210).

Tilley, Samuel Leonard, Sir (1818-1896), statesman, was born at Gagetown, New Brunswick. He was elected to the provincial legislature in 1850. From 1860 to 1865 he was premier of the province and was prominent in the discussion and conferences preceding confedera-

SIR SAMUEL LEONARD TILLEY

tion. From 1868 to 1873 he held various posts in the Dominion cabinet; he was lieutenant-governor of New Brunswick, 1873-78, and minister of finance in Sir John Macdonald's cabinet from 1878 to 1885. He was the author of the bill providing a "national policy" of protection, which is the basis of Canadian financial policy today. After his resignation from the cabinet he was again appointed lieutenant-governor of New Brunswick, this time serving for eight years.

Townshend, Charles J., Sir (1844-), legislator and jurist, educated at the Collegiate School and at King's College, Windsor, Nova Scotia. For many years he practiced law; then served in the provincial assembly, and in 1884 was elected to the Dominion House of Commons. In 1887 he was appointed to the supreme court of Nova Scotia and in 1907 became chief justice.

Traill, Catherine Parr (1802-1899), born in London, England. In 1832 she married Lieutenant Thomas Traill and emigrated to Canada, settling at Rice Lake, Ontario. Mrs. Traill won distinction by her contributions to English magazines and her other literary works. She is author of the *Backwoods of Canada, Canadian Crusoes, The Female Emigrants' Guide, Lady Mary and Her Nurse,* and *Rambles* *in the Canadian Forest.* Among her later works of distinction are *Pearls and Pebbles; or Notes of an Old Naturalist, Cot and Cradle Stories,* and *Studies in Plant Life in Canada.*

Tupper, Charles, Sir (1821–), statesman, was born at Amherst, Nova Scotia, and was educated at Horton Academy and Edinburgh University, where he studied medicine. Returning to Nova Scotia to practice his profession, he soon entered public life as a Conservative member for Cumberland county in the provincial assembly. From 1857 to 1860 he was provincial secretary and from 1863 to 1867 he was premier. In discussions preceding Confederation Sir Charles took a leading part, both at the Charlottetown and Quebec conferences and also at the final meetings in London where the British North America Act was drafted. He declined office in the first Dominion cabinet, but in 1870 accepted the presidency of the privy council, later becoming minister of inland revenue and then minister of customs. From 1873 to 1878 he continued to serve in the House of Commons and in 1878, in Sir John Macdonald's second ministry, he became in turn minister of public works and minister of railways and canals. Sir Charles was prominent in support of the Canadian Pacific Railway and in 1887, as finance minister, he floated a large loan on its behalf. From 1884 to 1887, and again from 1888 to 1896, he was Canada's high commissioner in London. In April, 1896, he succeeded Sir Mackenzie Bowell as premier of Canada, but at the general elections in June the Conservatives were defeated. Sir Charles continued to lead his party in the House of Commons until 1900, when he was defeated for reëlection and retired to private life. (For portrait, see illustration facing page 210.)

Tupper, Charles Hibbert, Sir (1855–), son of Sir Charles Tupper, was educated at McGill University and at the Harvard Law School. He was first elected to the House of Commons as a Conservative in 1882, and was returned in 1887, 1888, 1891 and 1896. From 1888 to 1895 he was minister of marine and fisheries, and in 1895–96 was minister and attorney-general for Canada. Since his retirement from politics he has practiced law in Vancouver.

Turgeon, Adelard (1863–), born at Beaumont, Quebec; educated at Laval University. In 1887 he was called to the bar and in 1890 was elected to the Quebec Assembly. He has held various offices in the provincial ministry, including that of minister of colonization and mines and minister of lands, mines and forests. In 1909 he became president of the legislative council.

Turgeon, William Ferdinand Alphonse, Hon. (1877–), an attorney and legislator, born at Bathhurst, New Brunswick, and educated in New York City and Laval University. He was admitted to the bar of Quebec, but soon afterwards removed to Prince Albert, where he continued his practice. He was sworn in as attorney-general of Saskatchewan in 1907, and in the next spring was elected to the assembly.

Tweedie, Lemuel John, K.C., LL.D. (1849–), a barrister and statesman, born at Chatham, New Brunswick, and educated at the Presbyterian College. He was first elected to the legislature in 1874. He was defeated in 1878, but returned in 1886, and continued to hold his position. In 1890 he became surveyor-general and provincial secretary in the Mitchell administration, continuing to hold the office in the Emmerson administration. On the resignation of Premier Emmerson in 1900, he was called to form a ministry, which he did, becoming premier and provincial secretary. From 1907 to 1912 he was lieutenant-governor of the province.

Vancouver, George (1758–1798), explorer and discoverer. He accompanied Cook on several of his voyages, and later was in command of an expedition to explore Australia and New Zealand. From there he sailed by way of the Hawaiian Islands to North America, where he surveyed, in a period of two years, the coast from 35° to 56° North latitude. Vancouver Island was named after him. He sailed for England via Cape Horn and St. Helena, and died shortly after his arrival at his home in Surrey.

Van Horne, William Cornelius, Sir (1843–), was born near Joliet, Illinois. He entered the railway service at the age of fourteen, and, after filling various positions, rose to the superintendency of the Chicago and Alton Railway, and later of the Chicago, Milwaukee and St. Paul Railway. In 1881 he was appointed general manager of the Canadian Pacific; in 1884 he was elected vice-president and in 1888 president. He retired from active management in 1899, and became chairman of the board of directors.

Vaudreuil-Cavagnal, Pierre Francois, Marquis (1698–1765), the last French governor of Canada, was born in Quebec. In 1733 he was appointed governor of Three Rivers. He became governor of Louisiana in 1742, and was made governor-general of Canada in 1755. He surrendered Montreal to the English in 1760, against the advice of General Levis, who was in command. He was later brought to trial in Paris, but was fully vindicated.

Verandrye, *va rahn dre'*, Pierre Gautier De Varennes, De La (1685–1749), a French-Canadian explorer, born at Three Rivers, Quebec. He is noted for his work as an explorer and early pioneer in Central and Western Canada. He built Ft. Saint Pierre in 1731, Ft. St. Charles in 1732, and in 1733 Ft. de la Reine. He explored the western part of Canada, traveling to the Rocky Mountains. In 1748-1749 his explorations carried him to the north, where he built Fort Dauphin.

Walker, Byron Edmund, Sir (1848–), a financier, born in the township of Seneca, Ontario, and educated in the public schools. He began his business career in the banking office of his uncle, and in 1868 entered the service of the Canadian Bank of Commerce. In 1872 he was appointed accountant at the head office in Toronto and continued to rise until in 1907 he became president of the bank. Mr. Walker controls large interests in addition to those directly connected with the bank, and has rendered important services to the cause of Canadian banking. He has written and spoken frequently upon topics connected with business and finance. Among his publications are the *Canadian System of Banking, National Banking System of the United States, History of Banking in All the Leading Nations, Why Canada Is Against Bimetallism*, and a series of papers on *Early Italian Art*.

Warman, Cy, (1855–), author, born at Greenup, Illinois; educated in the public schools there. He came to Canada in 1897 and has been successively farmer, wheat merchant, railway employe and journalist. His best known books are *Tales of an Engineer, Express Messenger, Frontier Stories*, and *Snow on the Headlight*.

Wetherald, Agnes Ethelwyn, (1857–), an author and journalist, born in Rockwood, Ontario, and educated at Friends' schools in New York and Ontario. Miss Wetherald has written numerous works of fiction and is also known as a journalist. Some of her poems appeared in *St. Nicholas* under the pen name of Belle Thistlewaite. She also edited the woman's department of the Toronto *Globe* and did most of the editorial work on *Wives and Daughters*, a monthly published in London, Ontario. She is author of the novel *The Algonquin Maiden, The House of the Trees, The Radiant Road* and other poems.

Wetmore, Edward Ludlow, (1841–), legislator and jurist, born at Fredericton, New Brunswick; educated at Fredericton and Georgetown and at King's College (now University of New Brunswick). He was called to the bar in 1864, was mayor of Fredericton for two years and leader of the opposition in the legislature, 1884-85. He was appointed a judge of the supreme court for the Northwest Territory in 1887. He was commissioner for consolidating the laws of the territories and later of the province of Saskatchewan. In 1907 he became chief justice of Saskatchewan.

White, William Thomas, (1866–), banker and statesman, born near Bronte, Ontario, educated at Brampton High School and Toronto University. He was engaged in newspaper work for a few years but soon entered the banking business. From 1900 to 1911 he was general-manager of the National Trust Company, Toronto. He took a prominent part in the agitation against the Taft-Fielding reciprocity compact and on the defeat of the Laurier government accepted the portfolio of finance in the cabinet formed by Hon. R. L. Borden. He was elected to the House of Commons at a by-election on Nov. 6, 1911.

Whitney, James Pliny, Sir, LL.D., D.C.L., K.C. (1843–), statesman, born at Williamsburg, Ontario, and educated at the Cornwall grammar school. He began the practice of law in 1876, and in 1890 was appointed queen's counsel. He was first elected to the legislature of Ontario in 1888, and has been returned at each election, including that of 1908. In 1896 he was chosen leader of the opposition, and in 1905 was called upon to form a new government. In this he became the prime minister and assumed the office of attorney-general. Later he relinquished the office of attorney-general and became president of the council. The honor of knighthood was conferred upon him by H. R. H. the Prince of Wales, in 1908, on the occasion of the celebration of the Quebec Tercentenary. Sir James served in the militia during the Fenian troubles and is lieutenant-colonel of the militia reserve.

Wilmot, Lemuel Allan, (1809–1878), statesman and jurist, born at Sunbury, New Brunswick, and educated at King's College, Frederic-

LORD STRATHCONA

SIR JAMES P. WHITNEY

REV. ALBERT CARMAN

HENRY DRUMMOND

EMINENT CANADIANS

He was a good student and was known as "the best swimmer, skater, runner, wrestler, oarsman, speaker and musician" of his time. In 1832 he was called to the bar and two years later began his long career in public life as a leader of the Liberals. He was first elected to the assembly, twice went to England in an effort to secure control of the crown lands for the representative assembly and in 1844 was for a short time minister without portfolio. In 1848, after the principle of responsible government was firmly established in practice, Wilmot became premier and attorney-general of New Brunswick. Three years later he became judge of the supreme court and after the Confederation he was appointed lieutenant-governor. He was especially active in securing New Brunswick's consent to Confederation.

Wilson, Arthur, (1872–), legislator, was born in British Columbia. He has been a resident of the Yukon Territory for many years, was one of the first elected members of the Yukon government and was delegate to Ottawa to present grievances of the people to the government. He was acting administrator of the territory during the absence of the commissioner and in 1911 became commissioner.

Wilson. Daniel, Sir, LL.D., F.R.S.E. (1816–1892), archaeologist and educator, born in Edinburgh and educated at Edinburgh University. After completing his course at the university he went to London, where for five years he engaged in journalism. He then returned to Edinburgh, and devoted himself to archaeological research. In 1847 he published *Edinburgh in the Olden Time*, a work which attracted wide attention and was most favorably received. In 1851 *Archaeology and Prehistoric Annals of Scotland* appeared. Two years later Dr. Wilson was appointed to the chair of history and literature in the University of Toronto, and in 1881 he became president of the University. Dr. Wilson was one of the leading educators of Canada, and by his scholarship, energy, addresses and writings he contributed much to the advancement of higher education in the Dominion. He continued his archaeological researches, and in addition to the works mentioned above, published *Prehistoric Man; Researches Into the Origin of Civilization in the Old and New Worlds; Chatterton, a Biographical Study; Caliban, the Missing Link; Spring Wild Flowers*, a volume of poems; *Reminiscences of Old Edinburgh*. He was a member of numerous scientific societies in Great Britain and Canada.

Wood, Josiah (1843–), merchant and legislator, born at Sackville, New Brunswick; educated at Mount Allison Wesleyan College. He was called to the bar in 1863 but soon entered mercantile life. He was mayor of Sackville for five years, a Conservative member of the House of Commons from 1882 to 1895 and a senator from 1895 to 1912, when he was appointed lieutenant-governor of New Brunswick.

Wood, William, Lieutenant-Colonel, historian. Colonel Wood is one of the best known historians of Canada, his published works including *The Fight for Canada, The Logs of the Conquest of Canada* and many monographs on historical subjects; he is also the editor of a series of original documents relating to the War of 1812. He has been president of the Literary and Historical Society of Quebec, vice-president of the Quebec Tercentenary, and from 1907 to 1910 was commanding officer of the 8th Royal Rifles.

Wrong, George McKinnon (1860–), educator, born at Gravesend, Ontario; educated at University College, Toronto, at University of Toronto, and at Oxford, England. In 1883 he took orders in the Church of England, but he has since been engaged in academical work. In 1894 he succeeded Sir Daniel Wilson as professor of history in the University of Toronto. He is the author of a life of the Earl of Elgin and of *The British Nation: a History*.

Young, George Paxton, Rev. (1818–1890), a Canadian minister and educator, was born in Scotland. He was in charge of Knox Church in Hamilton, 1848 to 1853, and in the latter year was appointed professor of logic and philosophy in Knox College. He was made inspector of grammar schools for Ontario in 1864 and in 1868 was made principal of Knox College preparatory department. He was an able educator, and one of the most noted teachers of his day.

Young, Henry Esson, B.A., M.D., C.M., LL.D. (1867–), a physician and legislator, born at English River, Quebec, and educated at Queen's University, Kingston, and McGill University, Montreal. He was first elected to the legislature of British Columbia in 1903, and reëlected in 1907, when he became provincial secretary and minister of education. In 1907 he received the degree of LL.D. from Toronto University.

Young, John, Right Hon. Sir. See Lisgar, Lord.

Questions

The following groups of questions make no pretense to be anything but suggestive. Hundreds of others on each group will readily occur to any student or teacher.

FAMOUS WOMEN

In what year did Louisa M. Alcott write her famous *Little Women*?

Why will Laura Secord always be remembered?

Why is Agnes Machar famous?

In what production did Maude Adams score a great success and win much of her present fame?

For what are Alice and Phoebe Cary celebrated?

Who was Hypatia? What led to her brutal murder by the clergy?

How old was Queen Victoria when she ascended the throne? How many years did she reign? When and at what age did she die?

At what age did Wilhelmina become queen of the Netherlands?

In what field of labor did Frances Willard become world-famous? Where was she born?

Was Emma Hart Willard, who wrote "Rocked in the Cradle of the Deep," related to Frances Willard?

What are some of the principal productions from the pen of Mrs. Humphrey Ward?

ACTORS AND DRAMATISTS

How is Henry Irving regarded as an actor?

Of what nationality is Ellen Terry? How does she rank as an actress?

In what world-famous play did Joseph Jefferson take the leading part? How is he regarded by the American people? What is his rank as an actor?

In the presentation of what plays did Edwin Booth win fame?

What is the nationality of Bernhardt? For what lines of work is she noted other than acting?

What are the principal dramas of Shakespeare presented today?

ARTISTS

How does Rosa Bonheur rank as an artist? When did she die?

What was the last and unfinished painting of Raphael?

Is Dante Rossetti more famous as a poet or as a painter?

How many paintings did Rubens produce?

What picture by Titian has been described as faultless?

What are Raphael's greatest works? Name three

What is Vandyck's rank among portrait painters?

For what extraordinary sums were Rembrandt's "Coppenol" and "Jesus before Pilate" sold?

What sculptor made the statue of Sir John Macdonald on Parliament Hill, Ottawa?

DISCOVERERS AND EXPLORERS

What were the two most important trips of exploration made by Sir Alexander Mackenzie?

How did it happen that the new continent was named after Amerigo Vespucci?

Where did Andree start on his balloon expedition to the North Pole? What was the result?

What were the education and the early tastes of Christopher Columbus?

Which was the most famous of Drake's voyages?

How was Vasco da Gama rewarded by the Portuguese government for being the first to round the Cape of Good Hope?

What was the farthest northern point reached by Nansen?

What are the dates of Peary's three Arctic expeditions?

From what very humble origin did Livingstone make his way to fame?

Who is Captain Roald Amundsen? What did he do to entitle him to fame?

EDUCATIONAL

What is the rank of Egerton Ryerson as an educator?

Along what lines is Booker T. Washington working in the education of the negro?

For what is Euclid noted? Sir Isaac Newton?

What was the original endowment fund of the Astor Library, and what is the size of the library?

For what is Leland Stanford's name noted?

How did Aristotle believe happiness is attained?

What was the great good in life and the great evil according to Epicurus?

For what is Dr. J. G. Hodgins distinguished?

Of what university was Rev. George Monro Grant president?

What is the plan of the Carnegie Institution? Where is it located?

Who founded Harvard University, and when?

Who was Horace Mann? Francis Parker?

Who is the president of Harvard University?

HISTORICAL

What were the various stages of the emancipation of negro slaves in the United States?

Who were some of the leaders in framing the British North America Act?

Where did Croesus obtain his proverbial wealth?

Who was Aurelius Antoninus?

What was the career of Caius Marius?

What is the story of Romulus and Remus?

For what was Alfred the Great especially noted?

When did Kitchener leave the Sudan?

Who were the parents of Frederick Douglas, and what was his early mode of life?

What was the far-reaching object of Lycurgus?

In what way was the work of Frontenac important?

For what parliamentary acts was Sir Robert Peel celebrated?

What were the great events in Oliver Cromwell's life?

Who was Chinese Gordon or Gordon Pasha?

Who was Robin Hood?

What is the story of William Tell?

What Presidents of the United States have been assassinated?

INVENTORS

Where was the first locomotive engine made in the United States, and from whose plans was it constructed?

How is the story of Thomas Edison's life typically American?

What is the great invention of George Westinghouse?

What American ship famous in the Civil War was invented by Ericsson? What effect did it have on naval warfare?

When did Howe invent the sewing machine?

What machine invented by Eli Whitney has been the means of the saving and making of millions of dollars every year?

Who is Marconi? What is his important discovery?

RELIGIOUS

In what capacity has Rev. Albert Carman earned his fame?

What life did Peter the Hermit lead after the Crusades?

For what is Robert Raikes noted?

For what is Bishop Strachan famous?

Who was John Huss? What noted article did he write?

Who protected Calvin after he had turned heretic to the Roman Catholic faith? How did the Calvinist sect arise?

What famous duel was made the subject of one of Lyman Beecher's most noted sermons?

Of what religion was Zoroaster the founder?

Of what famous educational movement was Bishop Vincent the founder?

Who was Savonarola?

To what form of religion did Voltaire hold in denouncing Christianity?

In what way was the Society of Jesuits formed?

When did Leo XIII become pope and how many years was he at the head of the Roman Catholic church?

Who was the founder of the Church of Christ, Scientist?

At the head of what great religious and charitable movement is William Booth?

MUSICIANS

What rank does Mary Parlow take as a violinist? Where was she born?

To what king was Mendelssohn appointed musical director?

What is Mme. Nordica's nationality? What is her rank as a singer?

When was Sousa's band first organized?

For what is Antonio Stradivarius noted?

From what did Wagner select his subjects?

MILITARY AND NAVAL

In what great battle were Wolfe and Montcalm the commanders?

What part did Sir Guy Carleton play in the early years of the American Revolution?

What was the most important victory won by General Brock?

Who is Captain Dreyfus? To what persecutions has he been subjected and why?

Who commanded the Invincible Armada?

What Japanese leaders won fame in the Russo-Japanese War? What Russian leaders?

What great English general was victorious at the battle of Blenheim? How was he rewarded?

What event of far-reaching importance in the history of the United States took place at Appomattox Court House?

PHILOSOPHERS

What famous simile did John Locke make in describing the human mind?

In what direction has Hegel's philosophy made itself most powerfully felt?

What was Plato's philosophy? Who were the Seven Wise Men?

What system of reasoning did Sir Francis Bacon advocate?

What system of philosophy did Auguste Comte found?

What was Socrates' method of arriving at the truth?

POLITICAL

Who were some of the leaders of the political revolt against the Family Compact?

What was the effect of Mackenzie's rebellion?

What was the importance of the first Baldwin-LaFontaine ministry? Summarize Baldwin's political career.

What important positions did Lord Elgin hold in Canada and India?

Why is Lord Durham famous?

Who was the first premier of the Dominion? For how many years did he hold the office?

Who were some of the "Fathers of Confederation?"

Who was D'Arcy McGee?

What was the cause of the Red River rebellion? Who was its leader? Who was in command of the troops sent to suppress it?

How many years was Sir Wilfrid Laurier premier? What led to his defeat? Who succeeded him?

RULERS

Who is the present Sultan of Turkey?

For what reasons was Marie Antoinette unpopular with the French populace?

When was the title "Empress of India" conferred upon Queen Victoria?

Who is the present king of Denmark? Of Norway? Whom did the latter succeed?

Who was the father of Queen Christina of Sweden and who directed her unusually broad education?

Who was the greatest king of Scotland, and why?

Over what celebrated woman did Mary I triumph in ascending the throne?

What is the meaning of "Hapsburg?"

Who is the present ruler of Holland?

Who was Queen Elizabeth's mother?

Who was Peter the Great?

Why was George IV given the nickname of "First Gentleman of Europe?"

STATESMEN AND ORATORS

Who was Joseph Howe?

What are some of the important offices held by Sir Charles Tupper?

To which party did Alexander Macken belong? How long was he premier?

What important work did Sir Alexander Galt accomplish as minister of finance?

What were some of the important chan brought about by Robert Baldwin?

Who was Sir Georges Cartier?

For what was Lord Strathcona noted Parliament?

Of what important law was Sir Sam Leonard Tilley the author?

What were the leading characteristics William Lyon Mackenzie?

How long was Lord Rosebery premier England?

Who was Paul Kruger?

Who was Ito? What did he do for his cou try?

PATRIOTIC

Where is there a beautiful monument Laura Secord?

Who was Joseph Brant?

Who was Robert Emmet? For what was h executed?

Why is Joan of Arc famous?

In what way did Florence Nightingale serv her country?

What nation did Kosciusko seek to maintain independent?

What part did Garibaldi take in the struggle for Italian independence?

Who was Marco Bozzaris? How did he dis tinguish himself?

SCIENTIFIC

For what is Pasteur noted? Professor and Madam Curie?

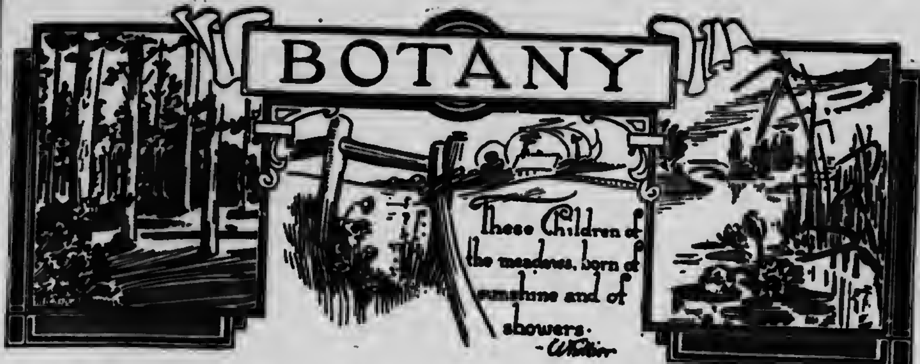
Why is Professor Roentgen famous?

What is liquid air? Who has been the most successful experimenter with it?

What are the principles on which the thermometer works? The barometer? Who invented each?

Who is Hiram Maxim and for what is he noted?

What deadly explosive was invented by Alfred Nobel? What are the Nobel prizes?



The Beginnings of Botany. It is easy to imagine how the science of botany began. Wherever men live there are plants of some kind, and always have been, and men must always have paid more or less attention to them. At first, no doubt, the plants were looked upon just as were the rocks o, the clouds or the hills; they were there through no art of man's, and it was not his duty or business to take care of them or develop them. When, without his aid, they produced fruits that might be eaten, he ate them; but he troubled himself little about the plants from which they came. But, naturally, as men grew more and more civilized, they came to take a more intelligent interest in their surroundings, and the differences in the various plants about them drew their attention. Some lost their leaves with the coming on of colder weather, and brought out fresh ones in the spring; some kept the same leaves all the year round; some had flowers, but no fruit; some had most insignificant flowers, but gorgeous fruits. And, besides, they were useful for different things. The stems of some might be eaten, the roots of others, the leaf buds of others; from some, medicines were made. Perhaps it was this last-mentioned fact which first led students to give serious attention to the study of plants—the beginnings of the science of botany seem to have concerned themselves most with medicinal plants. We know that a Greek writer, Theophrastus, in the fourth century B C, wrote a treatise called the *History of Plants*, in which he told of about five hundred kinds that were useful in healing diseases; and in the first century of the Christian era, Pliny the Elder described about a thousand plants, many of which were used as medicines.

It is not strange that these ancient writers, studying the subject, as they were, with a definite end in view, paid little attention to the classification of plants. Indeed, even the merest hint of such classification as modern botanists make would have been impossible for them. Certain plants resembled other plants so much that their relation was evident; but others looked much more like members of entirely different families than they did like certain members of their own family.

In the sixteenth century, when there was a renewed interest in everything, botany shared in the awakening. Books were published in various countries, describing plants and giving really beautiful woodcuts of them; but still the interest was chiefly on the medicinal side of the science. Gradually more and more definite attempts were made at systematic classification, until the time of Linne, or Linnaeus, in the eighteenth century. Linnaeus is looked upon as the originator of modern systematic botany, and more exact and elaborate classifications grew out of his outlines.

Outline. The following outline on botany not only shows the classifications of plants, in its larger aspects, but gives a general view of the whole subject, showing how a systematic study would be undertaken:

I. Plant physiology
   1. Chemical composition of plants
   2. Plant foods
   3. Movement of water in plants
   4. Action of chlorphyll (the green coloring matter)
   5. Digestion and assimilation
   6. Storing of food

II. The plant and its structure
   1. Cells

2. Protoplasm (the substance of which cells are composed)
3. Germination
   a. The seed
   b. The embryo
4. The root
   a. Functions
   b. Classification
      (1) By manner of growth
         (a) Soil-roots
         (b) Aerial roots
         (c) Water roots
         (d) Parasitic roots
      (2) By form
         (a) Taproot
         (b) Fascicled (cluster) roots
         (c) Fibrous roots
   c. Structure
   d. Use
5. The stem
   a. Functions
   b. Classification
      (1) By direction of growth
      (2) By manner of development
   c. Structure
   d. Use
6. The bud
   a. Structure
   b. Position
   c. Kinds of buds
7. The leaf
   a. Arrangement of leaves
   b. Structure
   c. Functions
8. The flower
   a. Arrangement
   b. Parts or organs
      (1) Calyx
      (2) Corolla
      (3) Stamens
         (a) Filament
         (b) Anther
         (c) Pollen
      (4) Pistils
         (a) Style
         (b) Stigma
         (c) Ovary
   c. Reproduction
      (1) Pollination
         (a) Self-pollination
         (b) Cross-pollination
      (2) Fertilization
      (3) Reproduction by spores
      (4) Other methods
9. The fruit
   a. Definition
   b. Classification
      (1) Fleshy fruits
      (2) Dry fruits
      (3) Aggregate fruits
   c. Dispersal of seeds

III. The struggle for existence
   1. Over-crowding
   2. Change of temperature
   3. Lack of moisture
   4. Adaptation to conditions

IV. Classification of plants
   1. Cryptogams, or spore-plants
      a. Diatoms
      b. Fungi
         (1) Molds
         (2) Mildews
         (3) Smuts
         (4) Rusts
         (5) Yeast
         (6) Mushrooms
      c. Algae, or seaweeds
      d. Lichens
      e. Mosses
      f. Ferns
   2. Phanerogams (seed plants)
      a. Gymnosperms (not having a closed ovary)
      b. Angiosperms (having a closed ovary in which seeds are matured)
         (1) Monocotyledons (having one seed-leaf)
         (2) Dicotyledons (having two seed-leaves)

THE NEW PRACTICAL REFERENCE LIBRARY has a long list of articles on botany. There are discussions of general terms, and hundreds of interesting descriptions of trees, flowers, etc. And the Classified Index affords a method of taking up the study of any phase of the subject which is desired. Under the heading *Botany* are included the general articles; under *Plants* are listed all the plants which are discussed in these books, divided into simple classes.

Botany for Boys and Girls. There are many things about botany which any child can and should learn—things which are as interesting as a story. We have dogs or cats or canaries as pets, and we say that they are interesting because they are alive, they have sense, they do things; but we would never think of saying, "I have a bed of pet pansies," or "I have a lily and a rosebush for pets." And yet, if we study

BOTANY

SCOPE AND HISTORY

1. Modern botany deals with plants, their forms and uses. How they breathe, grow and reproduce. Their distribution, classification, relation and value.
2. Theophrastus, 300 B.C., began to write on botany.
3. No scientific study until Linnaeus fixed his system.
4. Darwinian theories have revolutionized earlier beliefs.

TWO GREAT DIVISIONS

I. Cryptogams—Spore-producing Plants.

1. Myxothallophytes or Slime Molds
- a. A group of plants of very simple structure.
- b. Hardly distinguishable from the lowest order of animals.
- c. They are one-celled masses of protoplasm.
- d. They live upon rotting wood.
- e. At one period of its life the slime mold develops spores. In the process, the form modifies until it closely resembles an amoeba.

2. Thallophytes
- a. Leafless plants of plainly cellular structure.
- b. No distinction between stem and leaf. Many important groups.
- c. Diatom. Singly, invisible to the naked eye. Found in rain troughs, ditches, even in the dust of volcanoes.
- d. Lichens. Of a leaf-like thallus, living on the air, composed of algae and fungi. Grow upon rocks and barren soil. Dyes used in chemistry taken from lichens, and they give rise to plants of a higher order.

3. Bryophytes
- a. Small moss-like plants, living a life of two generations.
- b. In the first it has stem and leaves like a plant.
- c. In the second, a spore-producing capsule attached to the body of the first generation.

4. Pteridophytes
- a. The most highly organized of the cryptogams. Ferns; club moss.
- b. Has true roots, and often well-developed stems and leaves.
- c. Its life covers two generations.

II. Phanerogams—Seed-producing Plants.

1. Gymnosperms
- a. Coniferae, or Pine family.
- b. Called coniferae, or cone-beering, because of their peculiar fruit.
- c. Leaves slender and needle-like.
- d. The pollen, distributed by the wind, composed of minute grains which fly about as yellow dust.
- e. Cypress, fir, hemlock, larch, pine, spruce, yew.

2. Angiosperms

a. Monocotyledons
1. Plants in which the embryo has but one cotyledon. Grasses, palms, lily family, orchids.
2. Leaves usually parallel-veined and entire.
3. Parts of the flowers generally in threes, never in fives.

b. Dicotyledons
1. Plants in which the embryos have two or more cotyledons.
2. This class contains the greater part of the flowering plants.
3. Stems composed of bark, wood and pith.
4. The parts of the flowers usually in fours and fives.
5. Cruciferae, Leguminosae, Compositae, Labiatee, etc.

about them, we find that plants, too, are alive; they do things, and it almost seems to us sometimes that they have sense.

Did you ever stand in a garden and look at a tall, beautiful white lily? It seems strange, as you look at it, that from the black soil at your feet could come the materials to feed anything so pure and white. And now just look down; there beside the lily grows an ugly weed—a cocklebur. It is dusty and brown, with nothing beautiful about it, and everyone calls it a nuisance and wishes it out of the way. Does it not seem wonderful that those two plants can grow there, in exactly the same ground, within a few inches of each other, and each choose from the soil

IS THIS A BEAUTIFUL FLOWER OR A WEED?

just the elements it needs to make it what it is? The lily takes up water and food from the ground and turns it into smooth green leaves and beautiful waxy white petals; the cocklebur takes up water and food and turns it into harsh, rough leaves and troublesome burs. Could anything that is really "alive" do more than that?

Weeds. We ourselves would not have to think twice as to which we would choose to look at, the lily or the cocklebur; but if a botanist came into our garden he might turn from the lily we are so proud of and give his attention to the ugly bur. In fact, botanists are particularly interested in weeds, for one reason. No matter whether we have flowers or vegetables growing in our yards, we have to take care of them; a bed of sweet peas will soon die out if the sun beats too hot upon it; a garden bed of tomatoes will soon wither if it is never watered. But weeds are different; they do not need to be watered or shielded from the sun; the earth does not need to be loosened up about their roots. And it is just this ability to live in spite of everything which makes weeds interesting to botanists. Did you ever stop to think what makes a weed a weed? One of the flowers we like best is the daisy; if we buy it at a florist's we call it a marguerite. In some parts of the United States, and in Canada, there is a weed which the farmers hate, which they call whiteweed; it is almost impossible to get rid of it, and it chokes out other crops if it isn't constantly watched. Our marguerite and the farmers' whiteweed are the same. Any plant may be a weed if it grows where it is not wanted and becomes troublesome to the farmer or gardener.

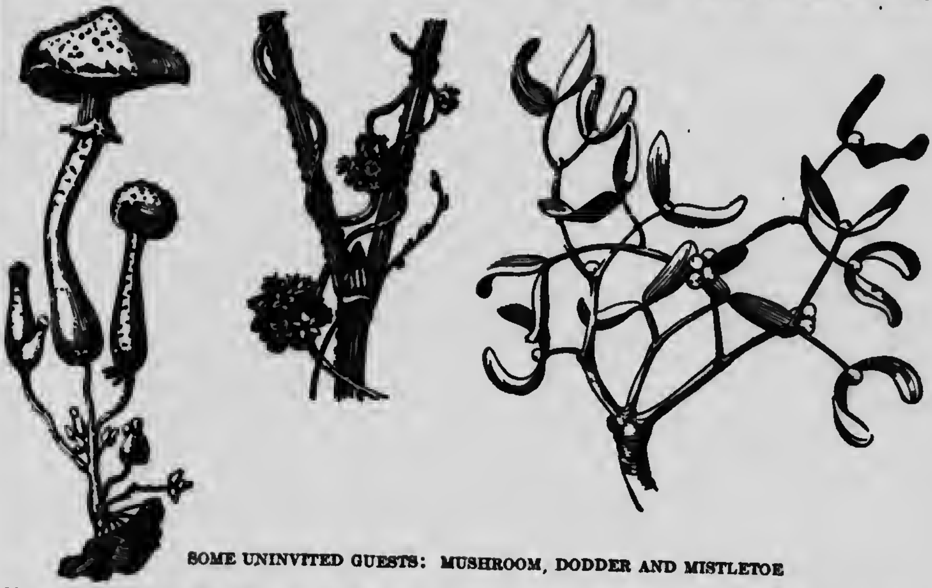
Another strange thing about weeds is that many of them which are now looked upon as the worst pests were brought to this country purposely. The tansy, the field-garlic, the ox-eye daisy, the wild carrot are a few of the weeds which we all know which were, for one reason or another, introduced into this country.

Uninvited Guests. There is a word we use often which comes from an old Greek word that meant "eating at another's table"—it is the word *parasite*. Probably at first the word had no unpleasant meaning, but meant any invited or welcome guest. But gradually it came to mean a man who, uninvited and unwelcome, thrust himself upon his host and stayed and stayed, doing nothing to pay for his keep, but just living off his host. From this the word came to mean anyone who demands and obtains a living from other people without giving anything in exchange for it. You probably think at once of the tramps and able-bodied beggars that you see from time to time, asking for food and money without showing the least willingness to work for it. Now it is not only in the animal world that parasites exist; there are plant parasites—many of them—and they attach themselves to plants which are called their *hosts*, and feed on them. We have all seen such parasites, though probably we have not always recognized them. Have you ever noticed on the top of a jar of preserves or on a crust of bread that has been left in a damp place a furry-looking covering? That is a parasite plant, and it is feeding not on another living plant, but on a plant product. The mildews on leaves and fruits, the wheat rust which so often destroys a wheat crop, the yeast with which your mother makes bread, the mushrooms you eat with your beefsteak, are all parasite plants.

There are others which are more interesting, because they are larger and can be examined more easily. One of these is the dodder. It starts life like any self-supporting plant, with its roots in the ground, but just as soon as it is old enough it begins to send out little stems, reaching for some host on which it can fasten itself. When the stems find such a plant they twine around it and send little roots down into its stem, to draw away the food which the host plant wants for itself. Then the first ground root dies, and the dodder is left, a parasite for the rest of its life, clinging to another plant.

Some parasite plants are not altogether lazy—they take part of their food from the host plant and make the rest for themselves. Such plants have green or greenish leaves, which a real parasite never does. At Christmas time when we trim our houses with the sturdy holly we put with it the mistletoe, which is a half-parasite. It grows on the branches of trees, down in the southern part of the United States; and often, unless the trees are very strong, the mistletoe must be cut off every year, or else it will steal so much of its host's food that the host will die.

Insect-eating Plants. We have talked so far of plants which get their food straight from the soil or from other plants; but there are some strange plants that want another kind of food—animal food. They capture insects, in one way or another, and suck the juice from them. It seems almost uncanny, doesn't it? If you could see a collection of such insect-eating plants you would find that they all have some special means of catching and holding the insects. The pitcher-plant, which you may find in swampy woods, has leaves which are shaped like pitchers, and which usually contain some water. The insects fall into the pitchers, or in some cases enter them in search of the honey which the leaves secrete, and are drowned. They are then partially absorbed by the plant. The sundew has another way of capturing its food. The leaves are covered with hairs, which give out a sticky liquid. When a small insect touches these sticky hairs he is held fast, and the hairs at once close over him. They remain closed until all the plant wants of the insect has been absorbed, and then they open and allow the undigested part of the insect to drop off. The Venus's flytrap has leaves which are hinged in the middle and which have three short hairs on each side of the hinge. When these hairs are touched by an



SOME UNINVITED GUESTS: MUSHROOM, DODDER AND MISTLETOE insect, the two sides of the leaf come together with a snap, and usually the luckless insect is caught. After it has been digested the leaves open and drop out the undigested parts. Do you wonder that we said at the beginning of this talk that some plants seem to have sense?

Plants that Store Food. During the fall the squirrels are very busy running about the woods gathering nuts and carrying them off to some hole in the tree. They gather far more nuts than they can use at the time, and they store them. Plants, of course, go about the matter differently, but they, too, often manufacture more food than they need and store it up. When you eat potatoes or turnips or carrots or onions, you are eating food which the plants manufactured and stored up. In some cases it is not so easy to see why the food was stored; in other cases it is just as simple as the squirrel's reason for storing up the nuts. The beet, the carrot, the parsnip, the turnip are what is known as *biennial* plants, that is, *two-year* plants. This means that if they are planted one spring they

THE PITCHER PLANT AND VENUS'S FLYTRAP
They need insects for food

do not go to seed until a year from the followi fall. The first year these plants store up fo in their roots, and send up above the grou only leaves; the second year they use the fo which they had stored to build a tall ste which bears on its top the flowers and finally t seeds. If you will pull up a carrot that h gone to seed you will find that the root h withered and shriveled—almost all the stored-u food has been used. The onion acts in muc the same way, but in the case of the onion it i a part of the stem, which we call the bulb, in which the food is stored.

Plant Families. Another thing about plants which may seem very strange to us is their family connection. We know that, in the animal world, the cat, the tiger, the panther, the lion all belong to the same family; but there is nothing extraordinary about that. A dog and a wolf look enough alike to be cousins, if not brothers. And so, in the plant world, we should not think it wonderful if we were told that the blackberry and the raspberry belong

SOME PLANTS THAT STORE FOOD
1. Onion. 2. Turnips. 3. Parsnip. 4. Carrots.

to the same family, for, indeed, they do. But many of the plant families are very large, and some of the members do not seem to have the least resemblance to each other. We will look at some of these families, examining all the members that we are acquainted with.

The first is the lily family—botanists call them the *Liliaceae*. The name is familiar; you know a number of beautiful flowers that bear it. But unless your attention has been called to some of the relatives of the lily, you probably have never suspected them of being relatives. First, there are the tulips and the hyacinths, the dog-tooth violets and the trilliums. Did you ever think when you picked the yellow dog-tooth violets, or the white and red trilliums that they were related to the lilies? But there are stranger members than that in this big family. Out in the fields you have touched at times the wild onion or the field garlic, and you

DO YOU SEE MUCH FAMILY RESEMBLANCE?
1 Rose. 2. Apple. 3. Peach. 4 Blackberry. 5. Strawberry.

THE NIGHTSHADE FAMILY
1. Nightshade. 2. Potato. 3. Jimson weed. 4. Sandbur. 5. Tomato. 6. Petunia.

THE BUTTERCUP FAMILY
1. Hepatica. 2. Anemone. 3. Larkspur. 4. Peony. 5. Buttercup.

THE POPPY FAMILY
1. Poppy. 2. Dutchman's breeches. 3. Bloodroot. 4. Bleeding heart.

THE PULSE FAMILY
1. Locust. 2. Acacia. 3. Beans. 4. Peas. 5. Clover.

have wished afterward that you had kept away from them, the scent is so unpleasant. Yet those bad-smelling weeds belong to the same family with the lily-of-the-valley and the hyacinth, some of the sweetest flowers that grow.

There is one member of this wonderful family that comes to our table often, and we are usually very glad when it is time for it to come. It doesn't look like a lily in any way, and yet botanists can prove to us by pointing out resemblances that we cannot see, that it does belong to that family. This is the asparagus. Would you ever have believed, that it was possible?

might think of all the beauty that would go o of the world with the roses, and you would sig But would it occur to you that you could nev again have apple pie or cherry pie; that n quince jelly or plum jelly would ever come t your table again; that no luscious strawberrie or raspberries or blackberries would ever b heaped up before you, waiting for the sugar an cream; that you would have no velvety peache or yellow pears, nor even any almonds to crac of a winter's night? It really doesn't seem possible; but it is a scientific fact that all o those fruits do belong to the wonderful famil

THE HEATH FAMILY
1. Huckleberry. 2. Cranberry. 3. Honeysuckle. 4. Rhododendron. 5. Trailing arbutus.

Some members of this family and also members of the rose family are shown in the color plates in connection with this article.

We have just referred to the rose family. "O yes," you say, "I know that is a big family. There's the moss rose and the tea rose and the American Beauty and the wild rose and the cinnamon rose, and dozens and scores of others." You are right; it is a big family—bigger than you think. If someone were to ask you whether you could get on without the rose family you

that includes the roses and the sweetbrier and the exquisite bridal-wreath. And there are family resemblances which even we who are not botanists can see. Just take a strawberry blossom or a blackberry blossom or an apple blossom and examine it. Doesn't it, after all, look in many ways very much like a wild rose? The petals on the little blossoms are smaller, but they are much the same shape and are placed in much the same way. And it is the wild rose which really represents the roses—all the other

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SOME MEMBERS OF THE ROSE FAMILY

1—Wild Rose. 2—Plum. 3—Peach. 4—Blackberry. 5—Raspberry. 6—Strawberry
7 Cherry. 8 Cultivated Rose. 9—Apple. 10 Pear.

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SOME MEMBERS OF THE LILY FAMILY

[illegible] Lily. 2—Onion. 3—Lily of the Valley. 4—Hya[illegible] 5—[illegible]
6—Asparagus. 7 Trillium. 8—Tulip. 9—Tiger L[illegible]

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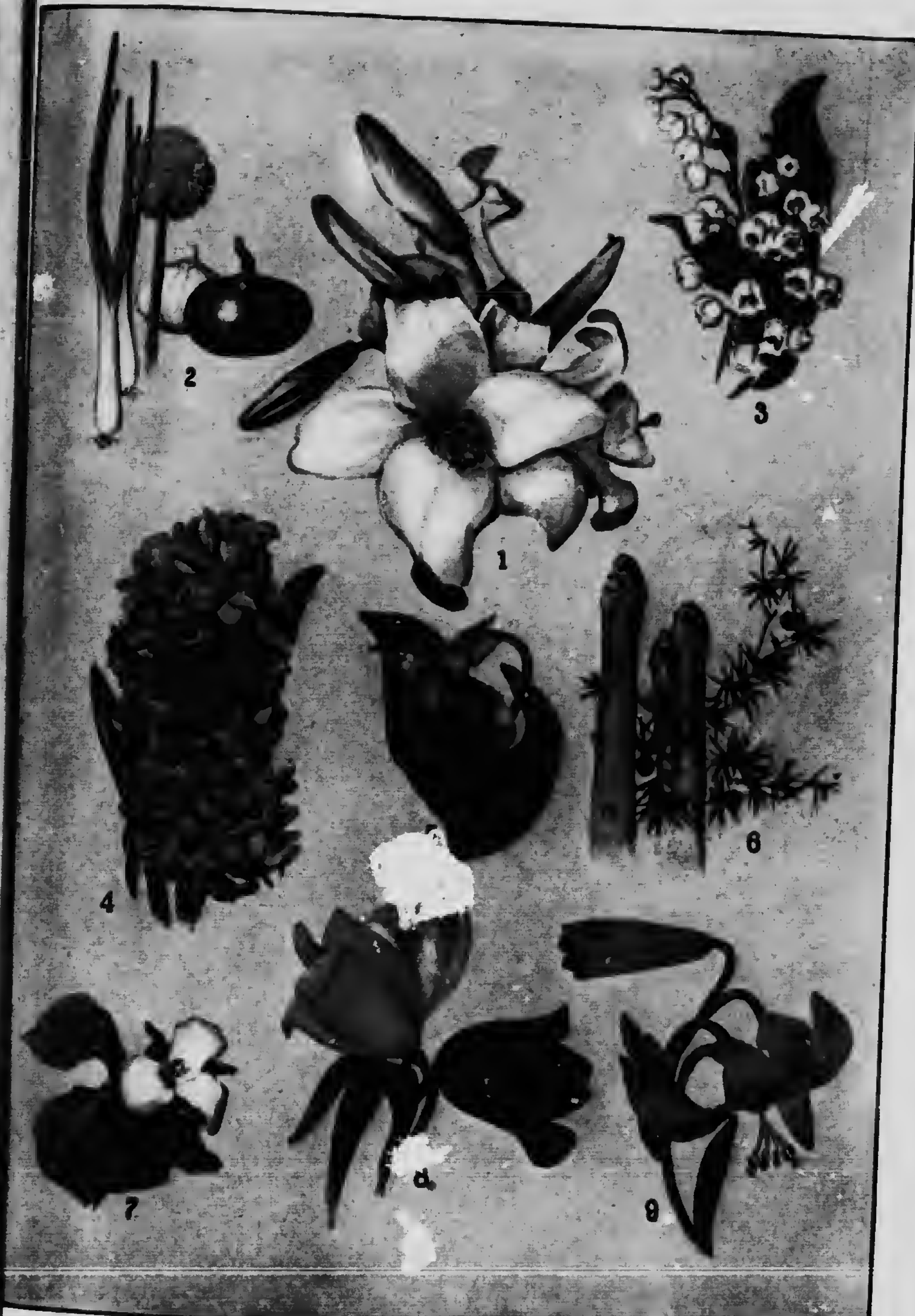
SOME MEMBERS OF THE ROSE FAMILY

1—Wild Rose 2—Plum 3—Peach 4—Blackberry 5—Raspberry 6—Strawberry 7—Cherry 8—Cultivated Rose 9—Apple 10—Pear



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SOME MEMBERS OF THE LILY FAMILY

1—Easter Lily. 2—Onion. 3—Lily of the Valley. 4—Hyacinth. 5—Dog-tooth Violet. 6—Asparagus. 7—Trillium. 8—Tulip. 9—Tiger Lily.

beautiful kinds have come from it. Now would you want to get along without the rose family?

There are other families which seem to us strange; there is the pulse family, which includes the locust, the clover, the acacia, the peas and beans. Look carefully at a red clover blossom; does not one of the tiny flowerets of which it is made up look very much like a sweet pea? If you had before you a yellow buttercup, a blue larkspur, a red peony, a white anemone and a pink hepatica, would you think of them as relatives? They are, and the little buttercup has given its name to the family. The poppy is a big, flaring flower; the bleeding heart is as different from it in shape, size and manner of growth as can well be imagined. And yet these two, with the Dutchman's breeches and the bloodroot, make up a part of the poppy family.

We have found out so many strange things about plant relations that perhaps it will not be surprising to learn that the heath family includes, besides the gorgeous rhododendron and the exquisite trailing arbutus, the honeysuckle, the cranberry and the huckleberry. But even these striking discoveries cannot have prepared us for the fact that the nightshade, the sandbur, the jimson weed, the potato, the petunia and the tomato are all relatives. This nightshade family is surely one of the strangest we have found.

Pictures of the members of all of the families described here are to be found on these pages. In some cases, close examination will show resemblances never noticed before; but in many instances the closest scrutiny will fail to make evident any traces of relationship. Do you think it is at all strange that men studied plants for hundreds and hundreds of years before they even began to be able to classify them correctly?

The Scattering of Seeds. If no seeds ever grew except those that are gathered and carefully planted, only a very small part of the earth would have green things growing upon it. But fortunately for the plants, most of them do not have to depend on people to carry their seeds about. They are provided with all kinds of ingenious apparatus to do the work for them. You all know what a dandelion seed looks like—what a tiny little thing it is. If it had to depend just on itself it would never get far; it would probably just stay on the head of the stalk until that withered, and then it would fall to the ground. But the dandelion seed has wings, white, feathery wings. A puff of wind takes up a number of the seeds with their feather tops and carries them away, sometimes, perhaps, bearing them for miles before it drops them. Did you ever think when you pick a fluffy dandelion that has gone to seed and blow it to "see what time it is" that you are helping the dandelion to scatter its seeds about? The thistle and the milkweed seed have the same kind of little white hairs, which help them to find their way about. The elm and the ash and the maple have winged fruits, but these wings are different. They are made of a sort of membrane which looks more or less like the inside wing of a grasshopper. However, they do just the same duty as the fluffy wings of the milkweed—they help the wind to carry the seed and scatter it everywhere.

You have surely looked often at the little seed-pods of the pansy or the violet. One day they are green and round and all closed up; then later you come and look at them again and find that they have become brownish and brittle and have split open and let the seeds fall out. Or rather, they look as if they had just quietly opened and let the seeds fall out; what they have really done is to burst open and throw the seeds about. That's why the pansy bed, if it isn't tended, becomes so crowded that none of the plants can grow rightly.

If you live out in the country where there are open stretches you have watched dried-up plants, rolled up almost into a ball, blowing about the prairies and piling themselves up by fences. These plants, which have broken off near the ground, are known as tumbleweeds, and they are doing just what the pansy does when its seed-pods shoot open—scattering their seed. The seeds are held rather firmly by the plant, so that they do not all fall out at once, but are strewn over long distances. This is the way the Russian thistle and the pigweed and the ticklegrass spread themselves over so much ground, for those three troublesome plants are all tumbleweeds.

We talked some time ago of the cocklebur. Of course children know what the burs are for—to make bur baskets; but are they of any use to the plant? The seeds are in the burs, and when those troublesome things stick to people or to animals the seeds are scattered. All the other kinds of bur plants, the sand bur, the sticktight, the burdock, have their seeds carried about for them in the same manner.

In these ways and in other ways seeds are scattered; and when you think of the many, many seeds that most plants produce, does it not seem strange that there are any places which are not covered with plants? Let us take a single instance. A morning glory has just about an average number of seeds—three thousand to a single healthy plant. If all of these seeds were planted, and grew, there would be nine million plants the next year. The following year there would be twenty-seven billion plants, and the year after that eighty-one trillion. You can readily see that at this rate it would not take the descendants of a single morning glory very long to cover much of the earth. Indeed, it is a well-known fact that if there were no check to the growing of plants, the whole surface of the land would soon be covered with vegetation denser than that in the thickest tropical jungle—so dense that men and animals could not get through. Why does this not happen?

The Struggle for Existence. Did you ever hear anyone speak of the "struggle for existence"? Perhaps if you did you thought it meant the hard time people have getting enough to live on; but it refers to the animals, and, which interests us more now, to the plants as well. Plants have many things to fight; many things which keep them from becoming as numerous and as thickly spread as they might be. For one thing, the very number of little plants which begin to grow makes it impossible for them all to grow up. If a farmer sows his seed too thickly, none of the plants are as strong as they might be; if a tree drops its seeds under its branches and many, many little plants sprout, only the strongest live; the weaker ones die. So we see that over-crowding is one of the things plants have to fight.

Sometimes the water in a certain place will grow less and less, until it dries up altogether; that means that the plants which need moisture must die When a swamp is drained the swamp vegetation is destroyed. Sudden changes of temperature affect many plants. and millions and millions of little plants are killed off each spring by late frosts.

SEED-SCATTERING DEVICES
1. Tumbleweed. 2. Milkweed. 3. Cocklebur. 4. Winged seeds of maple.

When you watch cattle and sheep grazing in the fields you are watching some of the strongest plant enemies. Of course in most places the vegetation grows again; but many regions have lost all their plant life because sheep have grazed on them so long. Insects, too—the chinch bug, the locust, various kinds of beetles—destroy whole crops every year.

These are some of the enemies and the unfavorable conditions that plants have to meet. Altogether, the things that destroy plants and the things that help them to grow just about balance each other, so that vegetation is not likely to change very much from year to year. Of course man can make it change; he can plant areas that have been barren, and with care can make them flourishing green spots, or he can cut down forests that have stood for centuries.

Have we not found enough interesting facts about plants to show you that there might be much pleasure in studying about them?

Questions

What is the great fact in the life of the flower?

Why is it necessary that birds and insects should be attracted to the flowers? By what means are birds and insects so attracted?

Name and describe a dozen different kinds of flowers of your neighborhood.

What are some of the peculiar shapes of orchids?

Name some members of the lily family.

What is the calyx of a flower?

Why is the corolla usually highly colored?

Where do you find the pollen in the flower and of what use is it?

From what country does the lotus come?

What flower is the emblem of Persia?

What country has the fleur de lis for a national flower?

What is the national emblem of Canada?

What is the national flower of the United States? How and when was it selected?

What flower is the emblem of Japan?

How are the state flowers adopted in the United States?

To what family does clover belong?

What species of the chrysanthemum are common weeds in Britain?

What is the popular name of geranium?

Where has ivy been held sacred?

What kind of plant is the sundew?

Of what was the myrtle an emblem at Athens?

In what way did Darwin's theories and discoveries revolutionize botany?

What is pollen? Why is it produced in such abundance? How do insects help in the fertilization of flowers?

What are some of the methods by which seeds are scattered?

What are parasites in the plant world? Give examples.

Give uses of the following to plant life: Roots, stems, leaves, flowers.

What is chlorophyll? What important work does it do for the plant? What is meant by saying that plants take in carbonic acid gas and give off oxygen?

What is meant by germination? Upon what does it depend?

The Supreme Law. The constitution of any country, whether a definite written instrument or whether founded on tradition and precedents, is the supreme law of that country; that is, it is the country's highest law and every other law must be in harmony with it in all respects. If any law is made in violation of that fundamental law it is of no force whatever, and is null and void. In Canada the Dominion constitution is our supreme law. One of the principal objects of the framers of the constitution was to establish a strong central government. The British North America Act assigns to the different provinces, and to the central government, their powers and spheres of action, but any rights not otherwise specified belong to the general government. This is the opposite plan to that adopted by the framers of the United States constitution, by which all powers not granted to the federal government belong to the sovereign states. It is clear that our Canadian constitution establishes the broad principles that shall underlie all legislative enactments which may at any time be made, though it does not include any laws as such.

Three Departments of Government. No free government can exist if the administration of its powers is not distributed. If one person should assume to make the laws and execute and interpret them, he would become a despot, and his government would be a despotism. If this combination of power should be centered in any number of people the character of the government would not be changed. One or more persons may safely be trusted to make the laws, another man or group of men may be chosen to execute the laws and a third group may be selected to interpret the law; but there would be the gravest danger to our institution if these powers were all in the same hands.

The constitution of Canada was the first attempt to adapt the British principles and methods of government to a federal system. The government, therefore, bears striking resemblances both to the British government and to the government of the United States; it is a safe generalization to say that the national and provincial governments are based on British principles and the local governments on American principles. The chief executive authority is vested in the sovereign, who is represented by the governor-general. The powers of the governor-general are strictly limited, all his executive acts being with the advice of the cabinet. The cabinet, as in Great Britain, is composed of members of Parliament, and holds office as long as it retains the confidence of the people. These officials are responsible to the people for the execution of the law which Parliament places upon the statute books. The third great division of the government is the judiciary, whose duty it is to pass on the constitutionality of laws passed by Parliament and decide many other judicial questions which arise in the government of a great nation.

Executive Department

The Governor-General. The king is the head of the executive department of the government of Canada. He is the sovereign of Canada, just as he is the sovereign of England. As he is unable to be present in person he is represented by a governor-general. This official has double responsibilities, for he is at once the governor of a great nation and the guardian of the imperial interests. As the chief executive of Canada, the governor-general assembles, prorogues (that is, closes the session) and dissolves Parliament, and receives and

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GROUP OF GOVERNORS-GENERAL

sents to the bills in the name of His Majesty. In the discharge of all his executive duties he acts with the advice of the privy council, which in turn has the support of the majority in the House of Commons. On Canadian questions clearly within the jurisdiction of the Dominion he cannot act apart from his advisers, and is bound by their advice. It is always as the "governor-general in council" that he acts, not as the governor-general.

Officially, the governor-general occupies a position of neutrality between opposing political parties. As he can have no possible object in view except to add to his own usefulness and the dignity of his office, he is often in a position to aid the interests of the whole country. He is free to act as the best interests of all concerned seem to dictate. In this respect he enjoys considerable advantage over the president of the United States, who is necessarily a partisan and often driven to partisan measures. The initiative in legislation rests with the ministry, but there are many occasions when the advice and help of the governor-general are invaluable. If we could see into the inner councils of government we should be surprised at the influence a conscientious and able governor can, and does, exercise. In the performance of social duties, which bring him into touch with people of varied opinions, he may exert great influence in lessening the bitterness of public controversy, by allowing men of opposing parties to meet on common ground. In his trips through different parts of the Dominion he may become familiar with all classes and interests; by the information he gains in this way, especially about the resources of the country, he can make himself an important factor in the development of Canada. The high character of the men who have held this office may be seen from the list below:

GOVERNORS-GENERAL

The Right Hon. Viscount Monck, K. C., M. G., 1867-1869.

The Right Hon. Lord Lisgar, G. C. M. G., 1869-1872.

The Right Hon. Earl of Dufferin, K. P., K. C. B., C. C. M. G., 1872-1878.

The Right Hon. Marquis of Lorne (later Duke of Argyll), K. T., G. C. M. G., P. C., 1878-1883.

The Most Hon. Marquis of Lansdowne, G. C. M. G., 1883-1888.

The Right Hon. Lord Stanley, G. C. B. 1888-1893.

The Right Hon. Earl of Aberdeen, K. T., G. C. M. G., 1893-1898.

The Right Hon. Earl of Minto, G. C. M. G., 1898-1904.

The Right Hon. Earl Grey, G. C. M. G., 1904-1911.

H. R. H., Arthur William Patrick Albert, Duke of Connaught, K. G., K. T., K. P., etc., 1911-——.

The Privy Council. The constitution provides that the council, which aids and advises the governor-general, shall be known as the "king's privy council for Canada." As in England, the terms "cabinet," "ministry," "administration" and "government" are popularly applied to those members of the council who are at the head of affairs for the time being. It should be understood that privy councillors, even when no longer ministers, retain honorary rank. When the governor-general appoints his advisers, he first determines who shall be premier; with the premier's assistance the other ministers are then chosen. The number of members of the cabinet varies; there are at present fifteen ministers as heads of departments and three "ministers without portfolio" (that is, without departments) besides the president of the privy council. Ministers in charge of departments receive a salary of $7,000 a year; the president of the council receives $12,000. The permanent head of each department is a deputy-minister, appointed by the Crown and holding office regardless of political affiliations. The duties of each minister may be briefly summarized as follows:

1. The president of the privy council, who has no departmental duties, except such as relate to the work of the council.

2. Minister of justice and attorney-general of Canada, who is the legal adviser of all departments of the government and has supervision of matters affecting the administration of justice.

3. Minister of finance, who prepares the budget and has charge of all matters relating to the finance and expenditures of the Dominion.

4. Minister of trade and commerce, who executes such laws relating to commerce as are not by law assigned to any other department and supervises the census and statistics branch.

5. Minister of agriculture, who besides agriculture has charge of immigration, public health, patents and copyrights.

6. Secretary of state, who has charge of all correspondence between the government and

the provinces and other official matters generally, including printing and stationery.

7. Minister of marine and naval service and fisheries, who has supervision of the fisheries, lighthouse and life-saving service, inspection of steamers and navigation.

8. Minister of militia and defence, who is responsible for all militia affairs, including the military college at Kingston.

9. Minister of the interior, who controls the affairs of the territories, Indians, public lands and geological survey.

10. Postmaster-general, who has complete charge of the postal service.

11. Minister of public works, who has charge of the construction of all public buildings and works, except railways and canals.

12. Minister of railways and canals, who has charge of the Intercolonial Railway and all railroad and canal matters.

13. Minister of customs, who is in charge of the collections of customs.

14. Minister of inland revenue and mines, who has the administration of excise duties, weights and measures, all internal taxes generally and mines.

15. Minister of labor, whose duty it is to investigate labor troubles and industrial affairs.

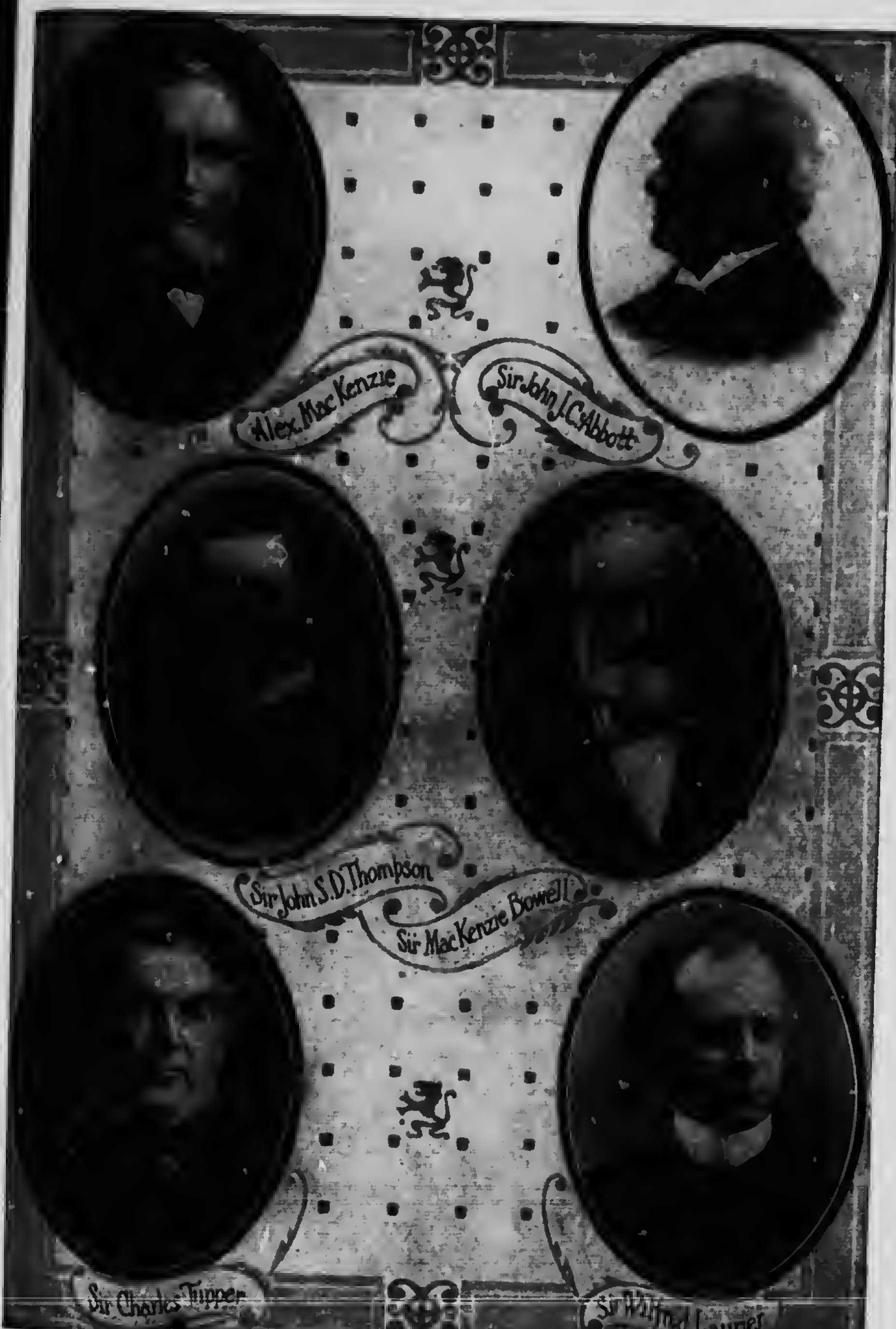
The Premier. As the members of the cabinet only hold office as long as they are supported by a majority in the House of Commons, most of the ministers are members of the lower house, though several are always senators. The ministry, therefore, is practically a committee, made up of members of both Houses. Its head is known as the "premier" or "prime minister," though he is legally known as "president of the privy council." The title "premier" originates from the fact that, as in England, he is the first called on to form a new ministry. As the leader of a political party and as a man of commanding influence and ability, he is chosen to lead the Houses and control the government. It may be safely said, as a rule, that the government's policy is his policy, though each individual minister has the right to communicate directly with the governor-general, on all important public matters. Communication between the cabinet and the governor-general takes place through the premier. If the premier dies or resigns, the cabinet is dissolved, and the ministers hold office only until a new ministry is formed. In case the government, that is, the ministry, is defeated on some important issue in Parliament, the premier must either resign or convince the governor-general that a new general election should be held, on the ground that the vote does not represent the popular sentiment.

Civil Service. That the efficiency of a government depends on the great force of subordinate employees who perform the routine work is a truth which no one will venture to dispute. What would be the condition, let us say, in the postoffice department, with its thousands of workers, if these were discharged after a general election and a new force employed? We can imagine the resulting harm to the service if the decennial census figures were compiled and tabulated by political favorites instead of trained statisticians. Yet the "spoils system" was the rule not only in Canada but in the United States and Great Britain for many years and is still the rule in many less advanced nations. In Canada, as in other countries, the civil service has developed slowly; each step in advance has been possible only as the result of struggle.

What is meant by the civil service? Briefly, the civil service includes the classified employees of the departments. This classification is based on the principle that people of ability and experience should receive the best positions. Mere length of service is not enough to ensure promotion. Competitive examinations are held for practically all positions, and the result of the examinations, together with the character of the applicant, determine appointments.

The civil service of Canada is controlled by a civil service commission, whose office is at Ottawa. This commission, composed of three members and a secretary, is appointed by the governor-general in council. Its duties are to test and pass upon the qualifications of candidates for admission and promotion; the actual work of examination is done by examiners under the control of the commission. The commission's powers also include the right to investigate the operation of the civil service laws, either independently or at the request of the minister or of the governor-general.

The service is divided into two great branches known as the *inside* and the *outside* service. The *inside* service includes the employees of the executive departments at Ottawa, and the employees in a number of offices, such as those of the auditor-general, the governor-general's secretary, etc. The *outside* service includes the rest of the public service, such as the customs' officials, railroad and postoffice employees. Thus



A GROUP OF PREMIERS

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the civil service list includes practically all the employees of the Dominion government except the heads of the departments.

Though the details of the classification and qualifications are too numerous to consider here, one fact of great importance must be noted. Members of the civil service pay five per cent of their salaries into a retirement or pension fund. The governor-general in council grants a pension from this fund to any person "who has served in an established capacity in the civil service for ten years or upwards, and who has attained the age of sixty years or become incapacitated by bodily infirmity from properly performing his duties." After a service of ten years an employee is granted a pension of ten-fiftieths of his average salary for the last three years; for each year of service over ten and up to thirty-five he is entitled to an additional one-fiftieth. If a person dies while in the service, the amount to his credit in the retirement fund is paid to his legal heirs.

Legislative Department

Parliament. The constitution declares that the legislative department shall be called the Parliament of Canada, and that this Parliament shall consist of a Senate and a House of Commons. In this respect the framers of the constitution patterned after the English government, where the law-making department consists of two houses, the House of Lords and the House of Commons. The theory of the bi-cameral (that is, "two chambers" or houses) system is this: if there were only one House it might pass some harmful legislation, either through haste, popular excitement, or under influence of powerful forces; if there were a second House acting with the first, it would be improbable that the same influences should exist in both, and one House would doubtless correct the influence of the other. Then, too, if one House were in some sense higher grade than the other, its restrictive influence would be the greater. This theory is really an outgrowth of the Middle Ages, when the House of Lords and the House of Commons represented the interests of different classes of people.

FIRST PARLIAMENT BUILDINGS, TORONTO, 1796-1813

The Senate. The Senate was originally composed of seventy-two members, twenty-four each from the three great divisions of Canada—the maritime provinces, Ontario and Quebec—with the hope of affording special protection to their representative interests. Since 1867 the entrance of other provinces has made necessary readjustments of the number from each division, so that the total membership is now eighty-seven. The senators are appointed by the governor-general, with the advice and recommendation of the privy council (the official title of the cabinet). Thus it happens, as in Great Britain, that the political party in control nominates the members of the Upper House. The fact that they are independent of the vote of the people at large is supposed to render them free from local influence. A senator must be thirty years of age, and have real and personal property worth $4,000 above his liabilities in the province for which he is appointed. The appointment is for life. In legislation the Senate has the same powers as the House of Commons, except in regard to bills imposing taxes or appropriating money (see page 214, for table of complete powers). Financial measures must originate in the lower House, and the Senate cannot amend them.

House of Commons. The real political power rests in the House of Commons, elected by manhood suffrage. No ministry can remain in office without its support and confidence. The British North America Act provides that the province of Quebec must have a fixed representation of sixty-five members, and each of the other provinces has a number bearing the same proportion to its population as sixty-five is to the population of Quebec The population of Quebec in 1911 was 2,002,712; by dividing this total by sixty-five, we find that the province has one representative for 30,780 inhabitants. The population of any province divided by 30,780 gives the number of its representatives in the lower House. The basis of representation is changed after each decennial census.

No property qualification is required for membership. A member must be a British subject by birth or naturalization, but he need not reside in the district for which he is elected. This provision is like that of the constitution of England and differs from that of the United States, where members of the House of Representatives must reside in the states from which they are elected. All members of Parliament receive an allowance of $2,500 if the session exceeds thirty days in length and an additional ten cents per mile for travelling expenses. The recognized leader of the opposition in the House of Commons, in addition to his sessional allowance, receives a salary of $7,000 a year.

Officers of Parliament. Each House of Parliament must have an officer to preside over its deliberations; this officer is the *speaker*. The term "speaker" comes directly to us from the English system of government, and the name of this officer could not be changed, except by amendment of the Constitution. The speaker of the Senate is appointed by the governor-general; the speaker of the House of Commons is elected by the members; he is assisted by the deputy-speaker, also elected, who presides in the absence of the speaker or in case of a vacancy. In each House there is a clerk or chief officer (appointed by the governor-general in council) under whose direction a large number of clerks write the journals, attend committees, translate the public documents, etc. All debates are reported by an official body of reporters. French or English may be used in addressing either House, and both must be used in all the laws and records. The sergeant-at-arms has charge of the messengers and pages, and looks after the furniture of the House and offices. The Senate also has a "gentleman usher of the black rod", who summons the Commons to meet the governor-general in the senate chamber at the beginning or end of the session.

Electoral Districts. In order that the Members of the House of Commons chosen from any one province may represent every part of the province, the provinces have been divided into electoral districts as nearly equal in population as possible. If the census shows that Alberta may send twelve representatives, the province is divided into twelve districts or "constituencies", each of which is entitled to one representative. It is not necessary by law that a man so chosen be a resident of the district, but in practice the voters prefer a man who resides in the district to a man who lives several hundred miles away and knows nothing of local conditions.

How Elections Are Held. General elections are held on the same day throughout the Dominion, except in several large and remote districts, such as Yale and Cariboo in British Columbia, where the returning officers fix the day so that all voters may have a reasonable chance to vote. When a general election has been decided on at a cabinet meeting, the premier so advises the governor-general and Parliament is then *dissolved* by a proclamation in the name of the king, who alone has the power to summon, prorogue or dissolve it. A second proclamation authorizes the writs of election or order to each district officer, announcing the date for nomination of candidates. As a general rule the election takes place on the seventh day after nomination. If the party in control is returned to power, no changes are necessary in the officers of Parliament, in the cabinet or in the character of legislation. If the opposition wins at the elec-

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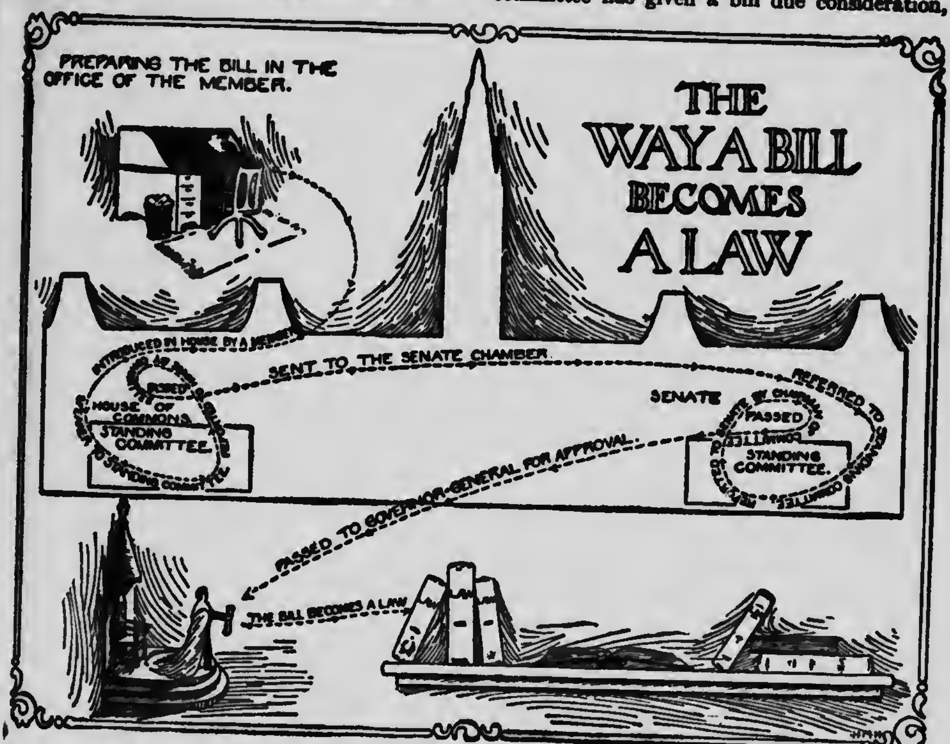
PARLIAMENT HOUSE, OTTAWA

tion the system of a responsible ministry necessitates the resignation of the existing cabinet and the formation of a new cabinet by the victors. General elections must be held at least once in five years, but they may be held oftener at the discretion of the governor-general in council. A by-election is one in which a seat, which has become vacant for some reason, must be filled. A by-election may be important as registering changes in popular opinion or as forecasting the result of the next general election; ordinarily, however, it is only of local interest.

How a Bill Becomes a Law. A formal statement of a proposed law or act is called a "bill", and under this name is introduced into the Senate or House of Commons. Bills may originate in either House, except that financial measures of every kind must come from the House of Commons and the Senate cannot amend them. To become a law a bill must pass both Houses of Parliament and be approved by the governor-general as the representative of the king. The voting is by yeas and nays, those in favor saying yea, those opposed, nay. If the vote is close, a roll-call or *division* is taken. After being passed by Parliament and approved by the governor-general the bill is called an act.



Committees of Parliament. A great many thousand bills are introduced into Parliament at each session and it is manifestly impossible for the Houses in open session to give consideration to even a very small portion of them. Standing committees are therefore named in each House whose duty it is to give particular consideration to such proposed legislation as shall be referred to them. For instance, a bill proposing that certain changes be made in the banking laws would be sent in each House to the committee on banking. After a committee has given a bill due consideration, it reports to the House in regular session the result of its deliberations and either suggests that the House pass the bill, or that it be not passed. The recommendation of a committee is usually accepted, although this is not the invariable rule.

In addition to the standing committees, select or special committees are appointed to consider private bills and such bills as do not fall within the province of the standing committees. All bills must be read three times in each House, as well as considered in the committee of the whole. After a bill has passed one House and goes into the other, the second House may amend it should it so desire (except that the Senate may not amend financial bills); in this case the bill must be returned in its amended form to the House in which it originated. Each House must agree to amendments proposed by the other House. If the two Houses cannot agree as to the final form of a bill, the bill is dropped for the session.

The Budget. The most important power of the House of Commons is the control of financial affairs. The committee of supply, at the beginning of the session, brings a message from the governor-general with the estimates of the sums required for the government for the next financial year, from the 1st of July to the next 30th of June. These estimates contain the expenditures for the current and the previous year in parallel columns and it is the duty of the minister responsible for expenditures for his department to give full explanations if they are demanded in the House. When the estimates have been formally laid before the House it is the duty of the minister of finance to make his financial statement, that is to present the *budget*. This familiar word is an old French word for "bag"; in making his statement the minister opens the money bag, shows how it should be filled and what should be done with the contents. The debate that follows the delivery of the minister's speech is sure to be one of the most important of the session. The committee of supply continues to recommend expenditures; when these have all been adopted by the House, the committee of ways and means reports a supply or appropriation bill which is a formal ratification of the work of the committees and shows how the money for the appropriations shall be raised and spent.

Powers of Parliament and of the Provinces. The constitution definitely prescribes what powers are granted to the provincial governments. It also enumerates some of the more important powers of the Dominion Parliament as well as those powers that are prohibited or in whose use Parliament is restricted.

The following outline explains the three divisions:

1. Powers of the Provinces
   - (1) The amendment, from time to time, notwithstanding anything in the British North America Act, of the constitution of the province, except as regards the office of lieutenant-governor
   - (2) Direct taxation within the provinces to raise revenue for provincial purposes
   - (3) Borrowing of money on the credit of the province
   - (4) The establishment of provincial offices and the appointment and payment of provincial officers
   - (5) The establishment and maintenance of reform and penal institutions, as well as hospitals, asylums and charitable institutions
   - (6) Control of their municipal institutions
   - (7) Shop, saloon, auctioneer and other licenses controlled by each province
   - (8) Control of public works, except such as are inter-provincial in character
   - (9) Guarantee of property and civil rights in the provinces
   - (10) Administration of justice
   - (11) Authority over matters of a merely local or private nature
   - (12) Education, except that no laws shall "prejudicially affect any of the denominational schools in existence before July, 1867"
2. Powers of Parliament Extend to
   - (1) Public debt and property
   - (2) Regulation of trade and commerce
   - (3) Raising of money by any system of taxation
   - (4) Postal service
   - (5) Census and statistics
   - (6) Military and naval service and defence
   - (7) Navigation and shipping
   - (8) Sea-coast and inland fisheries
   - (9) Currency, coinage and banking
   - (10) Weights and measures
   - (11) Patents and copyrights
   - (12) Bankruptcy and insolvency
   - (13) Indians and Indian lands
   - (14) Marriage and divorce
   - (15) Criminal law and penitentiaries
   - (16) Interprovincial matters
   - (17) Powers not expressly granted to the provinces
3. Powers Prohibited or Restricted
   - (1) Appropriation of money or taxation except on the recommendation of the governor-general
   - (2) Treaties with foreign nations

Judicial Department

Every power, executive, legislative, or judicial, exercised by the Dominion or provincial governments, is subject to the constitution. As with all statutes or laws, the meaning of this constitution must be interpreted by judges who are authorized to do so. The judiciary is thus the third great department of the government. The judges of the provincial courts, from the highest to the lowest, can and do decide on constitutional questions that arise under the laws governing their respective provinces. The judges of the provinces are appointed and paid by the Dominion government, but the organization and maintenance of their courts are in the power of the provincial governments. It is worthy of notice that the British North America Act made no specific provisions for a federal court. It provided for the appointment of the judges of the provincial courts by the governor-general, but in regard to federal courts it merely said that "the Parliament of Canada may, notwithstanding anything in this Act, from time to time provide for the constitution, maintenance and organization of a general court of appeal for Canada, and for the establishment of any additional courts for the better administration of the laws of Canada." The problem of creating a Supreme Court for Canada was an important one for the first premier, Sir John Macdonald, but it was not until 1876, in the premiership of Alexander Mackenzie, that the court was finally established. Since that time two other federal courts, the *exchequer court* of the Dominion and the *admiralty court*, have been established. The admiralty court is, properly speaking, a division of the exchequer court which has jurisdiction over all matters pertaining to navigation and shipping.

Supreme Court. The Supreme Court is composed of a chief justice and five puisne (or associate) judges. It is the highest court of appeal and has appellate, civil and criminal jurisdiction throughout the Dominion of Canada. The judges reside at Ottawa, where the Supreme Court holds three sessions each year—the first beginning on the third Tuesday in February, the second on the first Tuesday in May, and the third on the first Tuesday in October. In unusual cases, where the question at issue is of exceedingly great importance, appeal may be allowed from the decision of the Dominion Supreme Court to the privy council in England, but the court is intended to be, as far as possible, the court for the final settlement of controversies arising from the operation of the constitutional system of the country. By an act passed in 1891, the governor-general has authority to refer to the Supreme Court important questions relating to provincial legislation, education or any problems of general public interest.

Exchequer Court. The exchequer court originally formed part of the Supreme Court, but in 1887 the two courts were separated. The name "exchequer court" carries us back to early English times. The king's treasury was in charge of a treasurer or "hoarder"; as the revenues increased in amount and as disputes arose in connection with their management, it became necessary to divide the duties into an administrative and judicial department. When the English courts were formed, questions affecting the revenue were referred to the court called the *exchequer*, which derived its name, so we are told, from a chequered cloth which covered the table. The duties of the court grew in importance and were gradually extended to all suits in which the Crown was interested.

The exchequer court of the Dominion is presided over by one judge and has original jurisdiction in "all claims, suits or actions against the Crown." It also has jurisdiction in revenue cases and the enforcement of penalties, copyright, trade mark, and patent cases, and hears claims against the government when any person suffers injuries from or in the construction or operation of a public work. It hears all actions in which the Crown takes part in cases of receiver for or sale of insolvent railways, and in time of war it is also a prize court.

Admiralty Court. The exchequer court has the powers of an admiralty court, but with the development of commerce and the consequent increase in the number of questions for decision, it became necessary to establish separate courts to hear this class of cases. The court has jurisdiction in all civil cases in any way relating to navigation, shipping, trade and commerce in Canadian waters, tidal or non-tidal. The governor-general may appoint a judge of a superior court, or of a county, or any barrister of not less than seven years' standing, to act as "local judge in admiralty." Admiralty business may be transacted either at the exchequer court in Ottawa, or in the district courts. At present there are seven admiralty districts, each presided over by a local judge in admiralty:

(1) Ontario, under the name of Toronto admiralty district, with offices in Toronto.
(2) Quebec, with offices at the city of Quebec.
(3) Nova Scotia with offices at Halifax.
(4) New Brunswick, with offices at St. John.
(5) Prince Edward Island, with offices at Charlottetown.
(6) British Columbia, with offices at Victoria.
(7) Yukon Territory, with offices at Dawson.

Local Government

Correlated with Geography. In our discussion of geography, presented later in this volume, the fact is apparent that a great deal of government and geography may profitably be studied together. For example, it is clear that the governmental boundary between British Columbia and Alberta is also a geographical boundary. In studying the township, the village, the city and province, it is possible to unite geography and government to a considerable extent, and the reader is particularly urged to read pages 284 to 288 before continuing the topic of local government. The student, teacher or parent who will do this is better prepared to understand what follows.

Governmental Divisions. If Canada were very small it would be possible for all the people to meet together in one place to make their laws. We would then live under a pure democracy. The vast area of this country makes such a system impossible; indeed, so diversified are our interests and so great our domain, that we cannot be governed entirely from one central point, to say nothing of one central meeting place for the people as a whole to frame their laws. The framers of the constitution realized, however, that the nation could not survive if the provinces, which had hitherto been self-governing, retained all their powers; therefore they were granted only such powers as were necessary for the proper maintenance of local government; all other powers, national and international, belong to the general government (see page 214).

While there are many differences in the details of the machinery, all the local governments of the provinces have some characteristics in common. The province finds it impossible to exercise perfect control without still further sub-divisions. The divisions common to all provinces are county, township, city, town and village. In Quebec and New Brunswick the largest division of the county is called the parish, instead of township; as the name indicates, this was originally an ecclesiastical or church district. Prince Edward Island is the only province which has no local divisions; most of the local business is transacted by the assembly, but Charlottetown and Summerside are now incorporated as separate governing bodies.

The school district is the unit of government, and a true democracy. The local school board may do absolutely what it pleases in school matters, so long as the laws of the province relating to education are not violated. If the province declares that the teachers must hold licenses to teach and that each district must have at least six months' school per year, the regulations must be observed under penalty of losing the funds distributed by the province for education in each district. In some cases the township is the public school district; counties and cities are high school districts.

The township is independent of the province and even of the county, in everything local, such as the election of its officers, the building and maintenance of its roads, plans for drainage, etc. These affairs concern only the people of the township and it is natural that the higher political units should give the township free control of its affairs within the limits laid down by law.

The county governs itself without reference to higher authority, except that here again there can be no violation of general principles insisted on by the provincial constitution and statutes. The province does not care whether the county courthouse is in a Gothic or Romanesque style of architecture; it is none of its concern what people are elected to county offices. Such matters are the business of the people in each county. The county may incur debts at the pleasure of its citizens, though the province may declare what the maximum indebtedness may be.

County and Local Government. In *Ontario* the county councils are composed of councillors elected by "county council divisions," the number of which depends on the population of the county. The assembly has provided for the election of a mayor and three aldermen for each ward in cities. Any community with a population over 10,000 may become an incorporated city. Every town has a mayor and three councillors for each ward when there are less than five wards, or two councillors when there are more than five. A township or a village has a reeve and four councillors. All officers are elected by general vote except in cities and townships divided into wards; then election is by wards. Widows and unmarried women who are rated as taxpayers can vote.

In *Quebec* the county councils are composed of the mayors of the "local municipalities"—that is, the parishes, towns and villages, each of which is governed by seven councillors who elect the mayor from their own number. As in Ontario, cities have special acts of incorporation.

In *New Brunswick* the county councils consist of two councillors from each parish and of a warden chosen annually by the council. Cities are specially incorporated and elect their own mayor and aldermen.

In *Nova Scotia* the councils are elected by the taxpayers, one councillor for each district; a few districts, enumerated in the law, have two councillors. Town councils are composed of a mayor and not less than six councillors. All the towns are now subject to a general act passed by the provincial legislature.

In *Manitoba* the city and town councils consist of a mayor and two aldermen or councillors for each ward; the village council is composed of a mayor and four councillors. In a rural district the chief executive is the reeve.

In *Saskatchewan* there is a provincial department of municipal affairs. The minister or commissioner has general superintendence in county and local matters. In cities the councils consist of a mayor, elected annually, and from six to twenty aldermen; in towns, they consist of a mayor and six councillors, three elected each year; in villages the governing body is composed of three councillors. In rural municipalities the council consists of a mayor and one councillor for each division (the rural municipality comprises 324 square miles) in six equal divisions.

In *Alberta* the provincial minister of public works has supervision of municipal affairs. Rural municipalities and towns are governed under the Consolidated Ordinances of the Northwest Territories of 1905, which provide a council of a reeve and four councillors for the rural districts, and a mayor and six councillors for the towns. Cities are governed under special charters.

In *British Columbia* townships and rural districts are governed by a reeve and a council of four to seven members. Councils of cities established since 1892 consist of a mayor and five to nine aldermen. Nanaimo, New Westminster, Victoria and Vancouver are governed under special statutes. Mayors and reeves are elected annually by general vote, aldermen and councillors by wards where such exist, otherwise also by general vote.

Provincial Government

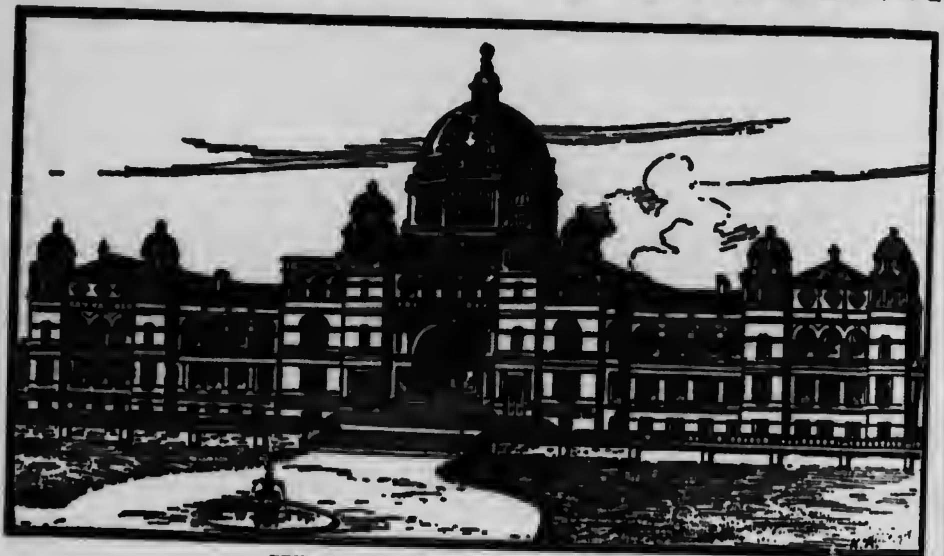
The provincial government is modelled very closely after the general character of the Dominion government. The constitution of the province is practically the constitution of the Dominion, for the latter expressly dictates what matters may be dealt with by the provincial governments. Within these limits it is free to act as it pleases. The provincial government, like the Dominion of Canada, has three great departments, the executive, the legislative and the judicial.

Lieutenant-Governor. The chief executive is the lieutenant-governor, appointed by the governor-general in council. He ordinarily holds office for five years, but he may be dismissed by the governor-general for "cause assigned," which, in accordance with the constitution, must be communicated to Parliament. He is, therefore an officer of the Dominion, as well as of the province. His position in the province corresponds almost exactly to that of the governor-general in the Dominion. He appoints his executive council, and is guided by their advice so long as they retain the majority and confidence of the assembly. He can summon, prorogue, and dissolve the assembly, make appointments to office, and perform all executive acts, with the advice of the council, which are necessary for the government of the province.

Executive Council. The executive council is the name given to the body of men composing the administration of each province. The number and titles of ministers varies; broadly speaking, they correspond to the departments of the Dominion government. Each province has an attorney-general, who supervises the administration of justice and is the legal adviser of the government. Nova Scotia, whose agricultural interests are small, has no minister of agriculture, whereas Saskatchewan, whose mining interests are as yet not developed, needs no minister of mines. There is generally a treasurer or minister of finance, and there are officials at the head of the different departments of public works, crown lands, education, etc. All the members of the council who are departmental officers must vacate their seats if the assembly votes against them. All the conventions, furthermore, which govern the relations of the governor-general and his ministers apply with equal force to the relations between a lieutenant-governor and his councillors.

Legislative Assembly. In all the provinces, except Quebec and Nova Scotia, the legislature is composed of one House, the legislative assembly. In Nova Scotia and Quebec, there is also an upper House, known as the legislative council, whose members are appointed by the lieutenant-governor. They may retain their positions for life, unless they become bankrupt, are convicted of crime, or otherwise disqualified by law. The council of Quebec consists of twenty-four members and that of Nova Scotia of seventeen members; one of the members is chosen speaker by the lieutenant-governor. In Prince Edward Island the assembly is a combination of the former legislative council and of the assembly; since 1893, when the union took place, each district elects one member with a real estate qualification ($3,250) and one member on the general franchise.

The legislative assemblies are elected by manhood suffrage, except in Nova Scotia and Quebec, where a small property qualification is necessary. The method of election corresponds to that for Parliament: the lieutenant-governor, by the advice of his council, issues a proclamation dissolving the old legislature and appointing the day for the return of the writs; he also calls the new legislature together. The members receive a sessional allowance of $200 in Prince Edward Island, $500 in New Brunswick, $700 in Nova Scotia, $1,000 in Manitoba and Alberta, $1,200 and extra mileage in British Columbia, $1,400 in Ontario, and $1,500 in Saskatchewan. The legislatures have a duration of four years (five in Quebec and Nova Scotia) unless dissolved by the lieutenant-governor, and they must meet each year. Provincial legislation in every way more closely affects the daily life and interests of the province than the more general and national legislation of the Dominion. A consideration of the subjects of provincial legislation (see page 214) will show how large a measure of local self-government is given to all the provinces in the Confederation.



BRITISH COLUMBIA LEGISLATIVE BUILDINGS

Provincial Courts. As the constitution gives to the provinces exclusive control over all matters affecting property and civil rights, the provincial courts have to deal with subjects that affect intimately all classes of persons. On the other hand, the Dominion Parliament alone makes laws relating to crime and criminals, but the trial of offenders must take place in the courts of the province, which have the right to administer justice. In other words, the provincial courts have absolute powers in all civil and criminal actions at law, but the Dominion Government determines the course of procedure in criminal cases. This division was due to the fact that in the province of Quebec the code of French civil law prevailed, whereas in the other provinces the civil law was based on English procedure. The criminal law of England has prevailed in all the provinces since 1763, but the civil code has always been different. This difference made it necessary to allow the provinces complete control of civil law.

The provincial courts are of various kinds and differ in each province. It is impossible to give a complete list of all of the courts, but a short summary of the classes into which they may be divided will be of equal, if not of greater value, as showing the principles on which all the systems are based:

1. Inferior courts of civil jurisdiction, for the recovery of debts and the settlement of civil actions where small sums of money are at issue.

2. Inferior courts of criminal jurisdiction, for petty offences and for preliminary examination in cases of serious crime.

3. Superior courts, for the trial of civil and criminal cases before a judge and jury in each judicial district.

4. Special courts for the dissolution of marriage, proving of wills, trial of disputed elections, etc.

5. Supreme Court, a court of appeal, for each province.

General Summary. A comprehensive survey of our system of government shows us that Canada exists as a great federation of nine provinces, each of which is practically independent of higher authority in the conduct of its own internal affairs. In this respect it resembles the United States and the Commonwealth of Australia, in both of which smaller units have retained their identity, and differs from the Union of South Africa, in which all the colonies were merged into one. Each of these nine provinces, practically independent, grants a large measure of local and independent self-government upon smaller divisions of territory called counties, townships, cities, towns and villages. The spirit of the government is local control, with such limitations as are necessary to the well-being and protection of every citizen.

Territorial Government

Northwest Territories. The Northwest Territories now comprise all the land north of the 60th parallel, except the Yukon and a small part of Quebec. Since the establishment of the provinces of Alberta and Saskatchewan in 1905, the territories have been governed by a commissioner as executive officer, acting under instructions from the governor-general in council or the minister of the interior at Ottawa. A council of four may pass ordinances which have the same force as those of the former assembly. These ordinances may be disallowed or declared void by the Dominion government within two years.

The judges or magistrates are appointed by the governor-general, and have all the powers formerly vested in the supreme court of the Territories. In case of a death sentence, however, the magistrate must forward to the minister of justice at Ottawa full notes of the evidence, together with his report on the case, and execution must be delayed until a reply is received. In general the commissioner may use his discretion whenever the laws fail to provide for emergencies. No established system of schools exists in the territories. Whenever a mission is started by members of any denomination, the government of Canada will usually grant a small sum to assist in the work. The Royal Northwest Mounted Police have jurisdiction over the whole of the Northwest Territories.

The Yukon. Before the discovery of gold in the Yukon, the territory was inhabited only by a few Indians, but the sensational finds in the Klondike brought great crowds of settlers into the region. Parliament then organized a government to meet the requirements of the population. The territory is now governed by a commissioner, appointed by the governor-general in council, and a territorial council of ten members. Any voter may be a councillor, but the qualifications of voters are determined by the commissioner and his council. To be eligible to vote a man must be over twenty-one years of age and must have resided in the district for at least twelve months previous to the election.

This government has extensive powers, always subject to the approval of the national government. It may impose taxes, pass ordinances regarding jury trial of civil and criminal cases, establish jails, and make any other laws necessary for the administration of justice. It may also legislate regarding education and the organization of municipalities. Any ordinance of this council may be disallowed or vetoed by the governor-general in council within two years after its passage.

The highest court in the Yukon is the territorial court, composed of three judges, who are appointed like all superior court judges. Besides this court there are also police magistrates, magistrates and justices of the peace, and the territory is also an admiralty district. The superior court has practically unlimited jurisdiction in all civil and criminal cases. In criminal cases there is no grand jury, but the accused is entitled to jury trial, though he may choose to be tried without a jury. The magistrates of various classes have only limited jurisdiction in criminal and civil cases. In all matters an appeal may be taken from the territorial court to the Supreme Court of Canada, and in capital cases the sentence must be approved by the governor-general.

The council of the territory, together with two citizens having no other official positions, form the council of public instruction. It possesses the usual powers of such a council in the provinces. The Yukon is divided into districts for school purposes, each district electing its own trustees. The minority of the taxpayers in any district, whether Protestant or Catholic, may petition and obtain a separate school district.

Royal Northwest Mounted Police

Formation. After the Dominion Government, in 1869, had purchased the territorial rights of the Hudson's Bay Company, it found itself face to face with the problem of governing a new country extending nine hundred miles from east to west and somewhat more from north to south. The Red River rebellion and other disturbances in the west showed the need of some control over the section if it was ever to be open to permanent settlement. To Sir John Macdonald belongs much of the credit for the idea and for the ultimate success of the plan. The first steps towards organization were taken in the autumn of 1873 and by October about 150 mounted policemen had been sent to the temporary headquarters at Lower Fort Garry, in Manitoba. The Act of Parliament which established the force provided that all the police were to be mounted and efficiently equipped, but without any finery. "As little gold lace and fuss and feathers as possible" was the motto of Sir John Macdonald. No person was to be appointed to the force "unless he be of sound constitution, able to ride, active and able-bodied, of good character, and between the ages of eighteen and forty years; nor unless he be able to read and write the English or French language." The Northwest Mounted Police was to be a civil force, though drilled in military organization.

From the very beginning it has attracted a high grade of men. One of the sons of Charles Dickens served for many years. University graduates and noblemen have served in the ranks with the humblest. Another important characteristic of the men of the force is that they think for themselves. In the course of a patrol a sergeant may find himself called on to act in almost any capacity. He must be a man capable of meeting emergencies as they arise. Consequently the Northwest Mounted Police has always been a self-reliant body of men, yet a body well-disciplined and ready to obey commands.

It was on the 6th of June, 1874, that the three divisions of the newly formed police left Toronto by train for the west, by way of Chicago, St. Paul and Fargo. From Fargo the expedition started on horse-back. The hardships of this overland march are history. How the police established their posts, how they broke up the illegal trade in whiskey and stolen horses, how they won the confidence of the Indians, how they really made possible the great development of the territories—these should be familiar stories to every schoolchild.

Duties. There is hardly a department of Canadian government that is not assisted by these hardy troopers. They act as customs officials along the border. They carry the mails to distant mining camps, they report on the roads, bridges, crops and weather, and they take the census. They help travellers, and they are frequently called on to care for the sick. In the winter of 1904 word came to the police at Fort Chipewyan that a missionary had become insane at Peace Station. Constable Pedley was sent to take him for medical treatment to the nearest settlement. In the dead of winter, with the temperature often 50 degrees below zero, the constable took the madman to Fort Saskatchewan, a distance of 500 miles by trail. Twice the madman broke his bonds and tried to escape. Shortly after the first attempt the pair were held prisoners by a terrible snowstorm for two days and nights. For protection Pedley lashed the madman and himself to a tree, after he had entrenched the dogs in the snow. When the missionary was examined at Fort Saskatchewan it was found that his feet were badly frozen and his tongue paralyzed by cold. After two months of careful nursing he was discharged completely cured in mind and body. Alone on the return trip Pedley himself broke down and had to be sent to an asylum for several months. After a short leave of absence he returned to Regina and continued to serve. Of course, this was an unusually terrible experience, but it is typical of the attitude of both officers and men toward their work. The motto of the force might almost be, "Be a hero, but don't tell anybody about it."

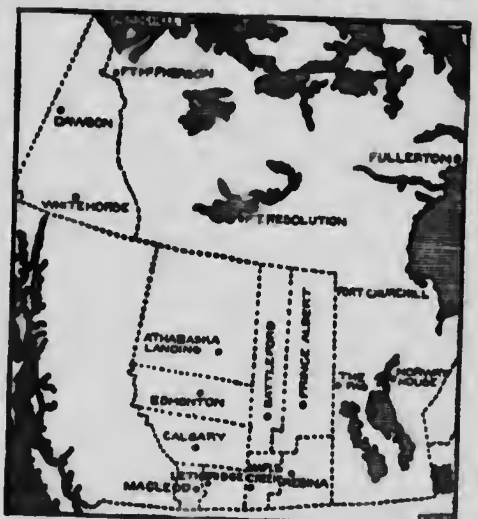
Probably the most important duty of the police is to enforce law and order. In many of the remote districts they not only preserve the law, but make it and interpret it. The officers make regular trips throughout their districts to hold court. In tracking down criminals these men have many difficulties. It might seem that in the north, especially in winter, it would be almost impossible to detect a crime and punish the criminal. The records of the police prove the contrary. No detective force in the world can show a better record. No matter how small the crime, "Get the man." The murderer and the meek thief are both criminals; though their punishment is different, both must be punished. Time and distance are no object. This attitude, absolute justice to every man, has earned for the mounted police the fear of all evil-doers and the respect and admiration of all good citizens.

Present Organization. At the present time, forty years since its formation, the Royal Northwest Mounted Police is 626 strong—50 officers and 576 non-commissioned officers and constables. They are distributed over Alberta, Saskatchewan, the Yukon and the Northwest Territories, an area of more than 2,500,000 square miles. The remotest detachments are those on Herschell Island, on the shores of the Artic Ocean, 2,500 miles from headquarters, and at Fullerton, on the northwest corner of Hudson's Bay.

The inadequacy of such a small force only increases one's admiration for the manner in which it faces and completes the many tasks thrust upon it. The table below shows the present distribution of the force:

	Officers	Non-Commissioned Officers	Constables	Totals
Alberta	19	68	189	276
Saskatchewan	26	75	181	282
Northwest Territories	2	9	16	27
Yukon Territory	3	12	26	41
Totals	50	164	412	626

The force is divided into eleven main districts, each of which is commanded by a superintendent, who has under him a number of inspectors and other officers stationed at important points.



ROYAL NORTHWEST MOUNTED POLICE DISTRICTS

Surgeons, assistant-surgeons and veterinary surgeons are commissioned officers. The non-commissioned officers, as in the militia and in the British army, are staff-sergeants of various kinds, sergeants and corporals. The troopers are called constables. Each of the central posts maintains communication with the smaller posts and detachments, and is responsible for their control to headquarters at Regina. Regina is the residence of the commissioner and assistant commissioner, the executive officers of the force. The permanent official head is the comptroller, who resides at Ottawa. The Royal Northwest Mounted Police is still a branch of the civil government of the Dominion, under the direct control of the premier and president of the privy council.

Along with the numerous other duties, the police regularly patrol all districts where there are settlers. All over the prairies, at stated intervals, mounted constables ride from homestead to homestead to see that all is well. Each is provided with a patrol sheet, on which the settler is required to enter any complaint that he may have to make. If nothing has happened that deserves to be called to the attention of the police, the constable fills in the form "No complaints," and the settler signs it. These sheets are then turned into the officers at the posts and any matters requiring attention are attended to. Especially to foreign settlers the visit of the mounted policeman is welcome. The constable is generally a man of considerable experience and can advise and help the homesteader in the building of his shack, the herding of his stock, and in dozens of other ways of which the outside world knows nothing.

Each month the superintendent of a district reports to the commissioner at Regina. These reports give full information as to all the work performed in the district. Thus the commissioner is enabled to keep accurate record of the entire force. Every report sent in to him is a comprehensive history of the district, nothing being considered too insignificant for notice. In the reports for a whole year, therefore, there is a fairly exhaustive record of the country's progress.

Taxation

The National Government Considered. The government of the Dominion is a vast business organization, requiring annually one hundred twenty-five million dollars to pay its expenses. Estimating the population of the country at eight million people, the cost of managing our national affairs averages over $15 for each man, woman and child each year. Thus, Mr. and Mrs. A., with three children, discover that in caring properly for their interests, the government is put to an annual expense of over $75. To whom does Mr. A. pay his proportion of the one hundred twenty-five million dollars? How does it get to the national treasury at Ottawa? Does Mr. A. ever protest at the amount of this tax, declaring it is too high, too burdensome, in proportion to the benefits he and his family receive?

It may seem strange to the boys and girls, and to some older people, as well, that no man or woman in all the Dominion pays to the Canadian government directly one cent a year towards meeting the enormous sum necessary to pay running expenses. If Mr. A. were called upon by the tax collector for $75 a year, he would sometimes find it almost, if not quite, impossible to meet so large a sum. It would be a very heavy burden, and one of the most serious problems of our law-makers has always been to make this burden as light as possible. They have planned it so well that no tax-collector for the Dominion ever calls upon Mr. A. or upon any other man. The money needed is not raised by direct taxation, but is otherwise secured.

Tariff on Imports. We manufacture a vast number of things in this country for our own use and to sell in foreign countries. Other nations are also heavy manufacturers, and they sell some of their products to us. Every time a boatload of goods from England, France, or Germany comes to Canada to be sold here, such goods come into competition with goods of the same kind that we manufacture at home. Sometimes our factory owners find that so much foreign material is offered here that there is an over-supply and our own workmen suffer for lack of employment. Some countries do not pay their workmen as much as ours earn, so the foreign goods can be made more cheaply and sold here for less than we can make them. Therefore we tell the foreign merchant that he may bring his products here if he chooses to do so, but that he must pay us for the privilege of selling them here. The case is exactly similar to the village tax of $1 a day you impose on the traveling huckster who comes to your town to sell things in competition with your local merchants.

The amount the foreigner pays varies with the character and value of his wares. He may be required to pay a certain per cent of the value of the goods, or may pay a certain fixed price per dozen articles or a certain price per hundred pounds. These matters are all stated in a law called a tariff law. When Mr. A. buys an imported article he pays a little more for it, because the foreign merchant has increased his price to cover the tariff charges. So in this way Mr. A. and every other person who buys foreign-made articles contributes to the expense of running our government.

Many of these foreign articles are such that they could be dispensed with almost entirely by nearly every person. If all were determined to do without them, then where would the government secure its revenue, since its income from such tariff duties would be cut off? Our lawmakers have provided for such an emergency, for it is recognized that the demand for most foreign goods may at any time decrease.

There are certain commodities we must have every day, and a tariff on these is certain to produce immense sums in revenue. Some of these are sugar, coffee, spices, and other domestic articles. Every tariff law, no matter by what political party it is prepared, always includes duties on these articles for which there is a constant necessity; thus is revenue assured.

Inland Revenue. Not all the necessary income of the government is derived from the tariff upon imports. Certain products of domestic manufacture are taxed, and in such instances the maker is obliged to add the tax directly to the cost of the goods. The consumer pays this additional sum every time he makes a purchase. Such a tax is called an excise duty, the word "excise" coming from an old French word meaning a tax. Every time a man buys a cigar he pays a tax to the government, as does the man who buys beer, whisky and other liquors. People could well get along without all these things, but they will not; therefore the government's revenues are increased nearly $16,000,000 each year.

Local Taxation. The province, county, township, school district, village and city are not allowed to raise money for expenses in any other way than by direct assessment of taxes upon the property of the people. The laws provide that all taxes levied shall be equitable—that is, that in any tax district each property owner shall pay in exactly the same proportion as any other who has taxable wealth.

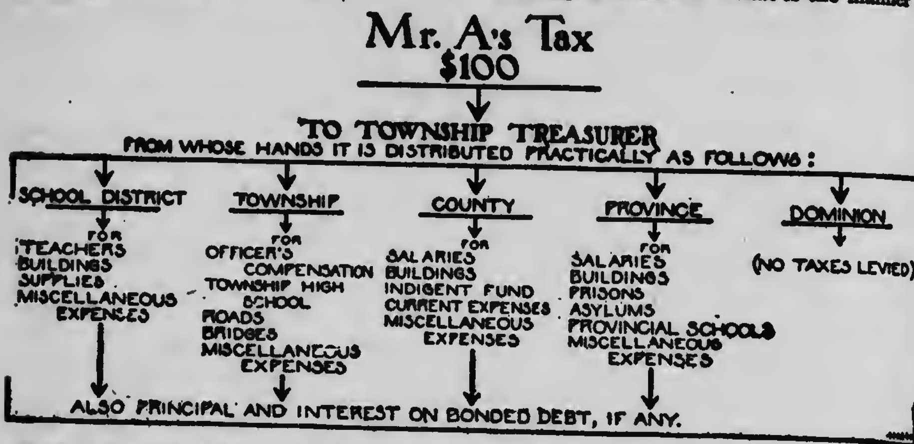
There are a number of taxing bodies drawing funds from each neighborhood; so it is a little difficult to explain in a brief article exactly how taxes are levied and collected. Every political division named in this article on civil government except the Dominion raises money by direct taxation.

In outlining the general system let us begin with the demands of the province. The province recei[illegible]t of its revenue from three sources: (1[illegible] from mines (especially in Nova Scotia); (2) sale of public lands, timber and mineral products; (3) the subsidies or annual allowances made by the Dominion government. Previous to confederation none of the provinces, except Ontario, had used direct taxation. It was felt that to force the provinces to resort to direct taxation as the only method of carrying on their government would probably spell the failure of Confederation, and it was finally decided that the central government should grant annual subsidies, based on the relative population and financial position of the provinces. It is from these subsidies that the provinces derive the greater part of their revenue. In none of the provinces has there been a general system of direct taxation for provincial purposes. In the fiscal year of 1911 the provinces received subsidies as follows:

Alberta	$1,173,068.60
British Columbia	522,076.66
Manitoba	838,247.06
New Brunswick	621,360.96
Nova Scotia	610,460.48
Ontario	2,128,772.08
Prince Edward Island	321,051.98
Quebec	1,686,579.08
Saskatchewan	1,229,975.90
	$9,131,591.90

The legislative assembly of the province meets to appropriate money to a fixed amount for the annual expenses of the province. The treasurer or minister of finance presents the budget or estimate of expenses for the coming year, whereupon the assembly accepts it, that is, makes the appropriations. The local divisions of the provinces receive their respective proportions of the total, and in addition such sums as they themselves have levied for local purposes. It is customary, for example, for the residents of a school district to pay an assessment towards the maintenance of the school system. Similarly, the people of the township and county must contribute toward the funds which pay the expenses of these units of government. The building of roads, of township high schools, and similar expenses fall properly on the locality which is to receive the benefits, though it is true, especially in education, that the provincial government often helps.

Mr. A. owns a farm on which his taxes are $100. He finds he must pay something for the support of the schools, whether or not he has children, for the government of his township, his county, and his province. This is all right and proper, for from each he receives benefits in return. The amount he pays is apportioned somewhat as follows, the details varying little in different provinces:



If the taxpayer lives in an incorporated village or city his village or city tax is added to the other items, and he would pay his money to the city collector rather than to the township treasurer.

After all collections are made the various allotted proportions are sent to the proper authorities, to be spent according to the appropriations that have been made.

An Illustrated Lesson. Various phases of local government and taxation can be made clearer to the student by study of the map on next page, and the questions suggested by it.

THE MAP. Medina township is a part of Boyne county, which stretches to the north, west and south. On the east the territory is a part of another county. This township is typical in form, six miles square, and wagon roads are on all section lines.

EDUCATION. Well arranged school districts provide that no child need travel more than two miles to reach a free public school. Is such the arrangement here? Within the school district of the village of Clayton are sections 15, 16, 21 and 22. Will F's children be entitled to free tuition in the village high school? E is one quarter of a mile nearer the village, on the opposite side of the street from F; why must E pay tuition if he sends his children to the village school? If E's children do not attend school in their own district, need E pay school taxes there? Do the village taxpayers help support the district schools? Is any part of A's annual tax applied to the support of the village high school?

LOCATION AND AREAS. Which section of the township is section 1? What is the manner of numbering? Where, then, is section 36? D's farm may be described as the w½ of the nw¼ of section 8. How many acres does it contain? Write the description of B's farm. How many acres does he own? What is A's farm worth, at $90.00 per acre?

POLITICAL. The village is incorporated. What does this mean? Can F vote for village officers? Will C and A and E vote for the same county officers? Do Medina township men vote for provincial officers? A portion of A's farm lies in Monroe county. His residence is indicated by the star. Is he entitled to vote in Monroe county? Would A and F vote at the same polling place? Would a voter of any township vote for county and provincial officers and for officers of the school district at the same polling place?

TAXATION. The school district in which A's farm is located comprises sections 23, 24, 25 and 26. He lives nearest the schoolhouse in section 13. Must he help support the school nearest him? Can A pay his entire annual tax in one sum in Boyne county? A pavement is repaired in the main street in the village on the section line from north to south. C lives one half mile from the paved street. Will he be taxed for this improvement? Will E be taxed for this improvement? Are residents of the village taxed for the support of the township government? Are residents of the township taxed for support of the village government? If it is voted to macadamize the highway north of section 23 and 24 from M to N, will A be taxed for a share of this improvement? Would B be taxed for it? Would any portion of this tax fall on the property owners in the village? A swamp lies east of King's Creek. Would the expense for the drainage of this area fall upon the township, the county or the individual owners of the land? When A pays his taxes on the Boyne county portion of his farm, to what official does he give the money?

When the railroad was built through A's farm, he demanded $500.00 for the property taken and for damages, but was offered $100.00. Was there a legal way of deciding how much A should receive? Does the railroad pay taxes for the privilege of running through the township? If so, to whom?

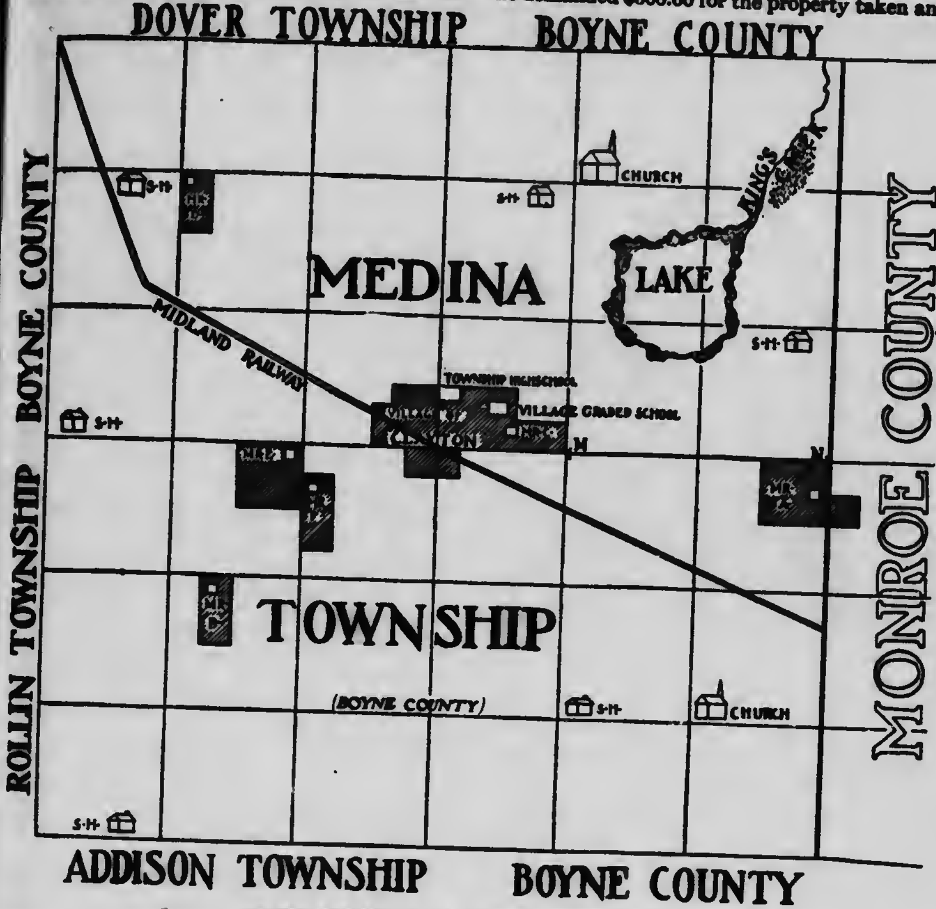


CHART FOR STUDY OF LOCAL GOVERNMENT

Education

According to the British North America Act, education is entrusted to the several provinces. Each province has worked out a system suited to its own needs and conditions. In all of the provinces except one, primary education is free to pupils of school age; in Quebec a nominal fee is charged. In secondary schools a fee is sometimes charged as supplementary to provincial, municipal and district grants.

The system in each province is administered by a central board. In Prince Edward Island this consists of the executive council, the superintendent of education and two prominent educators. In New Brunswick it consists of the executive council, the chancellor of the university and the chief superintendent. In Nova Scotia it consists of the executive council, and the chief officer is the superintendent appointed by the lieutenant-governor in council. In Quebec the council of instruction consists of the Roman Catholic bishops of the province, an equal number of Roman Catholic laymen, and an equal number of Protestants. This council

LAVAL-MONTMORENCY
For whom Laval University is named

is divided into two committees known as the Roman Catholic and the Protestant committees, each responsible for schools of its own kind. In Ontario the head of the department of education is a minister of the Crown, and he has as his advisers an educational council and is well supported by administrative officers covering every department of the work. In Manitoba, Saskatchewan and Alberta almost similar methods of government obtain, and in British Columbia the active head of the whole is the minister of education. He has as an advisory body the inspectors in the field.

Though these officials regulate education as a whole, each school district regulates its own affairs in all matters of detail. Each selects its own teacher, but no teacher can be selected who has not a certificate issued by the province. There is a fair degree of reciprocity among the provinces. In the western part of Canada the supply of teachers is not quite equal to the demand, and numbers of permits are issued from time to time.

In most of the provinces schools are opened and closed with religious exercises. Except in Quebec no definite religious instruction is given in the provincial schools. In British Columbia schools are conducted on strictly non-sectarian principles. In Quebec, Ontario, Saskatchewan and Alberta a distinction is made between Roman Catholic and Protestant schools. In the last two provinces this distinction is merely nominal.

The schools are supported by a provincial fund, municipal fund, and a fund yielded from district assessments. In Manitoba, Saskatchewan and Alberta, one-eighteenth of the whole land has been set aside for school purposes. This is being sold from time to time, and the provinces receive the interest from the fund so obtained.

The training of teachers has received attention in all the provinces of the Dominion. In Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, the course is almost purely professional and based on a definite academic training. In other provinces the academic and professional training are carried on simultaneously as in the normal schools of the United States. Usually the course of training for teachers develops into a short course for beginners and a longer course for those who have had some experience. The work in the normal schools is supplemented throughout the Dominion by teachers' institutes. In some of the provinces much has been done in the way of school libraries, and this applies particularly to Saskatchewan.

The courses of study in the various provinces do not differ very greatly and steps are being now taken to harmonize these. One of the most notable movements in education in Canada is that carried on at St. Anne de Bellevue, in the Macdonald College. It is to Sir William Macdonald that Canada owes not only this building, but the movement in favor of school gardens and consolidation of schools. Each province has secondary schools as well as elementary schools. Secondary schools are both public and private, the private being confined to the large cities. The secondary schools are supported most liberally, and one of the reasons for this is that they are so necessary to the continued existence of the elementary schools. It will be found that the secondary schools have two or three grades, according to the needs of the provinces and of the district. In small towns there are intermediate schools or high schools. These give instruction to the young people of the towns and to many teachers. The cities have collegiate institutes, and here the high grade teachers get their preparation.

Universities are to be found in every province. In Prince Edward Island there is the Prince of Wales College; in Nova Scotia, the Dalhousie; Acadia, St. Francis and King's colleges; in Quebec, McGill University and Laval University; in Ontario, University of Toronto, Queen's University, McMaster University, Western University and the University of Ottawa; in Manitoba, the University of Manitoba with its affiliated colleges; in New Brunswick, the University of New Brunswick, Mount Allison College, St. Joseph's College; in Saskatchewan, Saskatchewan University at Saskatoon; and in Alberta, the University of Alberta at Edmonton. British Columbia has recently made arrangements to absorb McGill University College and Columbia College and will soon have a provincial University.

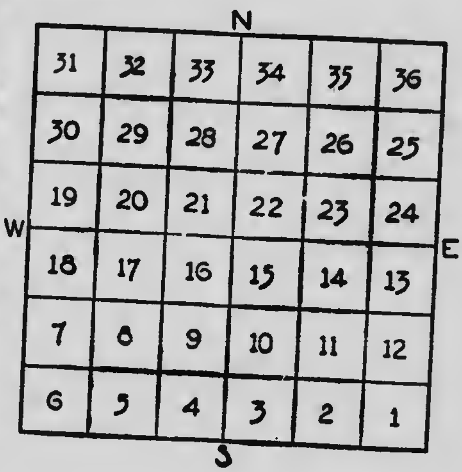
Education, Agricultural Since Canada is one of the leading agricultural countries of the world, it is natural that agricultural education should receive most careful attention. Each province has its agricultural college. These institutions are maintained on the highest scientific plane, and their benefit to their respective provinces is beyond estimate. The agricultural college of Manitoba owns property valued at $1,000,000, has about 300 students each year, and is maintained at an annual expense of $60,000. Although affiliated with the University of Manitoba, this college is under independent management. The most prominent of the agricultural colleges of the Dominion is that at Guelph, Ontario. Its influence is felt in all the Western provinces, and it is favorably known in every part of the continent. Ontario depends very largely upon her raw products for her national wealth. Among the various forms of raw material, none are so valuable as those included under the head of agricultural produce. If, therefore, the College of Agriculture can take from the farms a certain number of young men each year, teach them the best methods of tillage, the principles of stock breeding and feeding, and, in general, a better knowledge of how to look after the field, the garden and the orchard, these young men will help to prevent the waste which is so common in farming communities. That Ontario farming has been kept up to its present high standard has been largely due to the work of the Agricultural College.

What is true of Ontario is equally true of the other provinces. The agricultural college of Saskatchewan is destined to become an important factor not only in the educational life but in the industrial life of the province. In addition to the regular work of these colleges, short courses in the winter are offered to farmers who have not the time for a year's course. Stock judging, seed judging, horticulture, dairying and poultry husbandry are some of the practical subjects which are thus taught to the farmer. Together with the agricultural experiment stations, these colleges are doing much for the improvement of agriculture in Canada.

Public Lands

The public lands of Canada consist of granted and ungranted lands. The ungranted lands are in the older provinces and are the property of the provinces in which they lie. They are disposed of by the officials appointed by the respective legislatures of these provinces for this purpose. The ungranted lands in the Northwest Territories belong to the Dominion and are administered by the Dominion government under direction of the department of the interior.

Survey. The Dominion lands are laid out in quadrilateral townships, each containing thirty-six sections of as nearly one square mile, or 640 acres, as the convergence of the meridians permits. The sections are numbered consecutively, beginning in the southeast corner of the township and following the order shown in the diagram:



31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1

Each section is divided into quarter sections of 160 acres, and these quarter sections may be sub-divided into quarters. The numbering of the sub-divisions follows the same order as the numbering of the sections in the township, as shown by the diagram:

13	14	15	16
12	11	10	9
5	6	7	8
4	3	2	1

The townships are numbered in regular order northward from the international boundary lines on the 49th parallel of latitude, and lie in ranges numbered in Manitoba east and west from a prime meridian, which is named the principal meridian, and extends northerly from the 49th parallel. Throughout the northwest provinces the ranges are numbered westerly from other initial meridians, which are named 2nd, 3rd, 4th, and so on, according to their order, westward from the prime meridian.

Disposal of Dominion Lands. The Dominion lands of the northwest are divided in two classes, viz., even-numbered and odd-numbered sections. The sections numbered 8 and 26 are allotted to the Hudson's Bay Company; numbers 11 and 29 are reserved for school purposes and are known as school sections. All other sections are held for sale and as land grants in aid of the construction of colonization railways.

Homesteads. Any person, male or female, who is the sole head of a family, or any male who has attained the age of eighteen years, who is a British subject, or any alien who declares his intention of becoming a British subject, is entitled, on making application before the local agent of the district in which the land he desires is located, and on paying an office fee of ten dollars, to obtain homestead entry for any quantity of land not exceeding 160 acres.

Anyone granted an entry for homestead is required to conform to the provisions of the Dominion Land Acts, under one of the following acts:

(1) At least six months' residence upon and cultivation of the land in each year during the term of three years.

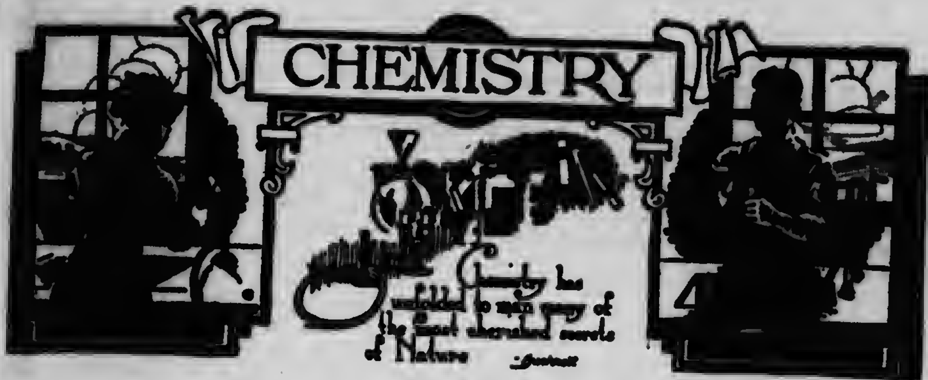
(2) If the father (or mother, if father is deceased) of any person who is eligible to make a homestead entry under the provisions of this act, resides upon a farm in the vicinity of the land entered for such person as a homestead, the requirements of this act as to residence prior to obtaining patent may be satisfied by such person residing with father or mother.

(3) If a settler has obtained a patent for his homestead, or a certificate for the issue of such patent countersigned in the manner prescribed by the act, the requirements of this act as to residence prior to obtaining patent may be satisfied by residence upon the first homestead, if the second homestead is in the vicinity of the first homestead.

(4) If the settler has his permanent residence upon farming land owned by him in the vicinity of his homestead, the requirements of this act as to residence may be satisfied by residence upon said land.

(5) Should a number of homestead settlers, embracing at least twenty families, with a view to greater convenience in schools and churches, desire to locate in a village or hamlet near their homesteads, the minister of the interior may dispense with the condition of residence, but the condition of cultivation must be carried out.

The privilege of homestead entry applies to agricultural lands only.



Beginnings of Chemistry. There is another word, the name of what used to be considered a science, which is closely related to the word *chemistry;* it is *alchemy*. One word, in fact, grew out of the other, just as the science of chemistry grew out of alchemy. Just what the name came from has been discussed for very many years; it seems most probable that it was derived from *Chemia*, an old name for Egypt, and that it thus means merely the Egyptian art This is reasonable enough, for alchemy was first practiced by the Egyptians.

There was another name given to alchemy, a name which had a most unfavorable meaning—the Black Art. The Egyptian priests, with whom the study began, were so mysterious about their researches that people in general got the idea that they must be dealing in magic. And when we remember what it was that the alchemists were trying to do, we do not wonder that they kept it secret. For they were trying to discover a way to change all metals to gold. They never doubted that such a thing could be done—the only trouble was to find the substance with which the base metals had to be treated. They had a name for this wonderful substance, though they could not discover its nature; it was called the Philosopher's Stone.

Sometimes the alchemists wrote out accounts of what they did, for their own use in the future or for the use of other alchemists, but since it was necessary that no outsider should find out about the great secrets which they felt they were always just on the verge of discovering, they set down their records in the most mysterious. ambiguous way possible. This of course added to the idea that it was a Black. or Secret, Art.

The Arabs were always interested in sciences, and when, in the seventh century, they invaded Egypt, they took up at once the science which they found there. In the next century an Arab alchemist made some real discoveries. He found a substance that would dissolve gold and he worked out several very important combinations. He also advanced the theory that there were certain elements from which all other substances are made, but he believed that there were only two of these primary substances.

During the Middle Ages alchemy flourished, especially in Spain, where the Mohammedans from Arabia had settled and founded schools. Students from these schools returned to their own countries and taught the science there and sometimes kings kept alchemists in their service; for why should not a science be popular which had for its object the making of much gold?

But through working toward this end and constantly experimenting, alchemists gained a fund of knowledge about many substances in nature which was very useful. And gradually they came to see that this knowledge might be very useful for at least one purpose—the compounding of medicines. Little by little the original object came to be neglected: men learned enough about gold to realise that it could not be made of tin or of zinc, and enough of other substances to see that they were valuable in themselves, aside from their possible use as a basis for gold.

In this way the science of chemistry began. Of course its progress was slow, but it was steady, until gradually the science came to be what it is today—"the science of the composition of substances."

Chemical Elements. Chemistry divides all substances in the world into two classes: either they are elements or they are compounds. An element is a substance which cannot be divided into two or more simpler substances; a compound is a substance made up of elements. There are in all at the present time about eighty substances which no amount of experimenting, no trying of process after process, has ever reduced to simpler forms; and these eighty we call elements. Of course it may be that some chemist of the future will succeed in breaking up some of these substances; but until this is done they will be considered elements.

In the list of the elements which follows, the letter or letters after the name represent the symbol of the element, which will be explained later

Name	Symbol	Name	Symbol
Aluminium	Al	Molybdenum	Mo
Antimony	Sb	Neodymium	Nd
Argon	A	Neon	Ne
Arsenic	As	Nickel	Ni
Barium	Ba	Nitrogen	N
Beryllium	Be	Osmium	Os
Bismuth	Bi	Oxygen	O
Boron	B	Palladium	Pd
Bromine	Br	Phosphorus	P
Cadmium	Cd	Platinum	Pt
Caesium	Cs	Potassium	K
Calcium	Ca	Praseodymium	Pr
Carbon	C	Radium	Ra
Cerium	Ce	Rhodium	Rh
Chlorine	Cl	Rubidium	Rb
Chromium	Cr	Ruthenium	Ru
Cobalt	Co	Samarium	Sa
Columbium	Cb	Scandium	Sc
Copper	Cu	Selenium	Se
Dysprosium	Dy	Silicon	Si
Erbium	Er	Silver	Ag
Europium	Eu	Sodium	Na
Fluorine	F	Strontium	Sr
Gadolinium	Gd	Sulphur	S
Gallium	Ga	Tantalum	Ta
Germanium	Ge	Tellurium	Te
Gold	Au	Terbium	Tb
Helium	He	Thallium	Tl
Hydrogen	H	Thorium	Th
Indium	In	Thulium	Tm
Iodine	I	Tin	Sn
Iridium	Ir	Titanium	Ti
Iron	Fe	Tungsten	W
Krypton	Kr	Uranium	U
Lanthanum	La	Vanadium	V
Lead	Pb	Xenon	Xe
Lithium	Li	Ytterbium	Yb
Lutecium	Lu	Yttrium	Y
Magnesium	Mg	Zinc	Zn
Manganese	Mn	Zirconium	Zr
Mercury	Hg		

This is rather a formidable-looking list, but when we really approach the study of the elements we find that it is not so complicated as it seems. Many of the substances in the list are very rare, and enter into compounds very seldom.

Chemical Compounds. The subject of compounds in chemistry is very interesting, for a chemical compound is a different thing from some of the substances we are used to considering as compounds. If you eat a piece of cake you can say at once, "There is sugar in this cake; there is butter; there is flour, and vanilla flavoring; there are eggs." It is *one* thing—a piece of cake; but you think of it instantly as made up of many things; that is, as a compound. But when you taste common salt you have no feeling that it is a compound; when you drink water you are not conscious of drinking *two* things; and yet both of these are compounds.

There is an experiment which is easily tried which will show us something about what a compound in chemistry is. Take a small quantity of very fine iron-filings and mix with them a small quantity of powdered sulphur. No matter how thoroughly you mix them, they are still iron and sulphur; you can tell them apart when you look at them through a microscope, and you can draw out the iron by simply holding a magnet over the mixture. But if you hold an iron spoon containing the mixture over a hot flame, the iron and the sulphur combine to make something which is neither iron nor sulphur; in fact, it is not like either iron or sulphur. If you pound the new substance to a powder, you will find that you cannot separate the iron from the sulphur now even with the strongest of magnets. That is, the two have formed a new substance which is just as real and has just as distinct properties of its own as the two original substances. But there is one difference: if you know the proper chemical means to decompose the new substance, you may get back your iron and sulphur, while neither of the original elements could have been divided by any means.

Such a mixture as that of the iron and the sulphur before they were heated is called a *mechanical mixture;* such a substance as that formed by the heating is called a *chemical compound.* Now many of the things we have in commonest use which we are used to thinking of as simple as anything could well be, are such chemical compounds. Water is such a compound; salt is another.

CHEMISTRY

Definition and History

1. The science which treats of the different kinds of matter, their properties, laws of combination, and relations to one another.
2. As a science it is of modern origin.
3. At a very early date it existed as alchemy, the object of which was to discover the philosopher's stone. It led to modern thought and the formulation of a true system.
4. During the time of Lavoisier the names element and compound were correctly applied.

BRANCHES OF CHEMISTRY

1. Organic Chemistry.

a. That division which treats of the carbon compounds.

b. In early times it was thought that every organic compound had a vital principle, existing in living plants and animals only.

c. This theory was abandoned when organic compounds were produced artificially by Wohler and others.

2. Inorganic Chemistry.

a. That division which treats of those compounds that are not united with carbon.

b. The dividing line not very sharp. Carbon dioxide is usually regarded as an inorganic substance, and yet is a carbon compound.

3. Agricultural Chemistry.

Deals with farm problems and farm products.

4. Electro-Chemistry.

Treats of the use of electricity in chemical problems.

5. Industrial Chemistry.

The application of chemical ideas to manufacturing products.

6. Physical Chemistry.

That part of the science dealing with physics in its relation to chemistry.

7. Thermo-Chemistry.

Deals with heat changes taking place in chemical reactions.

PRINCIPLES OF CHEMISTRY

1. Element.

An element is a substance which cannot be separated into two or more different substance molecules that contain but one kind of matter, such as arsenic, carbon. In 1906 seventy-seven elements were known.

2. Compound.

A compound is a substance composed of two or more substances, such as water. The force which holds together the elements in the form of compounds is called chemical affinity.

3. Laws of Combination.

a. Chemical combination takes place between molecules when very close together, when in solution or melted together.

b. Chemical combination always effects a change in all bodies.

c. Chemical combination takes place with different degrees of force in different bodies.

d. Chemical combination is much affected by such forces as heat, light, electricity and mechanical force.

e. All substances, elementary and compound, combine in fixed and definite proportions by weight.

f. When bodies combine in more than one proportion, their other combining proportions are simple multiples of the lowest.

g. Gases combine in fixed and definite proportions by volume as well as by weight.

h. The combining proportions of compounds are the sum of the combining proportions of their constituent elements.

GREAT CHEMISTS

Boyle. Faraday. Gay-Lussac. Lavoisier. Liebig.
Sir Humphry Davy. Berzelius. Bacon. Dumas.
Pasteur. Priestley. Black. Rutherford.

Atoms. What can we find out about the way such compounds which do not seem like compounds are made up? Chemists tell us that all matter which exists in the world is made up, in the last analysis, of inconceivably minute particles called *atoms*. We are not to think of these atoms as anything which could be seen by the most powerful microscope which might ever be invented; they are far too small for that. And they are indivisible. Now when a certain number of atoms of one element are brought close to a certain number of atoms of another, various things may happen. The two kinds of atoms may show not the slightest interest in each other, both remaining exactly as before; one atom of one kind may seize upon one or more atoms of the other substance and unite to form a tiny particle of a new substance; or both kinds of atoms may wait until some outside force, like electricity or heat, puts them in such a condition that they can unite. It is never hard to learn names, even long names, if we first have fixed in our minds the fact or thing which the name describes; and it will not be difficult to remember that atoms which unite with each other, either unaided or with the help of some outside force, are said to have a *chemical affinity* for each other. Unless the atoms of two substances have this chemical affinity, no amount of mixing or heating or fusing will make of them anything but a mechanical mixture.

In the very simplest form of a chemical compound, one atom of one substance combines with one atom of another. But often one atom of one element will seize upon two or three or even four of another; or two atoms of one may unite with three of another.

Some of the eighty or more elements of which we know are gases; some are metals, some are solids other than metals, and one is a liquid. Naturally we are better acquainted with the solids than we are with the gases, because such things as gold, iron, lead, silver, sulphur and tin we see about us every day, while chlorine, fluorine and argon must remain little more than names to us until we come to the systematic study of chemistry.

Some Well-Known Gases. But there are three gases with the names of which we are all tolerably familiar, for the reason that two of the most common things in the world, as well as the most important, are composed of them. These three gases without which we could not live are oxygen, nitrogen and hydrogen, and the two compounds without which we could not live are air and water. Now there is a very real difference between these two compounds—a difference more fundamental than the fact that one is a gas and one a liquid; that is, air is merely a mechanical mixture of nitrogen and oxygen, while water is a chemical compound of oxygen and hydrogen. (The articles on *Air*, *Water*, *Oxygen*, *Hydrogen* and *Nitrogen* in THE NEW PRACTICAL REFERENCE LIBRARY will give you many interesting facts about these two compounds and the elements of which they are made up.)

Chemical Symbols. Chemists have a way of naming chemical compounds which shows at once that they are such compounds, and shows the elements of which they are composed. Each element has what is called a *symbol* by which it is known—usually the first letter of its name; thus O stands for oxygen H for hydrogen and N for nitrogen. And when it is desired to express a chemical compound, the letters which stand for the elements of which it is composed are written together; thus NO would mean a combination of nitrogen and oxygen. But this is not enough. We said above that sometimes *two* atoms of one element combined with one or with three of another element. This also must be shown, and for this purpose small figures, written to the right of and below the letters, are used. For instance, H_2O means that two atoms of hydrogen combine with one atom of oxygen to form some sort of a compound. In this case, the compound is water.

Chemistry an Experimental Science Once we have really grasped the idea of the combining of atoms and the system of the naming of chemical compounds, we have the foundation principles of chemistry; all the rest is really variations of the same theme. But these variations are endless, or so nearly so that we can make not even a beginning of discussing them here. Chemistry is emphatically an experimental science, and no exhaustive knowledge of it can be gained without the making of experiments. Unlike experiments in physics, chemical experiments cannot well be performed at home, by an inexperienced person, as the substances dealt with are in many instances dangerous.

Questions

How do you account for carbonic acid gas being poisonous to the lungs but pleasant and stimulating to the stomach?

What is soda water? With what is it charged?

From the bark of what tree is quinine made?

When was it discovered? For what ailments is it helpful?

What is chloroform? When and by whom was it discovered? When and by whom was it first used as an anesthetic? How is it administered? What are its effects?

For what is ether extensively used?

Name some of the remarkable and valuable discoveries made by Sir Humphrey Davy.

What is ozone? Where does it exist? When is its odor noticed?

How is opium used in certain countries as an intoxicant? Under what name is it commonly used in medicine? Describe it in its natural state. From what country is the principal supply obtained?

What are some of the most common food adulterants?

How and from what is gunpowder made? What ancient people used it? When was it first used in war?

Does German silver contain any silver in its composition?

What is the difference between gunpowder used for rifles and that used for blasting and for cannon?

What is smokeless powder?

What is sulphur? Where is it found? What are its principal uses?

What is substituted for sulphur in matches? When were matches first used? How were they lighted?

How can you detect the presence of ammonia and alum in baking powder?

What part of air is oxygen? Nitrogen? Do these gases unite?

Reasons for a Domestic "Science." Not very many years ago those words would have looked very strange together; no one seeing or hearing them would have understood what they meant. The word *science* was, to most people, a word reserved for technical subjects. There was a science of geology, a science of botany, a science of astronomy; but about the domestic life, with its almost infinite number of big and little duties, there was little or nothing that was recognized as scientific. Even today, of course, the words would mean nothing to thousands and thousands of housewives, but gradually the ideas which they convey are becoming more and more widely spread, more and more willingly accepted.

Of late years scientific interest in all things has been increasing, and as a natural consequence scientific knowledge has been growing. That "domestic" science came late is due to the fact that it concerns itself with affairs which are so universal, so constantly and unobtrusively before our eyes as to seem commonplace. But little by little people came to see that there was, in the running of the usual household, an enormous waste of time, of energy, of money. Nothing like an adequate return was being received for the outlay that was made. The result, gradual and still uncompleted, was the systematizing of domestic affairs.

Changes in Household Occupations. Centuries ago the duties of a household were far different from what they are today. The women prepared all the food, cared for the house, spun the yarn, made the cloth from which clothing was made, and then in turn made the clothing. The education of a girl consisted largely if not exclusively of training in such household duties. But conditions within and without the home changed so that all of this became very different. First, there came the invention of machines which did much of the work women had been accustomed to do; it did not pay a woman to labor hours and weeks making "homespun," when factory-made cloth, as good and far more attractive, could be bought reasonably. The growth of factories of all kinds carried this result further and further; more and more industries were taken out of the hands of the housewives and transferred to factories. This tendency was strengthened by the growth of cities; when people lived by themselves, a long distance from a neighbor, perhaps, they were dependent in large measure on their own resources, but when they moved to crowded centers of population they found many things within their reach which before it had been well-nigh impossible to obtain.

Then, too, the desires and ambitions of women have changed. They are no longer satisfied to spend every minute of the day drudging at housework, even work which is in itself very pleasant becoming the merest drudgery when it must be performed day after day without relaxation or recreation. Women have taken up other occupations, have discovered how good it is to be out-of-doors, have formed societies and clubs of all sorts; have, in short, built up for themselves a social life which makes demands on time and energy which to our grandmothers would have seemed incredible.

One of the results of these various facts is that many of the old household duties are becoming lost arts. The young girl is not trained in domestic affairs in the home; she has no time and little inclination for such things, and in many instances her mother has no more. Besides, conditions have changed so that the necessity for such home education is less apparent. Suppose a girl is called on some day to manage a household. It will, in many cases, be a steam-heated flat in which she will live. Everything for the flat can be bought—even the taste to furnish it, for there are people who, for a fee, supply ideas for the furnishing and decoration of homes. Her clothes can be bought ready-made, from the simplest shirtwaist to the most elaborate evening gown. Bakeshops and delicatessen shops supply cooked foods of all varieties, hot from the oven, if desired. Why should a girl spend time in learning to do things which she can so easily have done for her?

Importance of Domestic Science. The realization of the fact that the old household accomplishments are being in large measure neglected has had much to do with the zeal with which wise men and women have tried to advance the cause of domestic science. For the answer of the girl to whom we referred in the preceding paragraph to domestic questions is in reality far from being the right or the wise answer. There are problems in the household which can never be met until the housewife understands every detail of the management as thoroughly as did the old-fashioned housekeeper, even if she does not do nearly so large a proportion of the work. It is not necessary that a woman should go back to the days of the spinning wheel, and insist on making the cloth from which her winter suit is to be fashioned; but she should know enough about fabrics to judge wisely of the materials which do go into the suit. The cooking problem differs in a measure from the problem of textiles and of clothing; for while there are shops where foods of all kinds are prepared, and in many instances well prepared, there are reasons why the habitual patronizing of such shops is not a wise policy. In the first place, such prepared foods are by no means always so healthful; in the second place, they are far more expensive. In the case of meats, for example, it is estimated that one pays almost double for cooked meats—and then they are usually neither as palatable nor as digestible.

It is more true in the case of domestic duties than in almost any other class of industries that a person is fit to have things done for him only when he knows how to do them himself. A man who owns a shoe store does not need to know how the workman operates the machine which cuts out the soles; but a housewife can tell whether things are being done properly and economically only if she thoroughly understands every process. If she knows the price of the various cuts of corned beef, the length of time it takes to cook them and the consequent cost of fuel, she can easily tell whether or not she is paying an utterly unreasonable amount for cooked corned beef.

When we realise that it is an established fact that ninety per cent of the salary is paid out by the woman of the average household for shelter, clothing, foodstuffs, etc., we begin to understand how extremely important it is that the woman who is to oversee this outlay should be able to do it intelligently. If a teacher had before her a class of fifty boys, and knew that almost all of them were to be architects, she would certainly find her teaching much modified by that fact. With a class of girls, it is known for a certainty that a arge proportion will be engaged in some phase of home-making. Is it not of importance, then, that some recognition should be made of this fact in their teaching?

Necessity for Knowledge of Foodstuffs. The question of food is naturally one of the first and most important problems taken up by the student of domestic science, or domestic economy, as it is sometimes called. The points to be covered in the study of foods are many—why we need food, what kinds we need, how much we need, how it should be prepared, what it costs, and so on. We need look no further than our regular newspapers and periodicals to convince ourselves that this subject is becoming a vital and a generally interesting one. Nearly every newspaper we pick up gives a corner to some phase of the problem—perhaps to the question of the healthfulness of certain foods, perhaps to economy in the preparation of foods, perhaps merely to recipes. And then, there are whole magazines devoted to such questions as diet and vegetarianism. You may pick up a magazine one day which proves conclusively that only raw foods should be eaten if the highest standard of health is to be maintained; the next day you may read equally convincing articles to the effect that all foods should be thoroughly cooked. These references do not mean that the present brief treatment of the subject is to be argumentative, is to advance any theory or champion any idea. They are simply brought forward to prove that the question is a live one.

It is not the purpose of the present article to give exhaustive technical information on foods and foodstuffs; the average housewife does not need such extended acquaintance with the subject. She does need, however, general information as to the elements required by the body, the foods which can supply those elements, and the combinations of foodstuffs best calculated to work good results. Such information can be given in a form which is comparatively untechnical, so that the housewife or student with little or no previous training in science can understand it.

It is true that a large proportion of diseases are traceable directly to the stomach, and many of these might be prevented if intelligent care were exercised. If the housewife understands this fact, it will help her to realize as nothing else can the necessity for knowledge of foodstuffs.

What the Body Needs. A plant growing in soil which is well suited to it takes up just exactly those substances which it needs to make it grow best. There are certain things it draws in through its roots and leaves and manufactures into food; the other elements of the soil it disregards altogether. In the same way, there are certain substances which the body needs—without which it cannot do its best work. But the body cannot always get just what it needs as simply as does the plant. Certain necessary elements are not given to it at all, or are given only in inadequate quantities; certain hurtful elements are thrust upon it, or things which in themselves are harmless are given to it in too large quantities.

It stands to reason that the food of the body, taken as a whole, must contain all the elements which the body contains. We do not need in a discussion of this sort, to consider these in detail, or even to mention them all. The elements do not exist by themselves, they combine to make up the various substances which we use as food; for example, hydrogen and oxygen, two very necessary elements, are found combined in water.

There are three things which food must do—it must furnish materials for replacing worn-out body tissues; it must give energy for work, and it must supply animal heat. Of course, no one kind of food can perform all three of these functions equally well, and that is why we need a mixed diet. That is why, too, certain combinations of food, as, for example, cheese and meat, are not considered good—they provide too much of one element and not enough of some others.

Food-substances in general may be divided into three groups—minerals, substances which contain nitrogen, and those which contain no nitrogen.

Chief of the mineral substances is water. We all realize that water is extremely important, in fact that we could not live without it, but probably we do not appreciate how universal it is. All foodstuffs contain it, in varying percentages from ten to ninety-five, and from two-thirds to three-fourths of the body consists of it. Every part of the body contains it, even the enamel of the teeth, though of course there the percentage is very small. Water furnishes no energy, but as a solvent it aids digestion, and it has an important part to play in the replacing of worn-out tissue by new.

The other minerals needed by the body include such things as lime, salt, soda, and iron. Though the proportion of such substances in the body is small—not more than about five per cent—they are absolutely necessary, and it has been proved that if all the other food elements are supplied in proper quantities but these mineral substances are lacking, death is the certain result. However, it is not often that one has to plan on supplying these minerals; the ordinary diet contains enough of them to supply all needs, except in unusual cases.

The second class of foods named—those compounds containing nitrogen—is a large and very important class. The name given to these foods is *proteins*, and since the name is becoming quite common we shall make use of it here. There are three classes of proteins, the first and most essential of which is called *albuminoids*. Albumin exists in the lean part of meat, the white of an egg, the casein of milk (that part which is coagulated by acids) and the gluten of wheat. These substances are absolutely necessary; life cannot go on without them. All of the three functions which food must perform—the building up of tissue, the supplying of energy, the supplying of heat—these substances perform. They do not, however, perform them all in equal degree, and so other foods are necessary. But the albuminoids are more nearly capable of maintaining life unaided than is any other class of substances.

The second class of proteins, called *gelatinoids*, is not nearly so necessary, though these substances have certain qualifications which make them valuable. They are very easy of digestion, and are for that reason often given to invalids and convalescents. The typical example of this form of foodstuffs is gelatin.

The *extractives*, the third class of proteins, include the juices obtained by soaking meat in water, at a low temperature—not much higher than 160 Fahrenheit. The beef tea so much used for invalids is made by this process. Formerly it was believed that there was much nourishment in such beef tea—that it contained all of the strength of the meat; but it is now known that such things really supply nothing for the maintenance of the body, and it is not unlikely that people have been starved to death while being fed on supposedly nutritious beef tea.

The third division of food-substances—those compounds which do not contain nitrogen—is divided into two classes, called *carbohydrates* and *hydrocarbons*. We use these technical terms simply because there are no other names to use in their stead, but it is not necessary that we should know the chemical compounds of the substances. When the term carbohydrates is used we may understand a class of substances of vegetable origin, of which sugar and starch are the most important. These compounds furnish much of the energy of the body and some animal heat, but the chief heat-producers are the other class of this third division - the hydrocarbons. These are the oils and fats of all kinds, whether of vegetable or of animal origin.

It is important that the food taken into the body should not only contain the right elements but that it should contain them in the right proportion. Physicians and chemists have spent much time and thought in figuring out just what this proportion should be. Tests have been made by having people eat different kinds of foods in different proportions, and some interesting facts have been discovered. Of course the results of such tests never could be expected to be absolutely alike, but the best authorities agree that to keep in good health the average grown person should have each day food which will provide him with food elements about as follows:

Protein, $1\frac{3}{4}$ ounces; fat, $1\frac{3}{4}$ ounces; carbohydrate, 16 ounces.

This translated into terms of food such as we eat would be about $5\frac{3}{4}$ ounces of beef, $1\frac{3}{4}$ ounces of butter, 6 ounces of potatoes, and 19 ounces of bread. Of course such a statement does not mean that we must have every day just those articles; if some other kind of meat is used, which contains more fat, less butter is required; if cheese is used, the quantity of meat may be lessened; the starch-furnishing potatoes may be replaced by other starchy foods, and the bread may include cake or other things which have largely the same ingredients as bread. But practically these proportions should be maintained. There are, naturally, many things which are not taken into account here; nothing is said, for example, of water, of which any normal diet should contain a goodly quantity.

Special Foods

Water. Since water is such an extremely important part of our diet, it may well be given very serious attention. As clear, pure water is a good preserver of health, so impure water is one of the greatest breeders of disease. The question can never be "Shall I drink water or not?" —it must always be "What kind of water shall I drink?" The word *pure* as generally used is really a relative term; no water is strictly pure except distilled water, and a very, very small proportion of the water used for drinking purposes is distilled.

The water that we use comes from wells, lakes, rivers and springs, and all of it contains, in greater or less degree, lime and other salts. These, however, unless they are present in unusually large quantities do no harm; the danger in impure water comes largely from the presence of decaying vegetable or animal matter. Such diseases as typhoid fever and diphtheria are often caused by impurities in the water supply, as are various forms of more or less violent intestinal disorders. In the case of those living near wells or springs from which water is secured, the greatest care should be exercised. No refuse of any kind, liquid or dry, should be thrown on the ground near the well or spring, or above it; for almost certainly, if such a thing is done, the impurities sink through the ground and find their way to the source of the water supply. People in towns and cities which have a public water system can of course have no such personal supervision over the source of the water supply; but they can exercise care enough to assure themselves of the purity of the water which is supplied to their homes. The safest way is to have samples of the water analyzed by a chemist, but there are certain simple and fairly satisfactory tests which anyone can make as to the conditions of the water.

The first one is the test with permanganate of potash, which may be made as follows:

Partially fill a clean teacup with the water to be tested, and add about sixty drops of weak sulphuric acid. Then pour in a weak solution of permanganate of potash (crystals of this substance can be obtained at any drug store) until the water in the teacup becomes a deep rose color. If there is harmful organic matter in the water, the beautiful color will soon disappear.

A still simpler test is as follows: Into a bottle which holds about two ounces of water drop granulated sugar equal in quantity to a pea. Place the cork in the bottle, and set the solution in a warm place for forty-eight hours. If the water, when the cork is removed, has an unpleasant smell, it is too impure to be safely used.

As to the methods to be used in purifying water, there are two in common practice. First, there is filtering, the simplest method, though not the most satisfactory. For filtering, while it does remove some impurities, is likely to allow some of them to pass through. The other method is boiling. This kills the organic matter and renders the water practically safe. It has, however, one drawback—it leaves the water flat and insipid; but if the water is poured back and forth from one vessel to another several times, it takes up again some of the gases which it loses by the boiling process, and tastes much more like fresh water.

The great importance of an uncontaminated water supply is being universally recognized. It would be a great advance if we had laws prohibiting public drinking cups at public fountains and in stations, office-buildings, department stores, and all places where a large number of people would be likely to use such drinking cups.

Milk. One of the most important as well as one of the most wonderful foods is milk. In a way, it is a sort of composite of all other foods or of the food-elements contained in them; for it has protein, fats, carbohydrates, salt and water, in just the right proportion to sustain the young. The most wonderful thing about it is the fact that these proportions differ in the milk of different animals. The little seals, walruses and whales, which have to live in cold countries, need much fat, the heat-producing element of food. And tests show that the milk of the seal and walrus and whale is ten times richer in fat than is cow's milk.

While milk is the perfect food for infancy, it has not enough carbohydrates to be in itself a complete food for adults. It has, however, valuable nutritive qualities, and should be used freely by itself and in combination with other foodstuffs. It has been proved that there is as much nourishment in a quart of milk as there is in a quart of oysters, which cost six times as much. Of course the nutritive value of a food is not the only thing to be considered; the flavor, or taste, is an important point. But there are many times when bills might be cut down materially, and real benefit be derived from the change, if milk and cheese were substituted for meat. Especially is this true in the summer months.

The greatest care must be taken that only pure milk is used, as it is of all foodstuffs the most subject to contamination. In the first place, be very sure that the milk is pure when it comes to you. If the conditions under which the cows are kept are not of the best, if the dairy, the people who handle the milk, and the vessels in which it is kept are not absolutely clean, there are certain to be impurities in the milk, and these impurities multiply with astonishing rapidity. There are some cities which have an oversight over the milk supply, and demand that milk have a certain richness, that is, possess a certain proportion of fat, and that it be kept and bottled under sanitary conditions; but there are very few places where one may depend on such public regulation of the supply. If you live in a small city or town, it will not be difficult to investigate the place from which your milk comes.

After the milk is received into your home, the greatest care is necessary. The vessels in which it is kept should be thoroughly washed, scalded and cooled, and the milk should be kept, if possible, in a room which is well-ventilated and cool; an ice-box in which other foods are kept is not the ideal place in which to keep milk. If you are in the least doubt as to whether or not milk is pure, boil it before you use it.

Sterilization, which consists in keeping milk at the boiling point, 212°, Fahrenheit, for about twenty minutes, kills practically all of the bacteria in milk and renders it safe for use. It also, however, does something else—it changes the flavor of the milk so that most people do not care to drink it. Pasteurization, on the other hand, which consists in raising the temperature of the milk to 155° Fahrenheit, does not alter the flavor of the milk. It is much to be doubted, however, whether this process really destroys all the harmful bacteria.

Eggs. Eggs are in their chemical composition very much like milk, but they are not so perfect a food, for they lack one important food element —the carbohydrates. However, if eggs are served with some starchy food, such as potato or rice or white bread, they form a complete food. At almost all seasons of the year eggs are cheaper than the choice cuts of meat, of which they take the place excellently. It is not, however, as a food in themselves that eggs are most important, but as an ingredient in innumerable combinations. Experiments have shown that eggs are much more easily digested if they are cooked at a temperature of from 150° to 180° Fahrenheit, and since this is also the proper temperature for milk, dishes composed mainly of milk and eggs, such as custards, should not be heated above that point. Of course, if cornstarch is used, it requires a higher temperature, but it is usually possible to cook the starch before the eggs are added.

Meats. There is no difference of opinion as to the absolute necessity of water; there is little difference of opinion as to the value of eggs and milk. But when we come to the subject of meat, opinions do differ. Many people insist that meat is not a fit article for food, that it does actual harm; others merely believe that it is not necessary. However that may be, it is certain that most of us use meat, and it is equally certain that almost always meat forms the most expensive part of the daily food. In many cases, by the expenditure of a little thought and care, substitutes for meat, such as cheese, nuts or eggs, can be used; in other cases, the more inexpensive cuts might be used, with no decrease in the nutritive value, and sometimes even with an increase.

At the outset of any study on meats there is one important topic which must be taken up—the selection of meat. By buying guaranteed milk or eggs we are fairly sure that we get the best of those substances which the market affords; but it is not enough to request the butcher to send meat that is fresh and not tough. Meat, more than any other article of food, should be selected by the housewife; only then can she be sure that she secures what she wants. A little study will acquaint her with the different cuts, and with the comparative values of them as foodstuffs. Almost any butcher will be glad, at an hour when he is not too busy, to help a customer in acquiring the knowledge she needs, for intelligence in buying will make his work easier. We give here an illustration which shows the location of the various cuts of beef, it is impossible to give such diagrams of all the animals whose flesh is used

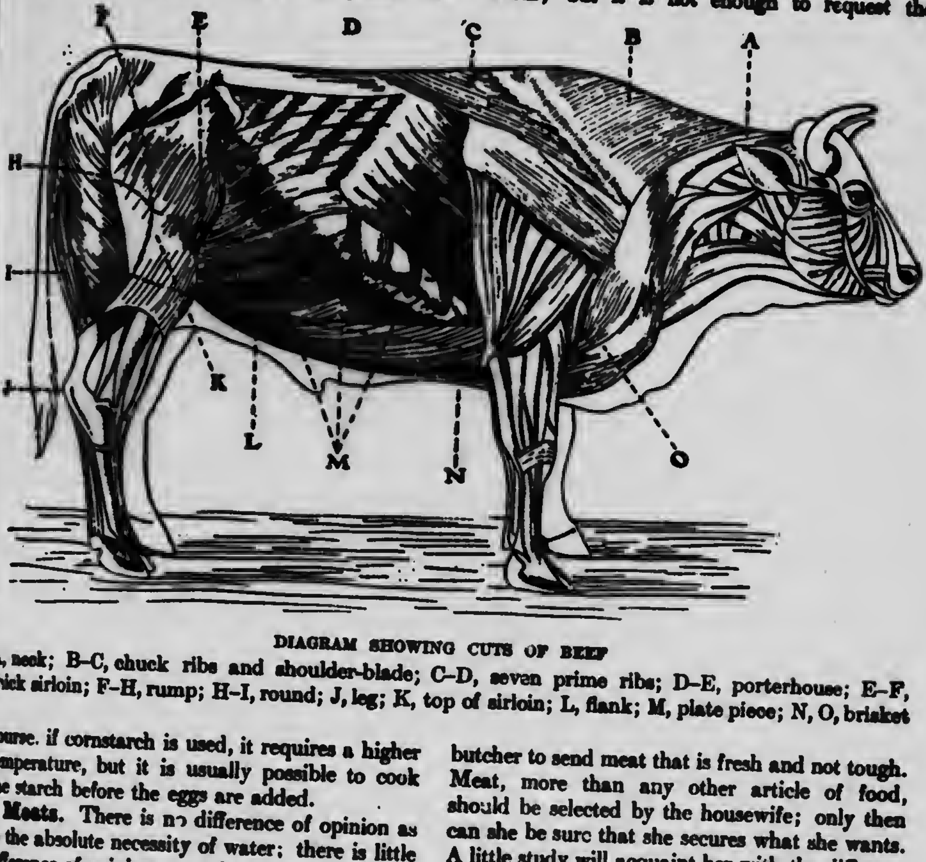


DIAGRAM SHOWING CUTS OF BEEF

A, neck; B–C, chuck ribs and shoulder-blade; C–D, seven prime ribs; D–E, porterhouse; E–F, thick sirloin; F–H, rump; H–I, round; J, leg; K, top of sirloin; L, flank; M, plate piece; N, O, brisket as food, but they are all built much on the same plan.

The first thing to consider in buying meat is the color and grain—good or poor meats may usually be distinguished in that way. Good beef is firm, fine-grained, of a purplish red when first cut, but changing very quickly after exposure to air to a bright red. The fat should be of a light straw color, the suet firm, white and crumbly. If the lean is dark colored, coarse and flabby and the fat dark yellow, it is certain that the beef is of poor quality. Veal, at its best, is fine-grained, tender and almost white; the fat is firm and white. If the flesh is flabby and has a bluish tinge it should never be eaten, as it is absolutely unhealthful. In mutton, the bones should be small, the meat fine-grained, rich red and juicy, and the fat white and firm. There should be plenty of fat, as a lean animal does not yield good meat. Spring lamb is from six weeks to about six months old. The lean of the meat should be pink, the fat delicate and white. Fresh pork, above all other meats, if used at all should be of good quality, for pork which comes from animals in poor condition is very harmful. It is absolutely necessary that pork should be thoroughly cooked; there is no part of it that may be left "rare," as is done with steaks and lamb chops.

The meat from different parts of the animal varies in several ways; some of it is tough, some tender; some is dry, some juicy; some has much flavor, some is comparatively tasteless. These differences determine largely the uses to which the various parts are put.

The loin of beef (D to F in the figure) is considered the choicest part, and is therefore the most expensive. It is used for roasts or steaks, giving porterhouse, sirloin and short steaks. The prime ribs, as they are called (C–D in the figure), are used for roasting. It is poor economy to buy one rib, even though the family is small; two will give much better results, and the "left-over" may be utilized in many ways.

The meat from the top of the round is often used for steaks, and while it is not always very tender, it has a good flavor. It is fine, also, for pot-pies or for boiling; since it has little bone and almost no fat, there is little waste. The rump is sometimes, from a prime animal, excellent for a roast, as are the ribs from B to C. Unless, however, the meat is tender, it is better used for braising or for pot-roasting The flank and the leg are used for stewing or for making soup.

Ways of Cooking Meat

Broiling Though raw meat is easily digested, we do not serve it on our tables. In order to make it more appetizing in flavor and more attractive in appearance, we cook it, and the cooking may be done in various ways. Primitive men, of course, had no way of cooking their meat except before or over an open fire, and we have kept their method in the simplest of our ways of cooking—that is, broiling. This method is used in cooking tender cuts of meat, such as steak, chops and cutlets, and for some kinds of fish. The heat at first should be intense, so that the surface may be quickly seared. In this way the juices are prevented from escaping. After the coating is formed on the outside, the heat should be lessened. To cook a steak or chop about one inch thick to medium rareness, keep it close to the fire for about two minutes, then draw it a little distance away. It should be turned often.

Roasting. Roasting was originally practically the same as broiling, the only difference being in the thickness of the piece of meat to be cooked. However, such constant attention and such frequent turning were necessary that the old open-fire method of roasting was given up; what we call roasting today is practically baking. The same principle holds as in broiling—the heat should be great at the outset, then decreased. A temperature of 350° Fahrenheit is none too great for the first half-hour or thereabouts, until the meat is browned on all sides. The heat should then be checked, a temperature of somewhere near 200 being sufficient for the remainder of the time. Roasting meat should be basted frequently with the drippings in the pan, as this makes the meat juicy.

Boiling. Meat to be boiled should be, like that to be broiled or roasted, subjected to severe heat at first, that the juices may be kept in. It should be put into boiling water and boiled rapidly for fifteen or twenty minutes; then the heat should be lessened until the water barely simmers. When a bubble of air rises from the bottom of the pan every few seconds, the temperature is about right. All boiled or stewed meats are far more tender, juicy and nutritious if cooked in this way than they are if boiled rapidly. It takes, however, a longer time to cook them done. A fairly good-sized piece of fresh beef must cook for about five hours to be well done; a ham of about ten pounds, or a piece of corned beef, unless it is very thin, will take about the same time. The "fireless cooker" is very satisfactory in boiling or stewing meats, just for the reason that it keeps them for hours at a simmering point The meat is boiled for fifteen or twenty minutes, then the kettle is covered closely and placed in a box which is filled with hay, or some other non-conductor of heat. The box is then made as nearly air-tight as possible, and the water remains hot enough to cook meat for several hours.

Stewing is practically the same as boiling except that it is done in less water, and that the meat is usually cut up into smaller pieces. The temperature must be kept considerably below the boiling point. In braising and fricasseeing and pot-roasting the meats are first browned in hot fat and then stewed slowly.

Frying. Properly speaking, frying is boiling in hot fat, but the name is more commonly applied to the process of cooking in a pan, the bottom of which has been covered with fat. The former method is the better, as it is not so wasteful of the fat, which may be used more than once, and as it preserves the juices of the meat or fish better. The temperature of fat suitable for frying ranges from 300° to 400° Fahrenheit. Frying is the least healthful method for the preparation of food, and should not be used often.

Soup-Making. As in roasting or boiling the object is to keep the juices in the meat, in soup-making the object is to draw them out. Consequently the meat is cut into small pieces and put into cold water, which is then gradually brought to a temperature near the boiling point.

Starchy Foods. Starchy foods include various things besides starch, but the starch is the important principle in their makeup. All vegetables do not contain starch—for example, carrots, onions, turnips and tomatoes; but many of our important vegetables, as potatoes, beans and peas, are largely composed of it. The cereals, too, are starchy foods.

In cooking milk, eggs and meat we have seen that the most satisfactory method is to keep them thoroughout at a temperature well below the boiling point. With vegetables no such caution is necessary; in fact, most vegetables are better if cooked at a temperature above the boiling point, and all vegetables should be thoroughly cooked, though not overdone. Some vegetables, as potatoes and squash, have water enough in their composition to cook themselves and may accordingly be baked, or boiled in just enough water to cover them. In boiling meats, it is better to have the cover pushed a little aside, that the air may escape; but vegetables are better cooked with a tight cover to the kettle.

There are certain kinds of vegetables such as lettuce, radishes, cress and celery, which are usually eaten raw. This is not only because they taste better in this state, but because they are more easily digested. In eating raw foods of any kind, it is always very necessary to be sure that they are clean and fresh.

Nutritive value is not the only thing to be considered in the selection of a dietary. Some foods, especially certain fruits and salads, contain little nutrition but are of the utmost importance because of their effect on the digestive process. They bring about certain reactions which are very helpful. Fruit and salads should form an important item in the diet of every normal person.

The grains, wheat, rye, corn, barley, oats, which are from six- to seven-tenths starch, are chiefly used in two ways—as cereals and in doughs. Doughs include any mixture of flour of any sort with milk or water, no matter what the proportions or what the other ingredients may be. As in the case of starchy vegetables, it is necessary that all cereals and all doughs be thoroughly cooked, as underdone starch is very indigestible. Many housewives dry out their bread in the oven after it has been cut, and it is certain that some people can eat such twice-baked bread who cannot with comfort eat fresh, soft breads.

It is hoped that enough has been said to show in what a proper diet should consist. To sum up: the weight of authority seems to decide that a mixed diet is best—that vegetables and other starchy foods, fat in moderation, sugars, lean meat should all be used. The methods of combination are also important. As has been pointed out above, meat should not be served with eggs or with cheese—they supply more than is necessary of the same element. Starchy foods should, on the other hand, always be served with eggs, for eggs lack the starch elements. Watery vegetables and fruits should not be used together to make up a meal, as the combination is likely to cause fermentation.

Sanitation and Ventilation

There are no more important questions connected with the home than those of sanitation and ventilation. If people always built their own houses, a wise supervision at the time of construction could settle many problems once and for all. By far the larger proportion of

people, however, live in houses or apartments that have been built by others, and in those cases the most that can be done is to exercise great care in the selection of a location and to remedy so far as possible existing defects.

Drainage. The drainage is an extremely important point. Stagnant water should never be allowed to remain near a house, as it breeds all manner of diseases, and shows, moreover, a defective drainage system. If a house stands by itself, in a neighborhood where there is no sewage system, it is absolutely necessary, if the inhabitants are to keep well, that drain pipes be provided to carry waste water from the premises. The custom of throwing the water out near the house is as unsanitary as it is unsightly. Such a drain should empty as far as possible from the house—three hundred feet is a good minimum distance; and if possible the opening should be lower than the house. If a break of any kind is allowed to exist in drainage pipes for any length of time, much harm can be done by the injurious sewer gas.

Plumbing. Plumbing is a subject which is closely related to drainage. In communities where there is a public sewage system, the owners of houses have little to do directly with the drainage, but every family should understand the plumbing in its own house well enough to be sure that it is kept in proper order. A safe rule is that plumbing should be "open," that is, not boxed up, so that defects may be found easily; and that it should be as simple as possible. A plumber who is called in at any time to make repairs will gladly explain the simpler points of the system, so that small faults may be detected and corrected.

Water Supply. This is a point which should be second to none in the selection of a location for a home. The topic has, however, been fully discussed under the subject of food, and need only be emphasized here. The fact that there is a public system which supplies water to hundreds or thousands of homes does not necessarily mean that the water is always safe. Usually, however, the public is kept informed by the board of health as to the condition of the water supply so that proper precautions may be taken. In the country, where people depend on springs or wells, great care is necessary, especially in the case of the former. The ground near the spring should be guarded so that surface water cannot get in, and under no circumstances should waste of any sort be thrown near the spring. Wells should be lined to the bottom with cement, that surface water may not soak in from the sides, and should be as deep as possible. If there are inequalities in the ground, the well or spring should never be lower than the barn or outbuildings.

Cleanliness. Dust and dirt are not merely unsightly; they are harmful, as well. We have all stood in a darkened room to which only one sunbeam had entrance and watched the dust particles dance in the streak of light. It is hard, sometimes, for us to believe that the light has not some attraction for the dust—it seems impossible that all the air is as full of dust as the streak in which we can see it. But we really know that such is the case. Dust contains particles of matter from the body and the breath, and cannot fail to injure those by whom it is breathed. Even what we call "clean dust" has a very irritating effect on the lining of the nose and throat, and the so-called "dust catarrh" is common. It stands to reason that little is accomplished by dusting with a dry cloth. The dust is merely stirred up, transferred from the furniture to the air. A dampened or oiled cloth should be used, or a damp chamois skin; and the dust should be gathered up instead of being brushed off. The inexpensive vacuum cleaners have done much to aid in getting rid of the injurious dust.

Insects. Of late years we understand more clearly what a great amount of harm comes from the insect pests which are so troublesome to almost every housekeeper. Bedbugs have always been detested, and roaches have been treated as real enemies to the household; the common fly has always been looked upon simply as a nuisance but not particularly as a menace. It is likely, however, that more injury is done by flies in the household than by any other insect, because they are so much more numerous and because housekeepers who would not tolerate roaches or bugs of any sort put up with flies. When we consider where flies spend much of their time, about the refuse heaps and garbage cans and stables where their eggs are laid, it is clear that they must carry about on their feet much filth. In the house they alight instantly on any food that is left about uncovered, thus leaving the germs where they are certain to be taken into the stomach. That typhoid fever is spread by flies is not a proved fact, but it is positive that some diseases are so carried. It is not an easy matter to get rid of flies, but it can be done. Every opening should be closely screened, and the greatest care should be exercised when the screen doors are opened. Whenever a fly is seen indoors it should be killed.

Mosquitoes, too, are known to be carriers of disease, notably yellow fever. We are, however, not in quite so much danger from mosquitoes as from flies, for mosquitoes are such a pest that nobody is likely to allow them to remain in a house if it is at all avoidable. It is to be hoped that the time will come when a housekeeper will be as much ashamed to have flies or mosquitoes seen about the house as she is now to have bugs or cockroaches.

Ventilation. This is a subject which is receiving so much attention now that at times we grow almost tired of it, and wish the discussion would cease. Despite that fact, we all realize, to a certain extent, its importance; it is doubtful whether many of us who have not given the subject definite study do really understand how serious it is. We content ourselves with the general knowledge that everyone needs fresh air to keep in good health, and do not go further into the question. It is safe to say that the most of us do not have enough fresh air through the greater part of the day.

Too much cannot be said, at the outset, on the need for fresh air during sleeping hours. It is believed now by most authorities that the ideal way is to sleep out-of-doors in all but the most severe weather; some people remain out all winter, taking care, of course, to have clothing and bedding which is as light as possible but warm, for there is no merit to be gained from getting cold at night. If we cannot sleep out-of-doors, the next best thing is to make the sleeping room as near like out-of-doors as possible. There are people who even in hot weather have their bedrooms windows raised but a few inches, held so, perhaps, by a burglar catch; but if windows are to be opened but a little, it is almost safer to have it be in the summer than in the winter. For in the winter the house has been closed during the day, and the air has been vitiated by the artificial heat and by the breath and bodily impurities of people, who are much more likely to remain in the house in the winter than in the summer. It is a safe rule to make that a bedroom window should almost always be wide open; of course there are times when a high wind or a storm makes this impossible. A bed should not, however, stand directly in a draught, though no harm can come from allowing a breeze to blow into the face.

But when we have made our sleeping conditions as nearly ideal as possible we have done by no means all, for we spend but about a third of our time in sleep. In some carefully built modern homes there are devices which provide for ventilation mechanically; but unless there is such a system which brings air into the house, there is no way to get fresh air except to open doors and windows. Even in the coldest weather the house should be thoroughly aired at least once a day, and there should be some opening which constantly allows air to come into the house.

The latest authorities declare that it is not enough to have outside air admitted—that that provides only one element. The other element needed is moisture. You have noticed that when you go into a hot, dry room your eyes smart and burn. This is because the dry air, constantly seeking to become less dry, takes up the moisture which protects your eyeballs. It does the same to the lining of the nose and mouth. Now the moisture exists in those membranes for protective reasons, and harm is certain to come from its drying up. These authorities plead for moisture in the air. Keep water on the stove at a boiling point, they advise, and colds and catarrh will certainly be lessened. Then, too, when the air is kept full of moisture, the temperature may be lower than when the air is dry without causing discomfort. A room kept at 60° Fahrenheit would ordinarily be considered too cold; but when the air is moist, 60° is quite comfortable. There is an instrument called the hygrometer which measures and records the amount of moisture which is present in the air.

The questions of sewing in its various branches and of the care of the house demand detailed treatment and cannot be taken up here. The outline which follows shows the various departments of the subject of Domestic Science, with their subdivisions:

I. Foods
- 1. Classification
  - (a) Nitrogenous—Proteins
    - (1) Albuminoids
      - (a) White of eggs
      - (b) Blood serum
      - (c) Lean meat
      - (d) Casein of milk
      - (e) Gluten
    - (2) Gelatinoids
    - (3) Extractives
  - (b) Non-nitrogenous
    - (1) Fats
    - (2) Carbohydrates

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(a) Starch
(b) Sugar
(c) Vegetable acids
(c) Mineral
(1) Water
(2) Salts and acids
2. Food Values
(a) Heat production
(b) Nutrition
3. Marketing
4. Cooking
(a) Purposes
(1) To change food so that it becomes more digestible
(2) To make food more appetizing
(3) To free food from organic impurities
(b) Methods of applying heat
(1) Radiation
(2) Convection
(3) Conduction
(c) Special foods
(1) Milk
(a) Production of butter and cheese
(b) Changes produced by cooking
(2) Eggs
(3) Meats
(a) Relative values of different cuts
(b) Methods of cooking
(1) Broiling
(2) Roasting
(3) Frying
(4) Boiling
(5) Baking
(4) Starchy foods
(a) Vegetables
(1) Proper methods of cooking
(b) Grains
(1) Cereals
(2) Doughs
(5) Drinks
II. Clothing
1. Materials
(a) Sources
(1) Cotton
(2) Wool
(3) Flax
(4) Silk
(b) Methods of preparing
(1) Spinning
(2) Weaving

(3) Dyeing
(4) Printing
(c) Adaptability to differing purposes
2. Making
(a) Cutting and fitting
(1) Making patterns
(b) Hand sewing
(1) Gathering
(2) Hemming
(3) Overcasting
(4) Making buttonholes
(c) Machine sewing
(d) Embroidery and fancy stitches
3. Patching and darning
III. Household Economics
1. Sanitation
(a) Drainage
(b) Water supply
(c) Plumbing
(d) Warming and ventilating
(e) Cleanliness
(1) Freedom from dust
(2) Freedom from insects
2. Furnishing
(a) Decorations
(1) Color schemes
(2) Materials
(b) Ornaments
(c) Articles of furniture
3. Care of the house
(a) Care of floors
(b) Dusting
(c) Dish-washing
(d) Bed-making
IV. Care of Person
1. Care of clothing
2. Bathing
3. Care of teeth, nails, hair.

Questions

What is the meaning of the word *domestic*?

What advantage came to housewives when no longer obliged to make "homespun" cloths for family clothing?

Does the fact that women today take more time for recreation than formerly necessarily indicate that any household duties are neglected?

Is it economical for the average family to patronize bakeshops and delicatessen stores? What has occasioned the popular demand for these institutions?

In your opinion does the household conducted according to the teachings of domestic science find its expense is increased beyond the sum needed previous to the introduction of scientific housekeeping?

To what extent should the housekeeper understand how the butcher cuts up a beef?

Must one be especially proficient in chemistry to apply to her daily bill of fare the rules respecting chemistry of food?

Can one learn from a non-scientific volume the various desirable combinations of food, with respect to chemical needs?

What mineral substance is most essential to life? Does this mineral supply energy? What is its main function?

How would the entire absence of salt from food eventually affect the body?

Learn the meaning of albuminoids, then make a list of foods containing albumin.

What proportion of food should be albuminoids?

Is coffee a food? In what respects do you consider it a useful beverage?

How can you determine whether your well water is nominally pure?

Is the law a proper one which banishes public drinking cups?

Explain carefully why milk is an excellent food. If not a perfect article of food, what does it lack? In saying that an article is a perfect food what do you understand by the statement?

What chemical changes occur in boiling a potato?

Is an egg hard-boiled or soft-boiled more easily digested?

What should be the appearance of a satisfactory cut of beef-steak?

What is a fireless cooker? Upon what principle is it constructed? Can one be prepared at home at little expense?

Do you know of any vegetables which, eaten raw, are easily digested?

Scientifically stated, why is too much sweet food injurious?

Is it healthful to sleep in a very cold room?

How many cubic feet of impure air are expelled per minute by the lungs?

Why is the vacuum cleaner especially sanitary?

How do flies carry contagion? Is there much danger of disease from this source?

Is it possible for a community practically to rid itself of flies? Have you ever read of a place where it has been accomplished?

Where there are many flies would you also expect to find many mosquitoes? Do the same causes produce both?

BY D. R. AUGSBURG, AUTHOR OF AUGSBURG'S DRAWING COURSE

INTRODUCTION

BY THE EDITOR

The System Taught in This Book. The exercises here given were prepared by Professor D. R. Augsburg, author of *Augsburg's Drawing*. After many years of experience as a teacher and supervisor of drawing, Professor Augsburg has solved the difficult problem of presenting this subject systematically and upon a scientific basis. The success of his work is such that within the few years since the publication of his books they have found their way into the public schools throughout the United States and also in some foreign countries. Wherever used they have been productive of excellent results. In these exercises Professor Augsburg gives the principles underlying his system of drawing, and shows the method of their application. The exercises are plain, simple and arranged in logical order. The directions are so complete that anyone can follow them, and any person who will practice these exercises as directed will learn to draw and thereby add to his other powers of expression that of pencil and brush.

Drawing a Natural Mode of Expression. Drawing is a mode of expression. It is as natural to the child as writing and is used by him long before he learns to write, and in many instances even before he learns to talk. Experienced teachers of drawing claim that were drawing taught with as much care and persistence as language in the primary grades of the public schools, the children would go from these grades as proficient in one mode of expression as in the other.

The practical value of ability to draw even simple objects is almost beyond estimate, let one's occupation be what it may; while to those engaged in the occupations of carpenter, blacksmith or dress maker, and in other common occupations requiring mechanical skill, a knowledge of drawing is indispensable. Notwithstanding this, how few can draw even the simplest designs. The common expression, "I can't draw a straight line," is in most cases more real than imaginary.

Importance of Drawing. Whoever goes into life without knowing how to draw is handicapped in his ability to express himself. Ability to draw also enables one to make plain many things which cannot be explained by words alone, as the description of a machine or the plan of a house. Moreover, a knowledge of drawing gives one a knowledge of form and size which enables him to judge machines, tools, houses and other structures more accurately than is possible without such knowledge; it gives him an insight into the beauties of form and structure in the various objects of nature—as rocks, flowers, insects, birds and animals, and this contributes much to his enjoyment of the works of creation. From any point of view, the man or woman who can draw has great advantage over one who cannot.

Considering the importance of drawing, we often wonder why so few people are able to draw even the simplest objects, and when we compare the results derived from teaching drawing in the public schools with results from teaching other branches, we find the comparison anything but encouraging. Doubtless the chief reason for the failure to secure good results in drawing lies in the fact that drawing has not been, and in general is not yet, taught as systematically as are the other branches in the course of study. This does not mean that regular lessons in drawing have not been given, but it does mean that underlying principles have not been presented and drilled upon as they are in the teaching of arithmetic, language and other common branches. Where this is done the children learn to draw as readily as they learn writing, language or other subjects. It is the purpose of the exercises on the following pages to illustrate how drawing can be taught systematically and how anyone who so desires can learn to draw.

BY D. R. AUGSBURG

Free-Hand Drawing

Mediums of Expression. The three great mechanical mediums through which we formally acquire and express thought are:

Language, the medium of communication,
Number, the medium of measurement,
Drawing, the medium of form and color.

FIG. 1

These three mediums, or studies, are fundamental in character and largely mechanical in construction. The elements are taught and learned more or less mechanically, and are the basis of all other branches.

The esthetic element is common to all of these mediums, in language as poetry, in number as rhythm and in drawing as the artistic. Music is the esthetic element of sound.

The mechanical elements of the above studies can be taught by all teachers and learned by practically all pupils, and during the process of teaching and learning, the esthetic elements are more or less absorbed.

Elements of Free-Hand Drawing. The fundamental elements of free-hand drawing are:

Position, or the placing of objects,
Direction, or the surface of objects,
Form, or the shape of objects, and
Proportion, or the size of objects.

These elements are mechanical and can be taught by all teachers and learned by practically all pupils. They are to drawing somewhat as addition, subtraction, multiplication and division are to numbers. Through them the fundamental processes of drawing are taught and learned.

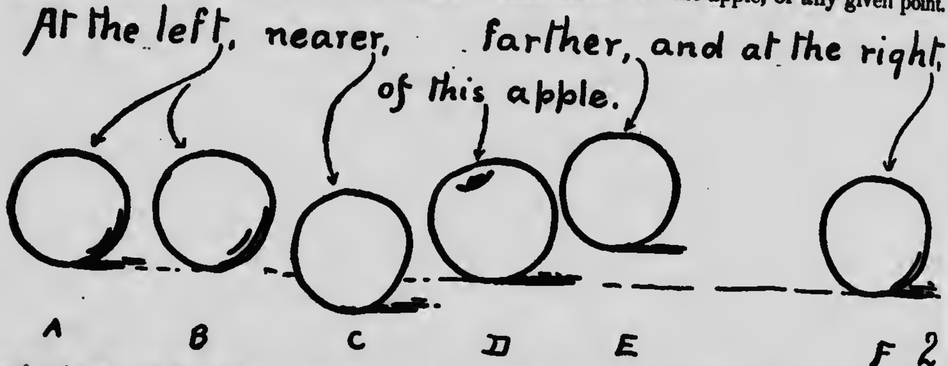
To these may be added the esthetic element, which in drawing is called the artistic or character element. This element is gained largely through absorption. The artistic cannot be taught in the direct manner of the mechanical elements, but is gained more slowly as the principle and the mechanical processes are learned. As the fundamental elements or processes are taught, the esthetic element is absorbed to a greater or less degree, according to the temperament of the pupils.

Position. Position tells how to place objects in the picture or drawing. From the first,

position deals with one object or a part of an object in relation to other objects. If two apples or three balls are drawn, each must have its place; and in advancing to higher levels, it is groups of objects and things, groups of animals, groups of boys and girls, forms of hills, dales, plains and trees, which must have their position

away the object, the higher it rests in the picture; the nearer the object, the lower it rests in the picture.

It will be seen from the above that the element *position* has four principal directions from a given point. To the right, to the left, farther, and nearer than the apple, or any given point.



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in the picture. Position includes perspective and composition. *Position* shows how to put objects in a definite place; *perspective*, how to place them different distances away, and *composition*, how to arrange them in a pleasing group. In Fig. 1 each part of the head, eye, nose, mouth, chin, ear and hair has its place. If one wishes to learn how to draw the human head, the first lesson would deal with the placing of each part.

The best objects with which to learn placing are apples and balls. The apple is the center, and the balls are to be placed right, left, farther and nearer, following definite exercises.

Work out such exercises as these: Draw an apple. Place one ball at the right and two farther away. Draw an apple. Place one ball at the left, three farther away and one nearer. Work out about twelve exercises of this nature.

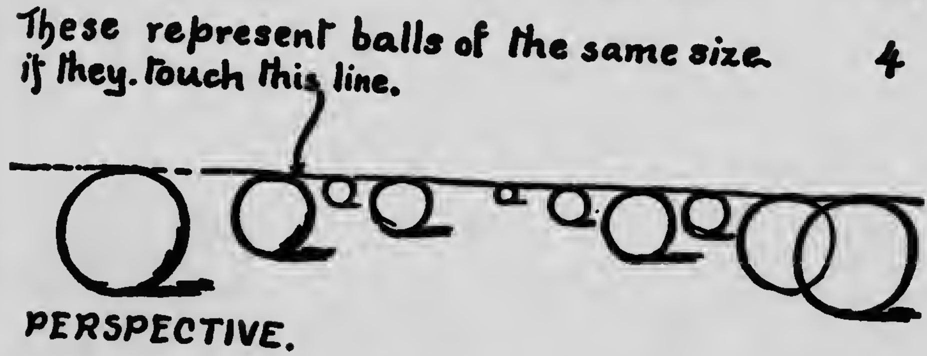
General Principles. In Fig. 2 there are five balls and one apple. Ball F is at the right of the eye. Balls A and B are at the left of the apple. The apple and balls A, B and F are the same distance away (back). Therefore: Objects on the same horizontal line are the same distance away. Ball E is farther away than the apple; ball C is nearer than the apple. The farther

Use models. Progress is more rapid with models than without. Round objects, such as apples, balls or oranges, may be used. The use of the model is to verify what you learn in the drawing. You need not draw from the model, but use the models to verify or prove your drawing.

After some power is gained in placing the balls and apples, then other objects may be used, as, for example, the deer and trees in Fig. 3. Here the deer takes the place of the apple as a center, and the trees are placed right, left, farther and nearer.

Croquet balls and a stake, one black marble and a number of lighter ones, a tree trunk and apples, pears or other fruit, all make excellent models with which to learn placing.

Perspective. Perspective is a branch of Position, and tells about representing objects different distances away.



The simplest way of teaching and learning perspective is arbitrarily to represent the top or a definite part of the object as being level with the eye. This level of the eye is indicated by a light horizontal line, as shown in Figs. 4 and 5.

The method gives perfect perspective, and by using it one learns perspective to the extent that objects near and far away can be represented with ease and with a fair degree of accuracy. The process is as follows:

Draw a light horizontal line, as in Fig. 4. This line represents the level of the eye and is called the horizon line.

Draw balls of various size, making the upper edge of the balls touch the horizon line. Then it makes no difference how large or how small the balls may be drawn; they are in perfect perspective. The line under the ball indicates the surface of the ground and marks the position of the ball. The balls are in reality the same size, the farther ones being drawn smaller because farther away.

Use heavy lines for the nearer balls and lighter lines for those farther away.

Make the nearest ball about one inch in diameter on paper, and on the blackboard about five inches in diameter.

Use balls when studying a principle. Why? Because balls are easy to represent, and have so little personality that the attention is not attracted to them sufficiently to lose sight of the more important element, principle. But the same principle is applicable to other objects in the

In B, the farthest house has a tree at the right of it and one farther away. Objects may be placed at the right, left, farther and nearer than a given object, the same as in placing.

To learn perspective one may draw such exercises as the following: Draw six balls various distances away. Draw five trees various distances away. Draw four houses various distances away. Work such exercises as these until you have acquired the skill necessary to represent objects various distances away.

PERSPECTIVE — *Place the roofs and tree tops above the horizon line, and the tree trunks and main part of the houses, below.*

same manner as to the balls. In Fig. 5 are wigwams. By placing the top of each even with the horizontal line, perfect perspective is represented.

When drawing tall objects, like trees and houses, part may be placed above the horizon line and part below. In A, Fig. 6, the tops or foliage part of the trees are drawn above the line and the trunks below. The trunks are of the same length. In B, the main or rectangular part of the houses are drawn below the horizon line, and the roof or triangular part above the line.

Of course, using the horizon line is a means of learning perspective; in nature objects are not cut by the horizon line like this, but after you have learned how, then the irregularity of nature may be taken into consideration.

Composition. Composition is the arrangement of objects in a pleasing group. The most simple, pleasing arrangement is triangular. In A, Fig. 7, is a triangle and below it are three balls, one on each angle of the triangle, and still lower down; in G, are the trunks of three trees arranged in the same manner. In like manner, B, C, D, E and F show the different arrangement of triangles;

under each triangle are the balls grouped in the same manner, and below these is a composition illustrating the group. Thus, group H corresponds to B; I, to C; J, to D; K, to E; and L, to F.

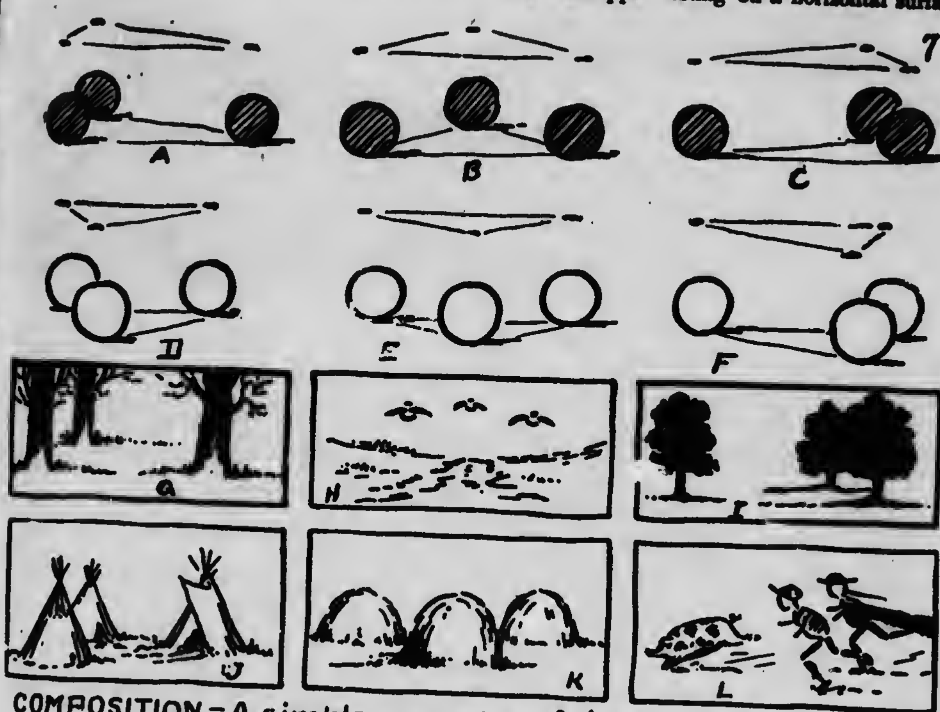
Grouping may be learned by composing such exercises as these: Make a group of trees based on triangle A, triangle B, triangle C, and so on.

Direction, or the Surface of Objects

Direction. Direction tells about the surface of objects and the various lines that indicate surface.

and are indicated by the vertical, horizontal and oblique straight and curved lines.

In A, Fig. 8, the trees rest on a horizontal surface indicated by the horizontal lines; also in F the horizontal horizon line suggests the horizontal surface of the water. In B the single tree rests on an oblique surface suggested by the oblique line of the slope. In E the vertical lines of the cliff suggest their vertical surface. C represents an outward curved surface and D an inward curved surface. The representation of surfaces may be learned through such exercises as these: Draw an apple resting on a horizontal surface;



COMPOSITION—A simple grouping of three objects.

Direction also indicates act · the action of growth as seen in growing plants; the action of inanimate form as seen in the movements of animals, and the action of rhythm as seen in graceful movements.

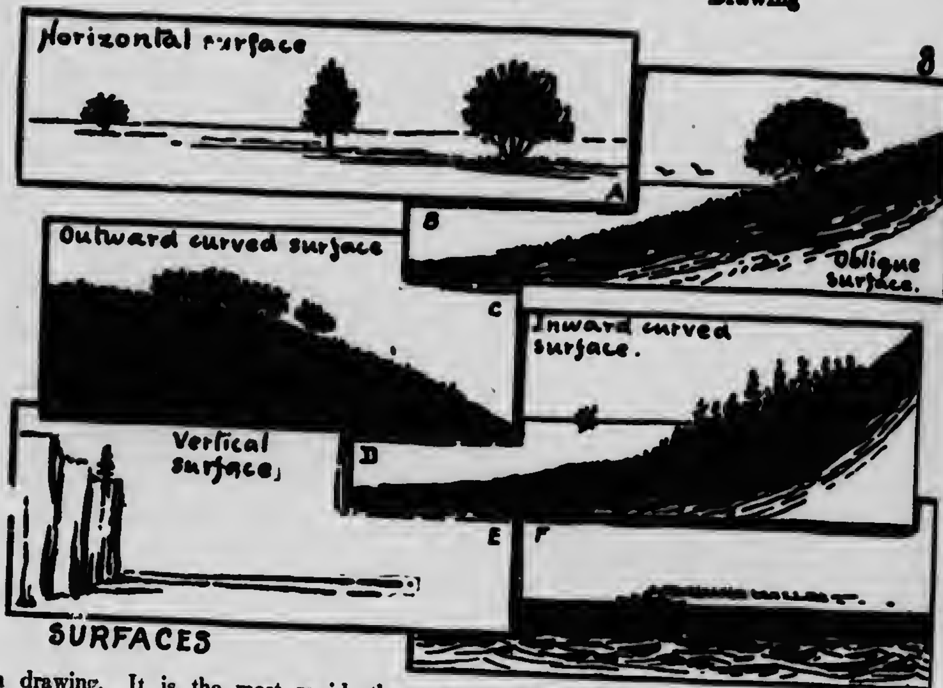
Direction is indicated by lines. It is the office of a line to show direction. A vertical line indicates a vertical direction or surface; a horizontal line, a horizontal direction or surface; an oblique line, an oblique direction or surface, and a curved line, a curved direction or surface.

The principal directions that lines may take are, therefore, vertical, horizontal and oblique,

on an oblique surface; on an outward curved surface; on an inward curved surface. In like manner represent other objects on the various surfaces, such as trees, wigwams, posts, balls and houses.

Lines. In Fig. 10 are shown the lines used in drawing. Of the above lines, the first group, the unaccented lines, are learned first. These should be learned before the accented group is taught at all. In general, use the heavy lines in the placing of objects, and the light and medium lines in perspective.

The graded line is the most important line used



SURFACES

in drawing. It is the most rapid, the most serviceable, and the most pleasing of all the lines. This line should be learned, however long it may take, or however great the exertion put forth in learning it. Learn to draw it from light to heavy, or from heavy to light, at pleasure.

In Fig. 11 are examples of the graded line which show how much may be accomplished at each stroke. Observe that the stems are made with a single stroke, and that the joints are represented by a space. Practice these lines until learned.

The *emphasized line* is a line accented by drawing one or more lines parallel and close to it, in such a manner that the general effect is that of one line or direction. Important lines and round surfaces should be emphasized.

The *broken line* is to indicate a broken surface, such as the roughness of ground, the irregularity of grass, the broken appearance of stone, or the bark on tree trunks. Both the broken and emphasized lines may be and usually are graded.

All that is truly great comes to us by slow degrees. It is the same in acquiring these lines. There is the least character in the unaccented lines, and the most in the accented, hence these latter are more gradually acquired, and of these the broken line seems to be the last one to be learned.

The different lines should be learned so well that they can be used at any time and in an almost automatic manner. Lines are the words of the drawing language. If they are not learned, they cannot be used, or if learned imperfectly, their use will be labored and imperfect. Learn these lines, and learn them now.

The birds' nests in Fig. 12 are examples of the broken line. The broken line is learned largely through the copy.

Action Drawing. Action is that part of direction that relates to motion. In a general way direction implies motion, and motion in drawing is largely indicated by lines.

Lines not only express action, but each line has a leading expression of its own that is of vital and far reaching use in action drawing. These expressions are as follows:

Vertical lines are the "still" lines. They express stillness, but when in motion they express vertical motion, as seen in falling water, rain and snow.

Horizontal lines are the "sleep" lines, and suggest repose; but when in motion they express horizontal motion, as ripples in still water.

Oblique lines are the "go" lines, and express movement more than any other kind of line.

Curved lines are the "grace" lines. They express graceful movement and harmonious action.

Parallel lines are the "order" lines. They express order. When the hair is combed, the lines are made parallel. Parallel lines when in motion express uniform motion.

Angular lines are "discord" lines. They are the lines of disorder and express violent action, as in explosion; awkward action, as in clumsy movement; and disorder, as in untidy hair.

Method of Teaching Action. Action is taught through the copy. It is practically impossible for the average draughtsman to learn action through the object that expresses the action. There is not a movement of an object, or animal, so slow that it can be grasped by a learner to the extent that he can transfer it to paper; hence, first efforts, at least, in the learning of action should be from the copy. An excellent plan is as follows:

First: Learn how to express the action from the copy; that is, learn the mechanical process—the lines that represent action and the method of using them.

Second: Use the action thus learned in memory and imaginative work until the action can be represented with some degree of facility.

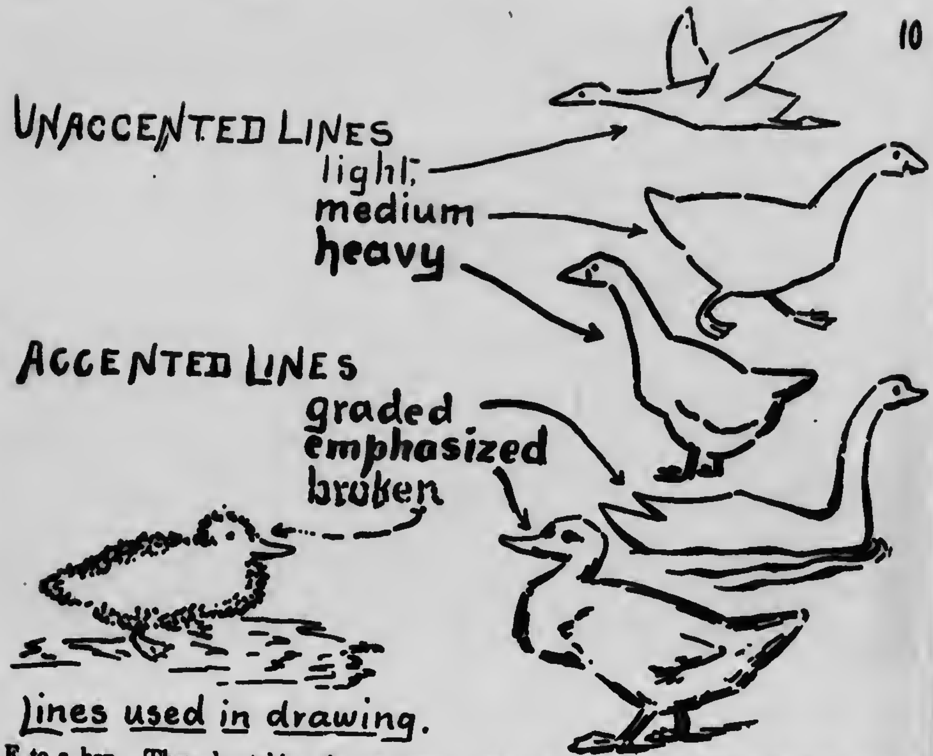
Third: Use direct observation to verify, correct and perfect the action until it can be represented with both facility and accuracy. These three steps are not widely separate, but may occur in the same lesson.

For example, we will choose the action of running. There are many phases of running, but perhaps that represented in A, Fig. 14, is as simple as can be made. Learn this action by carefully copying A, and then for practice, draw an Indian boy running, B; then a Chinese boy, C: a sailor boy, D; and a soldier boy, E.

Then take another phase of running, as shown in F. In this phase the knee joint is represented by a space. A space can represent an idea as well as a line. To learn this, first carefully copy the action; then represent a summer boy. F, running; then a winter boy, G; then a colonial boy, H, and so on until the action is learned.

Action is impersonal, that is, it is not a part of the object that expresses the action. Character belongs to the object, to the individual; character and action we often think are one and the same. The action or running is common to all animals alike, but the character of the run belongs to the individual. For example, the running of a turkey, a goose, a hen, a dog, a cat, and a squirrel are in principle the same, but the character of the run is so different that we recognize each one at a glance.

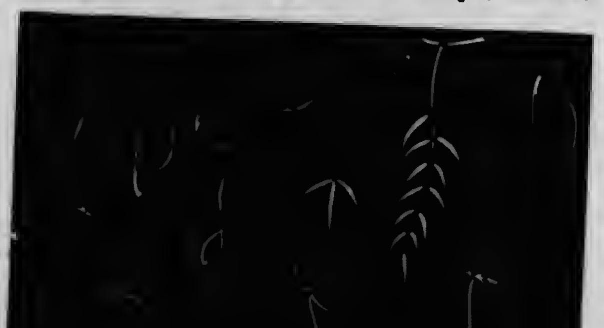
In Fig. 15, A represents the action of running; in C it is applied to an ostrich, in D to a goose,



Lines used in drawing.

in E to a hen. Then, by taking the two hind legs as one, and the two fore legs as one, the same action is applied to a deer, a horse, a pig and a dog.

Broadly speaking, there are five great groups of action, under which nearly all phases of action may be placed. They are the running group, the walking group, the standing group, the sitting group and the reclining group. For example,



dancing and jumping would be classed under the running group.

In the running and walking groups, the "go," or oblique, lines predominate; in the standing group, the "still," or vertical lines, predominate; in the reclining group the horizontal lines predominate, and in the sitting group the vertical and horizontal lines unite. The "grace," or curved lines, would predominate in dancing, "order," or parallel lines, in the marching of soldiers, and angular lines in a fight.

The Action of Rhythm. Lines not only show direction, and suggest motion, but they may represent rhythm. Rhythm is graceful motion, and in drawing is indicated by graceful lines. All nature is full of rhythm. We see it in the waving grain and bending trees, in the motion of water and the swirl of smoke, in the markings on the feathers of birds, and in the graceful folds of drapery. It is seen in the movements of a kitten and in the color of a lily; it is heard in the call of a lark and in the grand roll of thunder. It is all about us. It is in the graceful or rhythmic motion of sound, color and form.

Rhythm finds its expression in skill, in rhythmic skill. Rhythmic skill is doing things easily, quickly and gracefully. Decorative design is that department of drawing which deals with the ornamentation of forms, and has for its basis rhythmic skill.

A good way to acquire rhythmic skill is through two-handed drawing on the blackboard. Fig. 18

shows the method, and Fig. 17 shows some excellent examples to practice.

Decorative Design. Decorative design relates to the ornamentation of form, and the designing of form in which the decorative element is primary. In Fig. 19 are represented the line elements in decorative design.

The single and double curves are to modify form, as for example, in Fig. 20, A is a rectangle; in B, C, D, E, F and G, the single curves, both inward and outward, are substituted for the vertical lines of the rectangle; and in I, J, K, L, M and N, the double curves have been substituted.

An inward double curve is one that curves in at the top, and an outward double curve is one that curves outward at the top.

O, P, Q, R and S are pitchers made from the above forms.

Branching is of two kinds—outward and inward. Outward branching is the branch curving outward from the main stem, as A, Fig. 21. The shorter curve is the branch. Inward branching is the branch curving inward toward the main stem, as B, Fig. 21.

D is an example of inward branching, and all the others are examples of outward branching.

These branching elements are fundamental in character, and are the basis of an infinite number of combinations running through the entire subject of decorative design. To draw these curves and branches with facility requires much practice and persistent effort, but so important is it that these elements be acquired, that almost any amount of application and hard work is justifiable in their acquisition. The designer must acquire the ability to draw these curves and branches with ease, freedom and skill.

Fig. 22 represents the chief form elements used in decorative design and the three ways of apply-

The Action of Running

ing them. The geometrical forms are the same as those used as measures of form. These forms are used in the planning of ornaments, and as

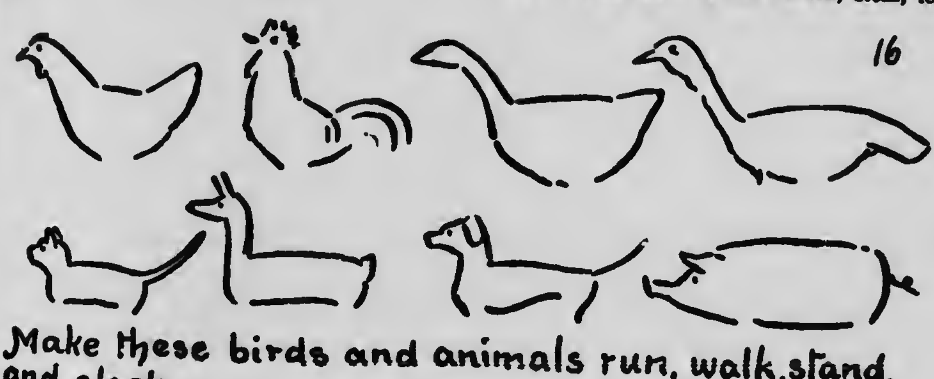
form measures in making designs. The use of these forms is shown in the following discussion on form:

A unit in decorative design is one of the parts used in making the design.

The sources of units are as follows:

The geometrical forms, such as the triangles, rectangles, diamonds, circles, ellipses and ovals.

Plant forms such as the branch, stem, leaf,



Make these birds and animals run, walk, stand, and sleep.

bud, flower, fruit and root of any kind of tree, shrub or plant.

Animate forms, as the head, body, legs, tail and product of all kinds of animals, birds and insects, fish and reptiles.

Natural forms, as water, snow, ice, icicles, waves, running water, smoke, clouds and wind, shells and minerals.

Artificial forms, such as ribbons, flags, stream-

ers, banners, ropes, chains—in fact, any object made by man.

It will be seen from the above that it is quite impossible to give even a superficial list of the units that may be used. Yet, while this is true, there are certain elements common to all decoration that have their origin in the experience of the past, and have been handed down to us as the fruit of successful experience.

These elements, as near as possible, have been reduced to their most simple form in the five standard units, A, Fig. 23. These units are the result of many years of research and study, and include nearly all the elements used in historic ornament and modern decoration.

These units are so fundamental in character that through them we can learn to use any unit or form, however varied or complex it may be.

These standard units are very similar in their construction, and have elements that are common. The two main lines of each are examples of outward branching.

Carry the point A of the blade around farther, and the trumpet is formed. Carry it still farther and the whorl is formed. Eliminate the point entirely and the loop is formed. Add to the blade another point and the shoulder is formed.

The names of the standard units are given from a real or fancied resemblance to the object after which they are named.

These units are classic, and therefore universal in their application. They can be applied to centers, borders, bands, flat patterns, covers, supports, or any other form of decoration. They will be used throughout this course; therefore they must be fully memorized. We must know them as a carpenter knows his tools.

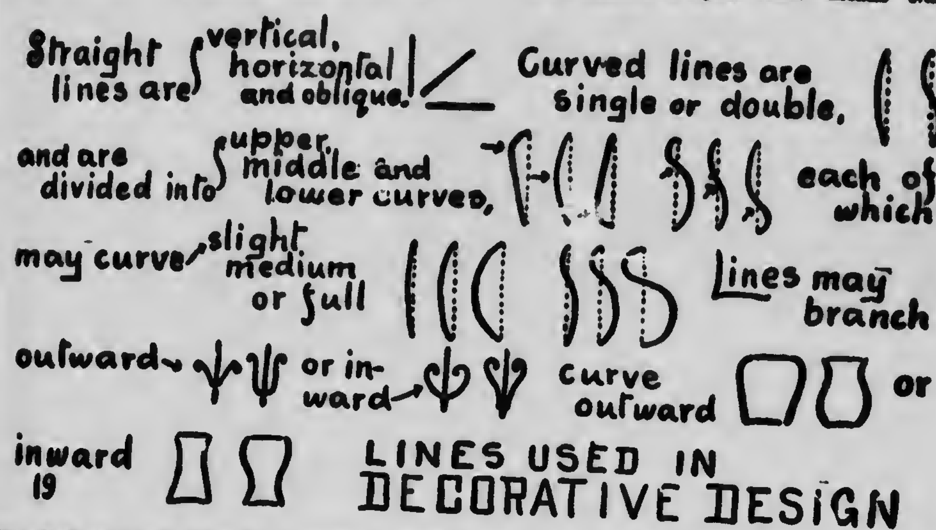
The combinations of these standard units are practically unlimited. Their elements enter into nearly every form of decorative design.

They can branch outward, as in A, Fig. 23; branch inward, as B; branch inward with double curves, as D; and outward with double curves, as C. In Fig. 24, the loop is shown in each of these branchings. Fig. 24 represents the Greek anthemion.

The standard units can be combined, as shown in Fig. 25, forming wing units. The first and second rows represent the blade united with each of the standard units. In like manner each standard unit may be united, thus forming endless combinations.

The standard units, the single and double curves with their inward and outward branchings, and the geometrical forms are together a complete set of tools with which to work in decorative

design. They are decorative words to express decorative thoughts, figures of design to work out problems of ornamentation. They are servants of the mind, and as such the greatest liberty may be taken with them; they may be added to, subtracted from, multiplied, divided, or modified in any way the mind may devise. There are no more elements to be given; the list is complete. All that now remains is to make these tools our own until they become willing and obedient instruments in our hands. They have infinite use, and can be applied to all decoration.



Form

The Measures of Form. Form tells about the shape of objects. The most simple forms that can be seen, recognized and named are the triangles, rectangles, circles, ellipses, and ovals. These forms in mathematics are called geometrical forms, and in drawing, type forms; but a still better name is measures of form, for their use in drawing is to measure form. They are the standards, or measures, of form, very much as a pound is a measure of weight· a gallon, of liquid, or a dollar, a measure of money.

The circle can be modified only in size but the remaining measures of form may be made narrow, medium and wide, as shown in Fig. 26. The triangle may be drawn with the apex pointing upward or downward, as in A. The rectangle may be vertical, as in C, or horizontal, as in D. A vertical rectangle is one longer vertically, and a horizontal rectangle is one longer horizontally Ellipses may be drawn vertically and horizontally, as in E and F. The oval may be inverted. There are other modifications, but these are the ones mostly used in the measures of form.

Right means *straight; acute* means *sharp;* and *obtuse, dull. Tri* means *three,* hence, *triangle* means a *three-angled figure. Rectu* means *right,* hence, *rectangle* means a *figure composed of right angles. Apex* means *top;* base, *bottom,* and *altitude, height.*

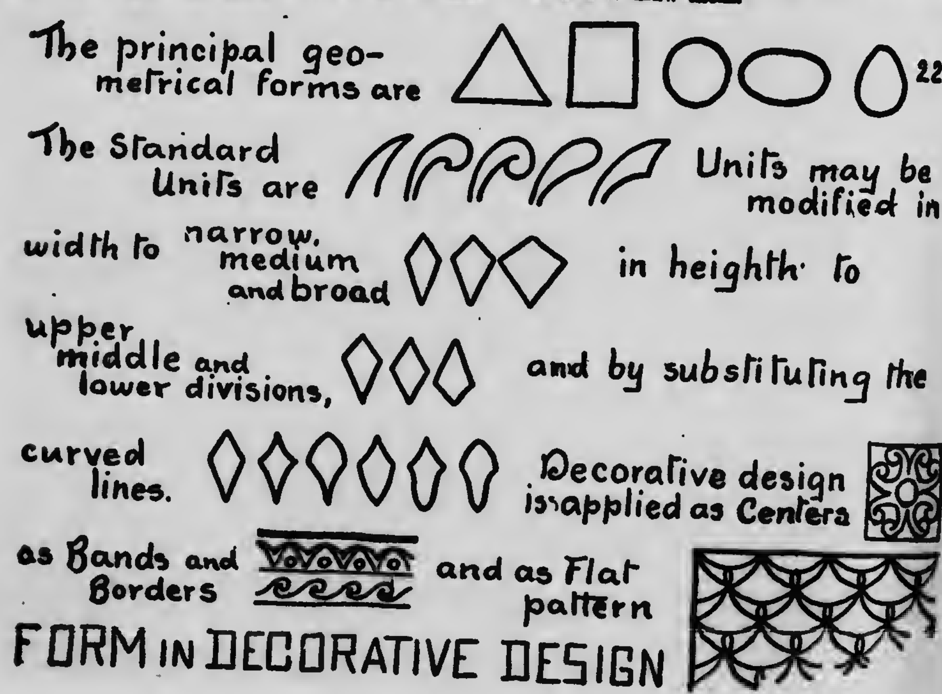
The uses of measures of form are to aid in recognizing and grasping the shape and propor-

tion of objects, to the extent that they can be reproduced in drawing. They also aid in making complicated objects simple and easy to grasp as a unit. These geometrical forms are measures of form in the sense that we recognize other and more complicated forms through their aid. These

measures of form are common in all form, both natural and artificial. We see them in the shape of trees, plants and shrubs; of leaf, bud, flower and fruit; in the shape of bird, animal and reptile, and in what they make. The hills and dales, forms of water, great clouds, the broad masses of light and shade, are all full of these simple form measures. The architect combines them in endless variety and ever changing proportion; the engineer in his greatest works and most complicated problems never departs from the simplicity of these form measures. The carpenter, the blacksmith, the cabinetmaker, the tailor, the dressmaker, artist and artisan, from the designer of the greatest sky scrapers to the humble workman who digs the foundation, base their work on these simple fundamental forms.

In Fig. 5 the triangle is seen in the wigwams. In Fig. 6 these forms are seen more or less in the tree tops and the houses. They are common in Fig. 9. The birds' nests in Fig. 12 are triangular, rectangular, round, oval and elliptical, and in decorative design they are the fundamental forms. In Fig. 28 the forms are used in designing a pitcher. In like manner they could be used in designing any other object.

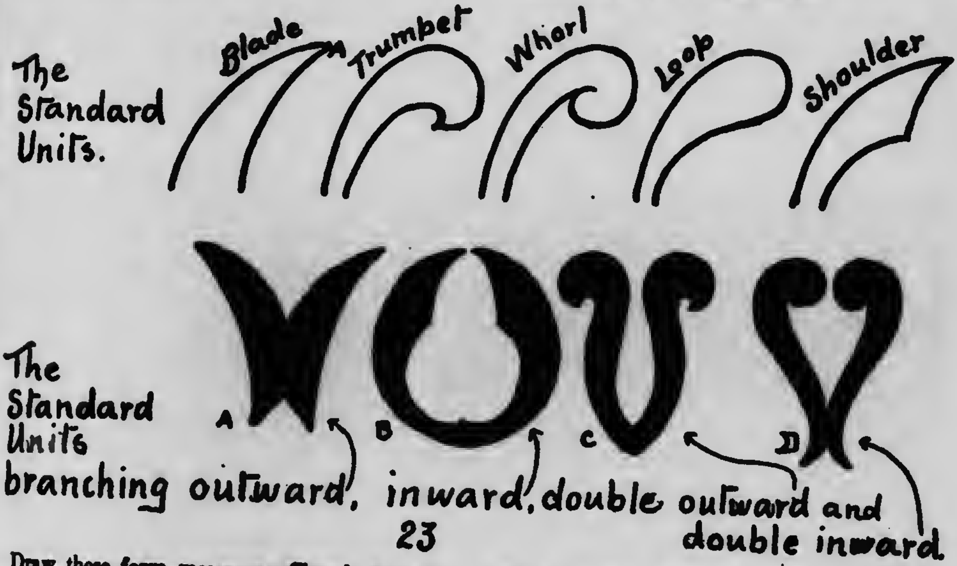
Drawing the Measures of Form. A measure of form to be used must be thoroughly learned—learned so well that it can be drawn easily and quickly. The best way to learn these forms is to draw them.



All measures of form should be drawn with light lines—with sketch lines. These forms are not an end in themselves, but merely a means to an end, and for that reason should be drawn so lightly that it will not be necessary to erase them in the completed drawing.

power and acquires the swing of the lines, his efforts become more and more accurate until crowned with success.

Draw the measures of form about two or three inches long on paper, and from fourteen to twenty inches on the blackboard.



Draw these form measures offhand, without the aid of ruler or compass, and with the minimum of guide lines, dots and other devices. Draw the ellipses, ovals and circles without aid of any sort. It can be done. At first the results are discouraging, but as the student gains in

When turning these measures of form into other objects, use a full range of line. Use all or as many of the lines in Fig. 10 as is necessary. The test of knowing these forms is the ability to draw them and use them as measures of form—to use them as measures of the great world of form.

An excellent way to learn these forms is to use them as measures of other forms. For example, procure a palm leaf fan; study it, draw it until you have learned how to represent it, then draw fans shaped like the various form measures. Do the same with a padlock, a pitcher, jug, teapot, sign board, and similar objects.

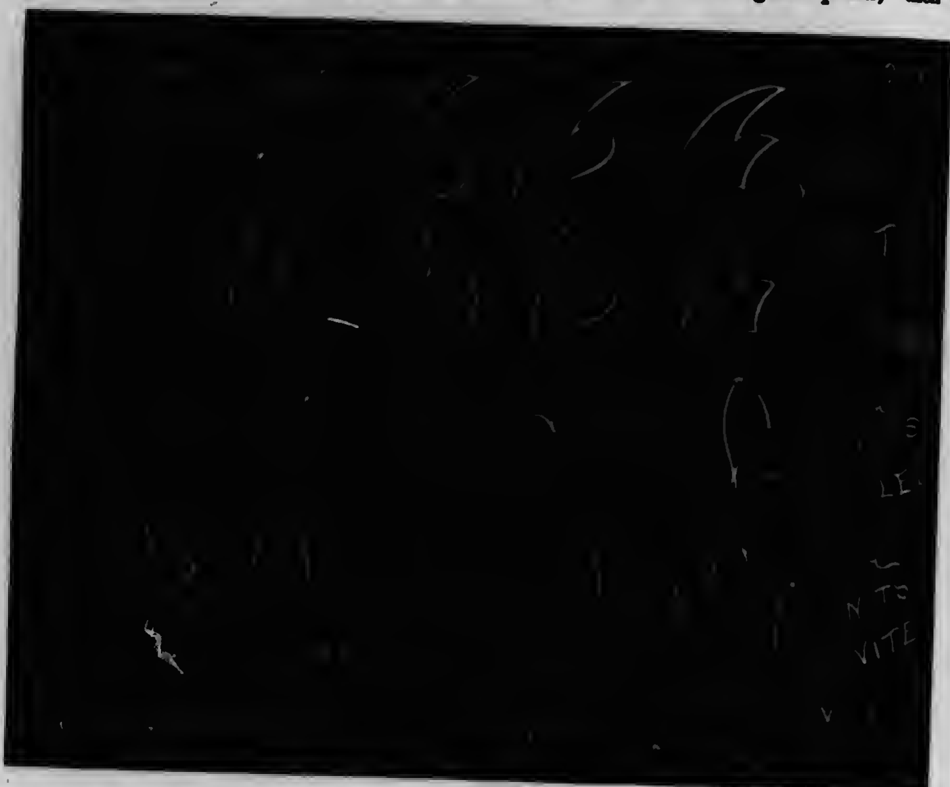
The Chief Measures of Form. The triangle, rectangle and the circle are the most important of the measures of form. By adding the third dimension to these forms, the prisms are made, giving the triangular prism, the rectangular prism, and the cylinder, which become the measures of solids.

The triangular prism is the form measure for objects containing oblique lines.

The rectangular prism, or box form, is the form measure for square-cornered objects.

The cylinder and the sphere are the form measures for objects containing curved lines.

In these form measures are represented the mechanical elements of drawing, and are the form basis of a vast range of objects that more or less embrace all form. These measures of form must be learned thoroughly; we must know them as we know the multiplication table, so well that they can be used instantly, without confusion or hesitation.



Parallel Drawing

The Rectangular Prism or Box Form. In Fig. 31 are represented the rectangle and the three most important triangles and their prisms. Read from the top downward, and in the first column we have, first, a right angle; then a rectangle; then a rectangular prism; then an oblique rectangular prism, showing the order of origin and the order in which they should be studied.

Parallel drawing, or as it is often called, parallel perspective, is represented by row C. *Parallel drawing* is representing objects with the front face parallel with the surface on which the drawing is made. This surface is called the picture plane.

Oblique drawing, or oblique perspective, is represented when the object is drawn at an angle with the surface on which the drawing is made.

Fig. 32 represents a box with the front face open and toward you. Procure such a pasteboard box and place it on the table before you in the same position and observe that the box has:

1. Six faces—Top face, bottom face, front face, back face, right face and left face.

2. Four vertical edges, four horizontal edges, and four horizontal receding edges.

3. Twelve edges or lines in all. These lines are divided into three sets of four lines each: A set of four vertical lines, a set of four horizontal lines, and a set of four horizontal receding lines. The vertical lines are all drawn parallel with the sides of the paper on which the drawing is made; the horizontal lines parallel with the top and bottom of the paper, and the horizontal receding lines all converge to a point.

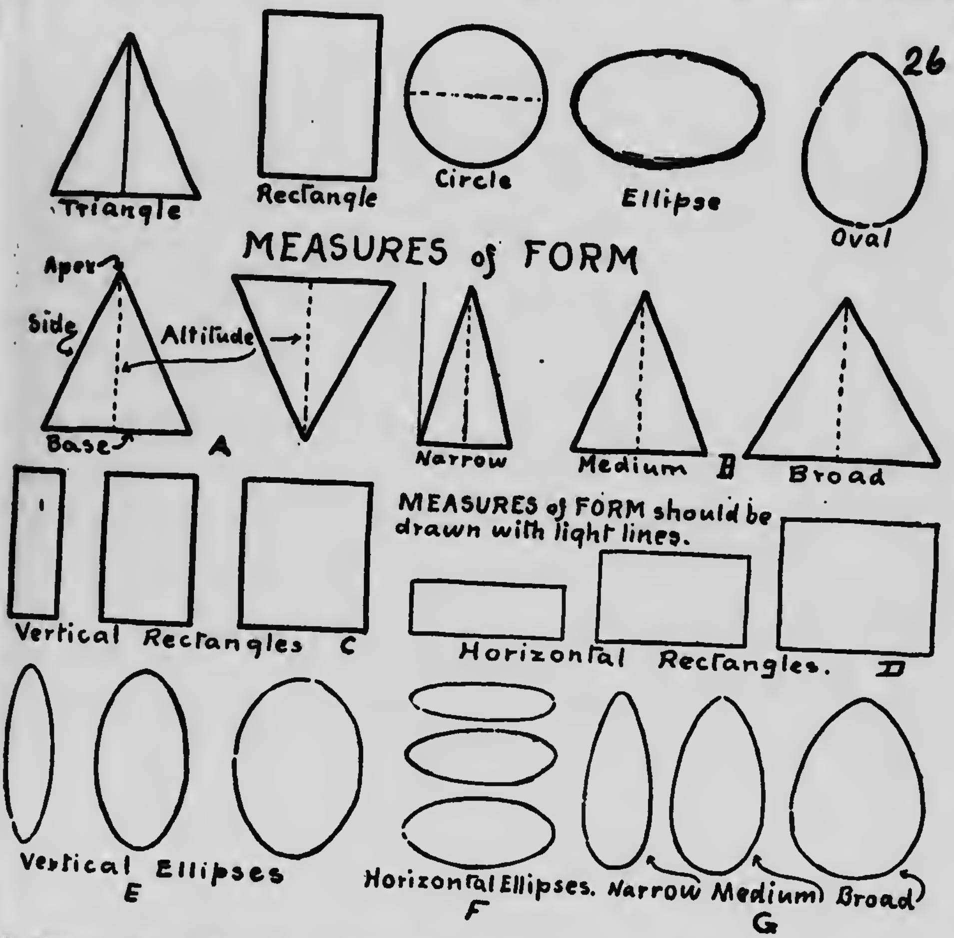
The horizontal receding lines converge to a point called the eye-point, or center of vision. This is an imaginary point directly opposite the eye, to which all horizontal receding lines converge.

The horizon line represents the level of the eye, and is often called the level-of-the-eye-line. The horizon line is to show whether the top or bottom of objects can be seen. If the object is below this line, the top can be seen, and if above, the bottom can be seen. The horizon line always passes through the center of vision.

The center of vision, or eye-point, shows where the horizontal receding lines converge and also whether the right or left face of objects can be seen.

Observe in Fig. 33:

That the box can be drawn in nine positions.



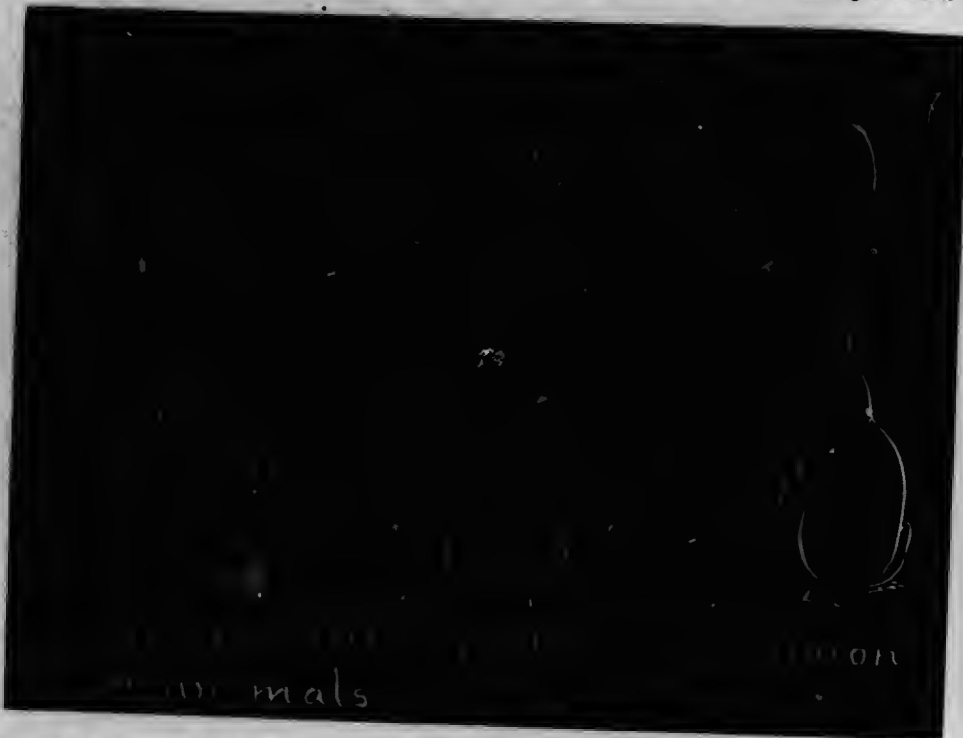
That when drawn above the level of the eye, the bottom faces can be seen. (Boxes H, C and I.)

That when drawn below the level of the eye, the top faces can be seen. (Boxes F, B and G.)

That when drawn at the left of the eye, the right faces can be seen. (Boxes H, D and F.)

That when drawn at the right of the eye, the left faces can be seen. (Boxes I, E and G.)

That the vertical lines are all drawn parallel with the sides of the paper on which the drawing



is made; that the horizontal lines are all drawn parallel with the top and bottom of the paper, and that all the horizontal receding lines converge to the eye point, or center of vision.

There can be but one center of vision in each drawing.

The box forms are drawn as follows:

(1) Draw the front face, A, B, C, D, Fig. 34.

(2) Choose the center of vision.

(3) Choose the point E and draw the remaining lines.

First make the drawing with a very light sketch line, then finish with heavier lines.

Do not use a ruler or straight edge.

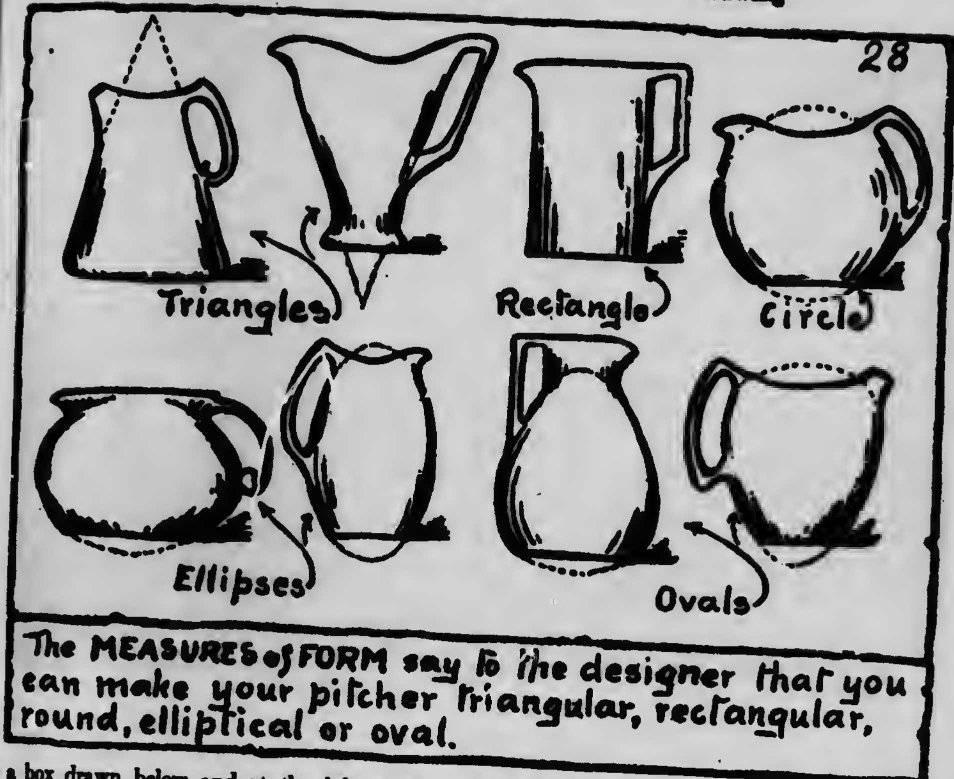
Make the drawings on paper, about $1\frac{1}{2} \times 2\frac{1}{2}$ inches. On the blackboard the drawings should be at least 7 x 12 inches.

Use the model. Compare your drawing with a model, not so much to see if your drawing looks like it as to see if you have the correct principle.

Trees may be introduced into these drawings by placing the top, or foliage part of the tree, above the horizon line, and the trunk below it, as in Fig. 33.

The best way to learn these positions is to draw them. Practice exercises such as these: Draw a box below the eye; above the eye; at the right of the eye; at the left of the eye; below and at the left of the eye; above and at the left of the eye, and similar exercises. Introduce trees, balls and similar objects to make a picture effect.

Fig. 35 represents block or box 1 as drawn below the eye, block 2 added to the left face, and block 3 to the right face. In A there is a similar combination. In B there is a box drawn above the eye, and in C, one below and at the left of the eye, with balls placed on each side. In D boxes of all sizes are piled up around the center of vision, and in E there

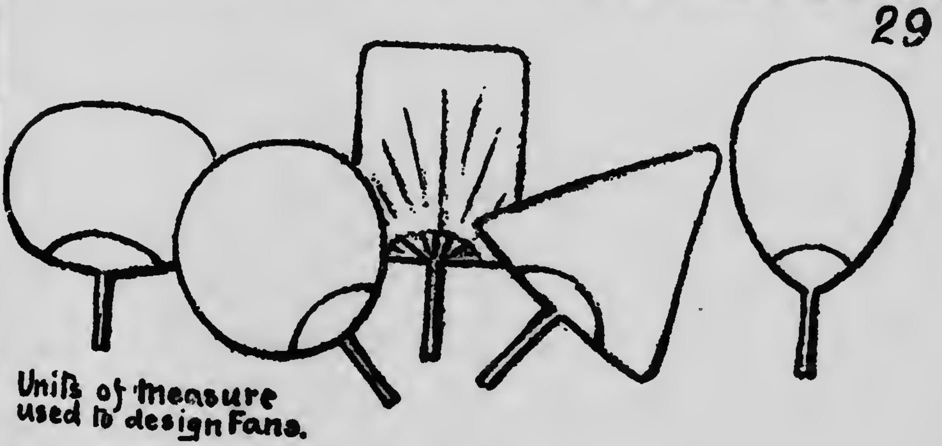


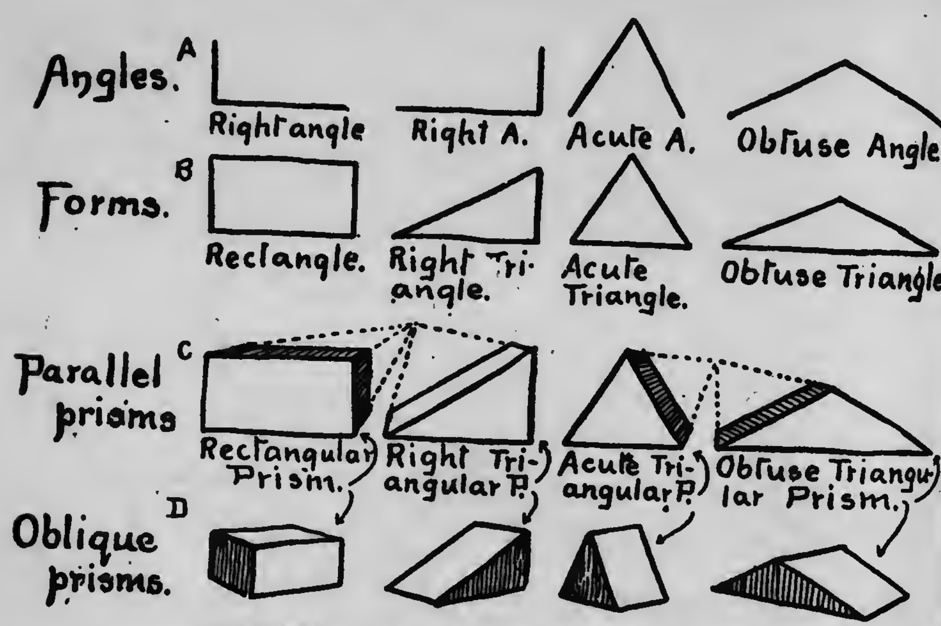
is a box drawn below and at the left of the eye and the front face removed. These are all suggestions as to how to learn in parallel drawing.

Make arrangement of blocks similar to A. An object above the eye shows the bottom face, and is supposed to be in the air, as the box in B. Place objects, as the balls in C, on various faces.

The birds on the blocks in the large drawing are similar in principle to the placing of the balls in C. It is interesting to pile boxes promiscuously, as in D. Remove the various faces from boxes, as suggested in E.

A, B and C, Fig. 36, represent the triangular prisms, which are drawn in the same manner and obey the same principle as the rectangular





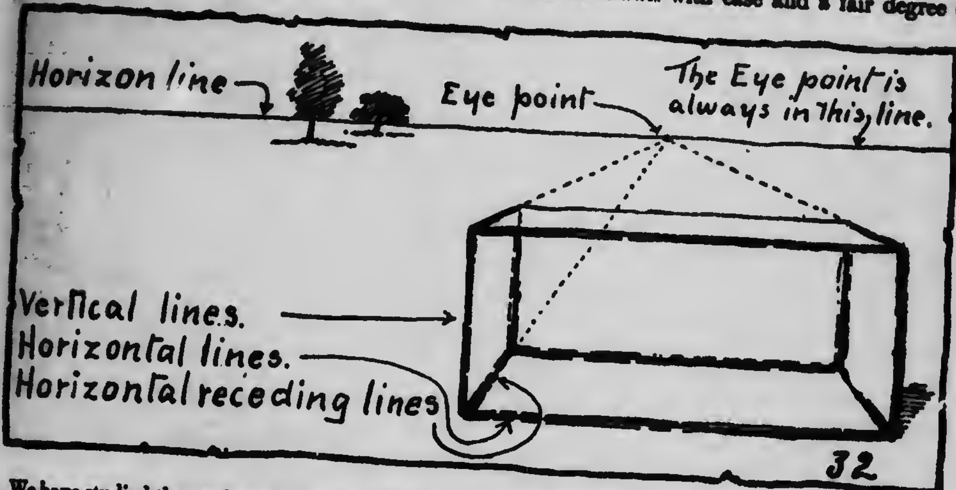
The MEASURES of FORM for Objects containing straight lines. 31

prism. The rectangular and triangular prisms together make up the principal house forms, as shown in D, E and F. In Fig. 36, D is called a shed roof, and E and F, gable roofs.

These houses may be drawn in all of the positions represented in Fig. 33. A, Fig. 37, represents a house drawn at the left of the eye, and B, a shed at the right of the eye.

In oblique drawing the center of vision is not hand, neither are vanishing points of any kind. The whole dependence is put on the unaided used and eye.

The rectangular prism, as shown in Fig. 38, is the principal figure. This must be thoroughly learned. It must be drawn over and over until it can be drawn with ease and a fair degree of



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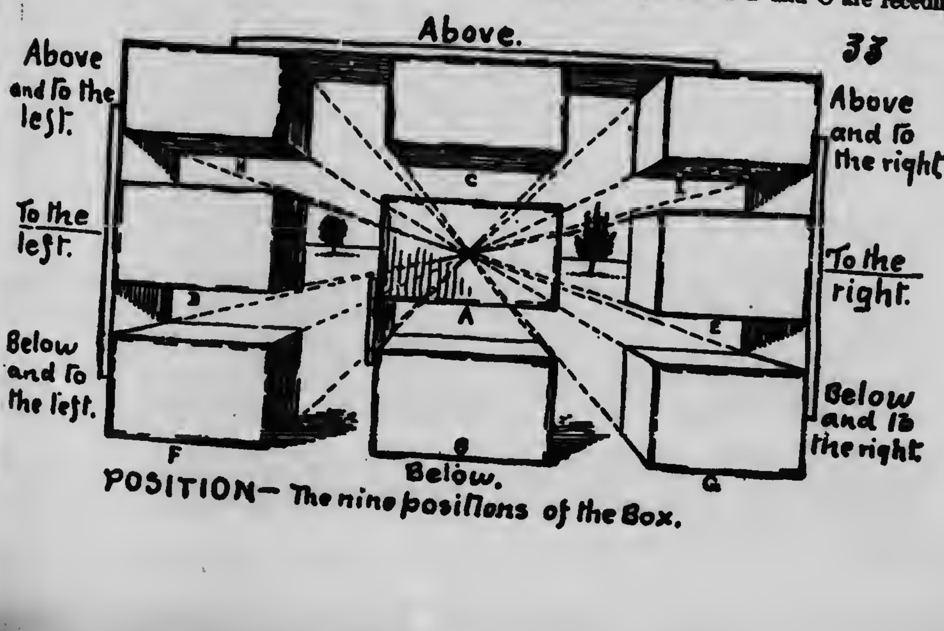
We have studied the angles and forms as shown in Fig. 31; then the prisms in parallel perspective, as shown in the third horizontal row, and now we will study the prisms in oblique position, as shown in the last horizontal row. The aim is to show how to draw straight-lined objects in an oblique position, or in oblique perspective, as it is often called.

accuracy, for it is the basis of a large class of objects, and if this is learned thoroughly it becomes the basis of the whole class.

Place before you a common pasteboard box in the position of Fig. 38, and observe the three sets of lines, AAAA, BBBB and CCCC. The lines of the first set are vertical and parallel. The sets of lines marked B and C are receding



33

POSITION—The nine positions of the Box.

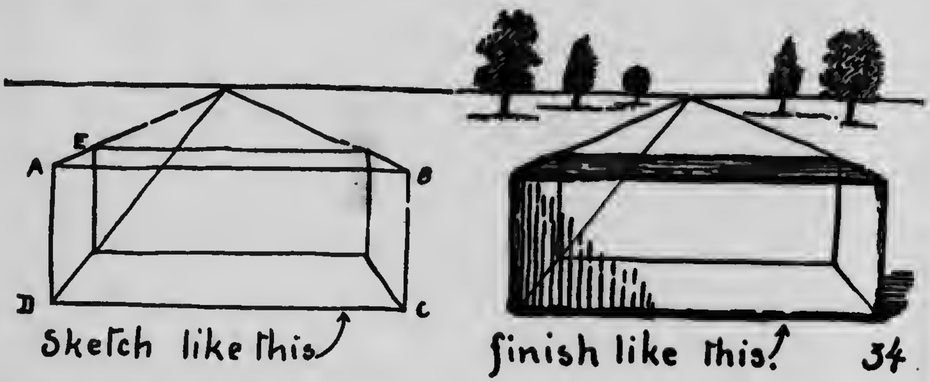
and consequently converge slightly, but in the drawing they should not appear to converge, but should appear parallel and natural.

Draw the rectangular prism in the order of the numbers, beginning with line 1, then line 2, and so on, as shown in D, Fig. 39.

Fig. 39 represents the principal forms of the rectangular prism that may be used in drill work.

Learn to draw these forms quickly, with ease and a fair degree of accuracy.

The lunch box in Fig. 40 is an application of



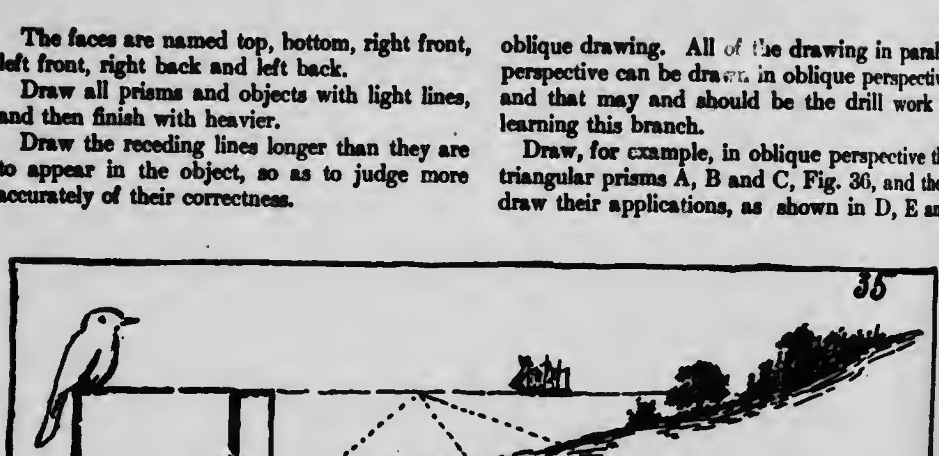
The faces are named top, bottom, right front, left front, right back and left back.

Draw all prisms and objects with light lines, and then finish with heavier.

Draw the receding lines longer than they are to appear in the object, so as to judge more accurately of their correctness.

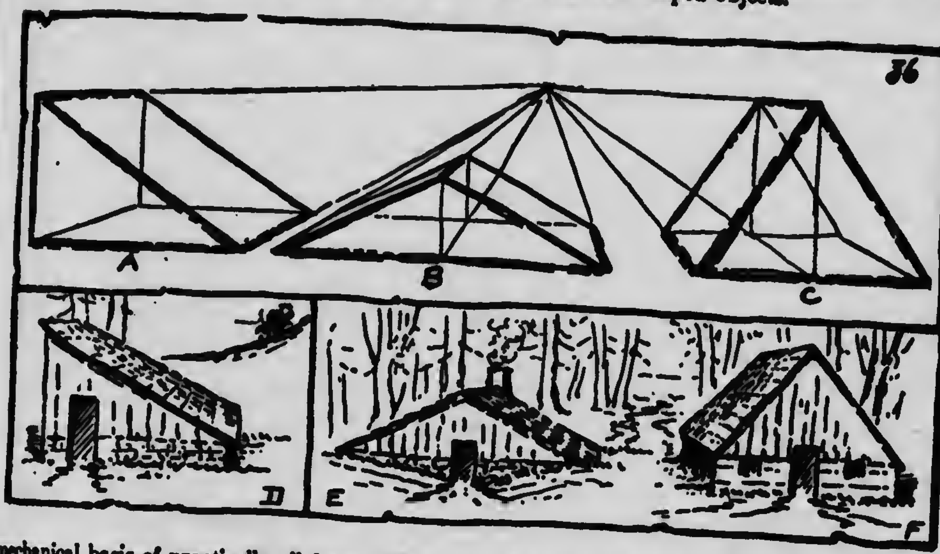
oblique drawing. All of the drawing in parallel perspective can be drawn in oblique perspective, and that may and should be the drill work in learning this branch.

Draw, for example, in oblique perspective the triangular prisms A, B and C, Fig. 36, and then draw their applications, as shown in D, E and



F. Draw the houses in Fig. 37. Do this until this kind of drawing is learned.

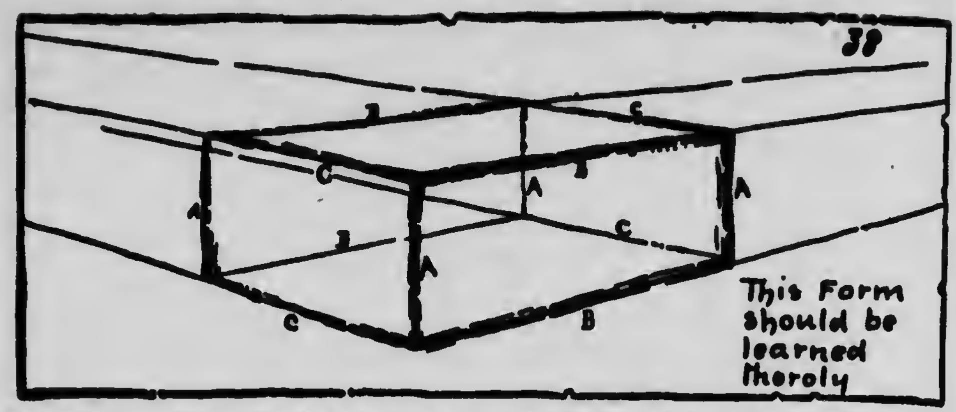
The Cylinder. With the addition of the cylinder, our measures of form are complete. The four rows of forms in Fig. 41 represent the



mechanical basis of practically all form. These are the measures of form that underlie the arts and crafts, the engineering professions, and the great world of form. These are the basic forms for all making and building, and are common alike in the fashioning of delicate jewelry and the building of a great skyscraper.

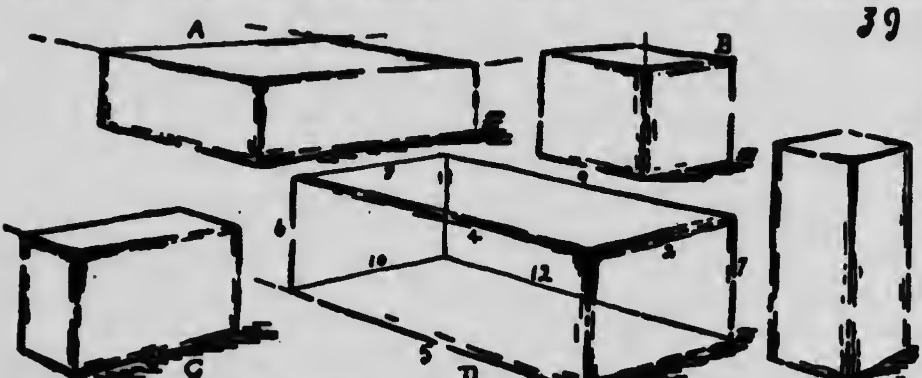
The cylinder is the measure of form for objects having curved lines. It is the mechanical basis of cylindrical shaped objects.

The leading directions of the cylinder are the vertical, the horizontal, the receding (horizontal receding), and the oblique (oblique horizontal receding). These four directions are the ones most commonly used in drawing cylindrical



shaped objects; of these the first three are in parallel drawing and the last in oblique drawing.

These four cylinders must be thoroughly



learned, learned to the extent that they can be easily, quickly and skillfully drawn. The test of knowing the cylinder is the ability to use it in drawing similar forms.

MODELS. Use a variety of models. A roll of pasteboard or paper two inches long, a small fruit can, a plain tumbler, and cylindrical blocks, are all good models. These models are not to draw from as in object drawing, but are to aid in understanding and learning the cylinder.

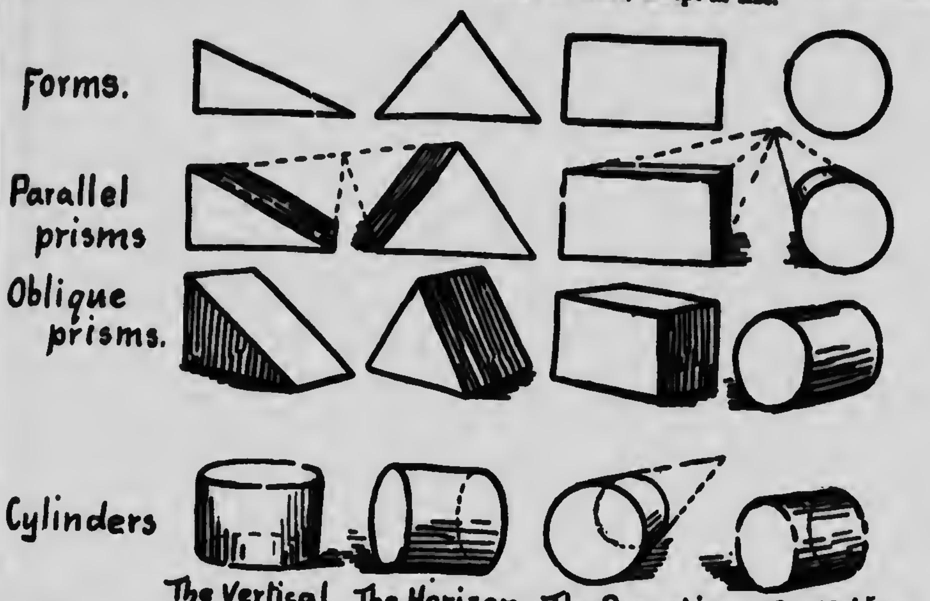
The cylinder and sphere are the last of the type forms. The cylinders, together with the rectangular and triangular prisms, are a complete set of measures for all forms. There are no more to learn.

The vertical and horizontal cylinders are drawn alike, except in direction. The unseen end in each is drawn somewhat wider than the seen end. It is necessary to draw all of the unseen end to make correctly the part that can be seen. Draw the cylinder offhand and in the order of the numbers marked on the lines.

Draw the cylinder about two inches in diameter on paper, and about twelve inches on the blackboard. Mark in with light lines and finish with heavier.

The center of vision is used when drawing this cylinder.

Both the seen and unseen ends are circles; both are alike, except in size.



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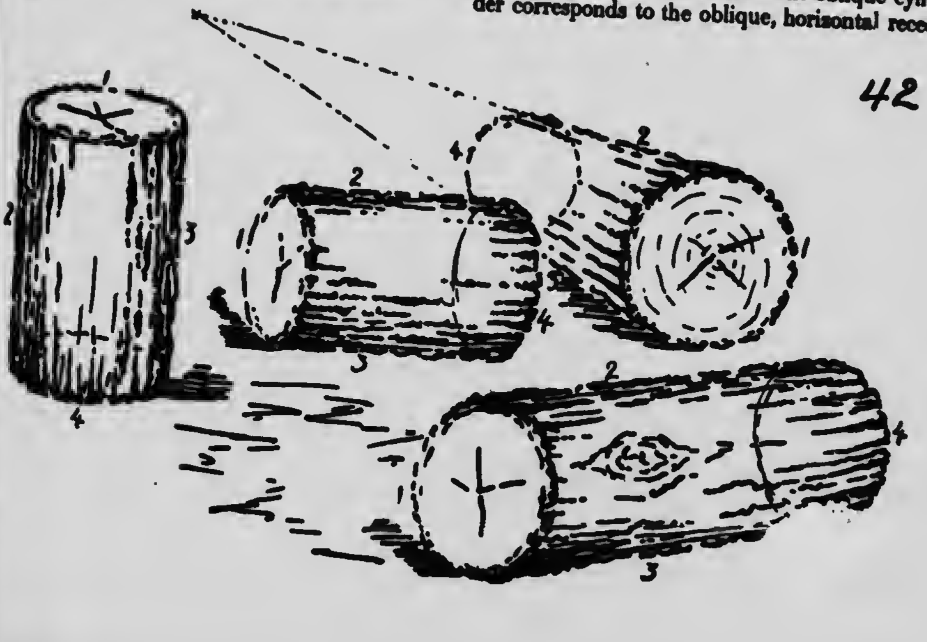
THE RECEDING CYLINDER. The receding cylinder corresponds to the horizontal receding lines, hence the sides converge to the center of vision.

It is at right angles with the picture plane. The entire unseen end should be drawn.

THE OBLIQUE CYLINDER. The oblique cylinder corresponds to the oblique, horizontal reced-



42

ing lines, hence the sides converge to a vanishing point.

The vanishing point is not used when drawing this cylinder.

Both the seen and unseen ends are ellipses; both are alike, except in size.

It is at an oblique angle with the picture plane.

The entire unseen end should be drawn.

These four cylinders must be thoroughly learned. They must be learned so well that they can be drawn easily, quickly and with a fair degree of accuracy. By learning these cylinders, the mechanical elements of all objects similar to a cylinder are being learned. It is well to draw these cylinders several times each day until learned.

ETHICS

Scope of the Subject. Ethics is the science which treats of the nature of the moral obligations one person owes to another and to his community at large; it outlines those rules which should determine conduct. Some writers on the subject declare it to be the science of ideal humanity, and this it really is. It may be best not to consider it generally in such exalted sense, for the teaching of ethics will be more effective if there is carried the impression that it is possible easily to measure up to the standards set. Ideal humanity is something the world should strive for, but we are easily discouraged in the belief that such a state can soon be reached. Let us, then, say that our subject goes not beyond an inquiry into the nature of what is good, a study of that which is preferable and desirable; an investigation into what is right and what falls clearly in the line of duty. We prefer this middle ground because it is not at all theoretical; when one theorizes there is always danger that others will declare him visionary. What we all need is practical precept and principle, so plainly stated that there is no escape from acceptance of the truth. Knowing the way, then, or having a guide, it may be easier for us to walk uprightly.

Importance of Moral Training. Surely parents and teachers should not underestimate the value of ethical culture. In the right moral atmosphere—we do not mean strained, affected Puritanism—where every act seems the entirely appropriate thing and nothing violates the injunction, "Let everything be done decently and in order," the child establishes ethical standards without knowing it. Every child's moral nature reflects his surroundings; when the parent, the teacher, the State, eliminate wrong and injustice, the ideal humanity referred to will be a reality. Parents give children their earliest surroundings, and stamp upon them the impress of earliest influences; by the time the task of mind- and character-building is passed on to be shared with the teacher a great deal in the way of training has been accomplished, for good or ill, which is to be permanent. It is a pity, but it is true, that habits are frequently formed by the young through the faults of their elders, yet we blame the wayward child for the traits he has developed. In all fairness, this should not be done A very wise man said that the moral education of a boy or girl should be begun with the grandparents. We readily understand what he meant.

Especially Needed Today. While moral training has always been important, it is particularly so at the present time, for the following reasons:

1. In a system of government such as ours, the laws of the country derive their authority from the consent of the governed. The strongest safeguard against lawlessness and the enactment of vicious laws is a public moral sentiment which will not tolerate the one nor support the other.

2. Our present industrial system separates employer from employe, parents from children; creates classes in society, and makes practically impossible the old-fashioned home with its benign and sacred influences. Unless special emphasis is placed upon moral training during childhood, the public standard of morals will be lowered.

3. Our complex life tends to a confusion of moral ideas on the part of some. There are altogether too many men who possess a "stratified conscience"; that is, they have one conscience for their home life, another for their church life, a third for their social life and a fourth for business. "Mr. A is the soul of honor in his

private life, but in business he is not to be trusted," says one. "Mr. B. is a very faithful attendant upon the services of his church on Sunday, but look out for him on the other days of the week," says another. Unfortunately, the conditions here described are so numerous as to make the above examples commonplace. We say that a person following different moral standards lacks principle, and this is true; but he lacks as well a moral training which would have given him a clear conception of right and wrong and developed in him the power of deciding for and adhering to the right.

Recognizing the importance of moral training—the kind which in most cases may accomplish its object—we consider it a high privilege to present the helpful material found in the pages which follow. The principles stated are fundamental, and the purpose of the article is to show parents and teachers how they can aid those under their charge in gaining high ideals of right and in forming the habit of maintaining those ideals. To be aware of ideals is not sufficient; to strive to reach them in every-day affairs and live according to them is greatly to be desired. The following outline will assist in the study of the article:

ETHICS

- Right and Wrong
  - Impulse
  - Action
    - Immoral Acts
    - Non-Moral Acts
  - What a Moral Act Includes
    - Knowledge
    - Desire
    - Choice
    - Execution
  - Ideals
    - Heredity
    - Early Training
    - Public Opinion
    - Associates
  - Change of Ideals
  - Moral Standards
- Helpful Suggestions
  - Environment
  - Mental Attitude
  - Example
  - Books
  - Self-Restraint
  - Self-Reliance
  - Reason and Judgment
- Questions for Discussion

Right and Wrong

Impulse. Every idea has in it what may be called an impulsive element, that is, as soon as the idea is entertained there comes along with it a tendency to carry it out in action. In children, and in some people of mature years as well, this element is so strong that it leads to immediate execution of the idea, regardless of the consequences. People in whom this element is strongly developed are called impulsive. If their acts are disastrous either to themselves or to others, and they are asked why they do such things, the usual reply is, "Oh, I did it before I thought," or "I didn't think."

The thoughtful man is inclined to censure impulsive people, but he should not condemn impulse, for in impulse lie the beginnings of action. The impulsive or motor element in ideas should be brought under the control of the will and be guided by reason. In this way it will be led to manifest itself in acts that are beneficial to the individual and helpful to those with whom we associate. In brief, impulse properly guided leads to right action. Without guidance it is liable to lead to wrong action. One of the first steps in moral training consists, therefore, in helping the child to gain control over his impulses.

The child is particularly a creature of impulse; the reason and the will develop slowly, and for the first ten or twelve years of his life the child is moved to action more by his feelings than by any other power. Parents and teachers who understand the training of children recognize this condition and endeavor to keep the children under their charge in a happy frame of mind. In a state of happiness the desirable emotions are active, and these in turn lead the child to right action in his relation to others.

Moral Acts. What is a moral act? Do all acts contain a moral quality? While there may be some differences of opinion upon these questions, it is generally accepted that moral acts are those which are concerned with our relation to others, or with the development of our own character. For instance, casting one's vote is a moral act. In his vote the citizen registers his choice for officials to administer the law or for measures which affect the welfare of the state or community. His choice affects not only himself but those with whom he is associated.

Again, a boy's obedience to rightful authority, as a request or a command of his father or mother or his teacher, is a moral act. It shows that he recognizes and conforms to the proper relation which he sustains to the one making the request or giving the command.

Acts relating to the development of our own character cannot be wholly separated from acts relating to others. What we are determines what we do On the other hand, what we do helps to make us what we are. A good illustration of this class of acts is found in those acts which are concerned with the formation of personal habits, such as truthfulness, honesty and the like.

IMMORAL ACTS. Acts which are contrary to the welfare of society and of the individual are immoral. Indulgence in an appetite for intoxicants is immoral because their effect is injurious both to body and mind. Appropriating that which belongs to another without his consent, or without giving him an equivalent in return, is immoral. Deception in any form is immoral, and to the above list many other illustrations can be added by the reader.

NON-MORAL ACTS. A non-moral act is one which sustains no relation to others and will have no specific effect upon one's character. Such, for instance, is the swinging of the arm when walking; multiplying one number by another simply for the multiplication or when there is nothing depending upon the result. In the discussion of morality non-moral acts are usually given little or no consideration.

What a Moral Act Includes. A complete moral act brings into play all the mental powers. It consists of the following steps:

1. KNOWLEDGE. You must know whether the contemplated act is right or wrong before you can determine its moral quality.

2. DESIRE. The knowledge gained leads to a desire to perform the act.

3. CHOICE. Knowledge and desire lead to decision. You choose to do or not to do.

4. EXECUTION. Having made the choice, you proceed to carry it out in action. The act is performed or it is dismissed from the mind.

A concrete illustration will enable us to fix these steps more clearly in mind. Henry, a boy of twelve, started for school one morning in time to enable him to walk the mile between his home and the schoolhouse and be in his seat when school called. Before he was half-way there he discovered a neighbor's colt so entangled in a wire fence that the animal was liable to serious injury unless released at once. Upon examination Henry found that unaided he could not release the colt. He saw that the colt was in danger (knowledge); he therefore wished to release it (desire), but if he went for help he must be late at school. Which should he do—go for help or go on to school? He decided to return home and get help (choice). He no sooner reached this decision than he started for home (action).

The reader will be interested, possibly, in analyzing a number of his own acts after this plan. In the study of the illustration, or in the analysis of his own acts, however, the reader should bear in mind that the last step is the crowning achievement, and that unless this step is taken, the others are of no value. Many a young man can trace the beginning of his downfall to his failure to act upon the good resolutions he made.

Ideals. Though we may understand that a moral act is a right act, it is not always easy to decide whether an act is right or wrong. Such is the difference of opinion, that the same act is often considered right by one and wrong by another. The questions "What is right?" "What ideals shall I follow?" and "What ideals shall I lead those under my charge to follow?" are constantly before the conscientious parent and teacher. If we would lead those having less experience than ourselves in the paths of right, we must first of all be familiar with those paths ourselves. Our ideas of right and the ideals that we form are shaped by a number of influences; chief among them are the following:

HEREDITY. Everyone is born with certain inherited tendencies. These become more or less prominent in childhood and exert an influence over one's entire life. These tendencies may be beneficial or injurious. They are modified to a greater or less extent by environment and training. If given proper attention in childhood, inherited tendencies can usually be brought under the control of the will. Those which are undesirable should be suppressed, and those which are beneficial should be strengthened. Many people assign to heredity a much larger share of responsibility in the development of character than justly belongs to it.

EARLY TRAINING. We never wholly depart from the teaching of the first ten years of our lives. The ideas of right and wrong received during these years abide to a greater or less extent in our moral consciousness. The early moral training, both direct and indirect, which a child receives is therefore of the greatest importance.

Thomas lives in a home whose inmates are kind and courteous to each other, and whose atmosphere is pleasant. He is taught to be kind, truthful and generous. By the time he is ten years of age he has learned that these virtues are right and that their opposites are wrong. Andrew lives in a home where there is constant strife; the inmates exercise their ingenuity in deceiving each other and in trying to gain some advantage over their associates. To Andrew lying and selfishness are virtues, and truthfulness and generosity are weaknesses practised only by those who have not sufficient courage to withstand their fellows. These boys go out into life with directly opposite moral ideas as the result of their home training. Between these extremes are many grades of moral code, each formed by home training and association.

Public Opinion. Every social group, whether of children or adults, has its moral code, and failure to conform to this code is a cause for disapproval, if not for censure and expulsion. This code expresses the moral sentiment of the group, be it large or small, and this is what we usually mean when we speak of public opinion. It requires courage to stand against public opinion. Let Thomas remove to a locality where the most of his boy associates are of Andrew's type, and he can remain true to his moral code only by constant struggle and possibly an occasional fight. If Thomas is a lad of weak will, he will soon yield to his companions and adopt, with possibly some mental reservation, a good portion of their moral code.

The case of Thomas is that of a large number of people of older growth. When removing from one locality to another they often find themselves at variance with the community they have entered. What shall they do? Shall they adhere rigidly to their established moral code and be looked upon as "queer," "Puritanic," and so on, or shall they overlook these points of difference and conform to the usages of society? These are among the most important questions that ever confront a young man or a young woman upon leaving home, and their decision often marks the turning point in the person's life.

A young person of good moral training and strong will will not give up those moral principles upon which his character is founded. Furthermore, he will adhere to such virtues as truthfulness, honesty, sobriety and industry. However, if one's moral convictions are not firmly fixed, one is very liable to change one's moral standard, because in so doing the individual follows the line of least resistance.

Earnest people who believe the moral code of society to be partially wrong refuse to conform to those beliefs and practices which their conscience will not approve. Such people are staunch moralists, and although the thoughtless may deride them, their influence in a community is always good. In time this influence usually wholly changes or in part modifies the objectionable practices. The reformer not only refuses to adopt the moral code of society, but he openly and aggressively goes to work to change public opinion until it shall coincide with his views.

Associates. One's ideas of right are more or less influenced by the opinions of those with whom one comes in daily contact and by the opinion of intimate friends. When two people are associated, the stronger influences the weaker and the result is a modification of ideas. This influence is much stronger with children and young people than with those of more extended experience. We can, therefore, see the necessity of safeguarding the young from evil associates. The saying of the wise man, "Keep thy heart with all diligence, for out of it are the issues of life," is as potent now as when it was uttered three thousand years ago.

Change of Ideals. To the active mind the ideal of today is different from that of yesterday. Every day sees advancement; man's view of moral truth is broader and his insight into moral principles is deeper. This growth does not necessarily imply the forsaking of old principles and the adoption of new ones. It is more likely to mean the discovery of new opportunities of applying these principles, and with each new application the strength and significance of the principles are increased. In this way our moral ideas expand. Men and nations regard each other with greater respect and kindlier feelings today than they did a century ago. The ideal hero of the fifteenth and sixteenth centuries was the warrior; the ideal hero of the twentieth century is the man who can prevent war. Ex-President Roosevelt gained greater renown by bringing about the treaty which closed the Russo-Japanese War than any military or naval commander in that conflict. This is also true in local communities; the man who is held in highest esteem is he who uses his talent in promoting the peace and welfare of the community.

Again, the true boy hero of today is not the bully of the playground but the boy with the moral courage that enables him to stand by what he knows to be true and right, and thereby promote a public sentiment which drives the bully to cover.

Breadth of view leads to tolerance. Many pastimes and pleasures that were formerly considered harmful and even sinful, are now accepted and indulged in as being beneficial. People of experience are more lenient toward young offenders than are those of their own age. These facts do not imply that moral principles have been discarded, but that they are more broadly applied.

Moral Standards From the foregoing discussion we see that moral questions are often complex and that even the man of education and experience occasionally finds it difficult to decide what is right in certain cases. This is true to a much greater extent of those who lack training and experience. For these reasons moral standards should be established, and those virtues which for ages have been recognized as right by all civilized peoples, should become firmly fixed during the periods of childhood and youth. The most important of these virtues are truthfulness, honesty, fidelity, reverence, sobriety and kindness. However widely people may differ in their application of these virtues, they are universally recognized as constituting the foundation of all good character, and their installation should be the chief aim of moral instruction. Teachers and parents will be aided in this work by giving attention to the points mentioned under the title "Helpful Suggestions":

Helpful Suggestions

Environment. The body exerts a strong influence over the mind. While now and then we find a brilliant intellect associated with a weak and sickly body, in general, health and vigor of the body lead to a clear intellect and a clear conscience. The surroundings of children should be pleasant and of such nature as to give them the bodily comfort necessary to a happy frame of mind. Plain, nourishing food and loose, comfortable clothing are important factors in moral training. Children who live in the country have greater advantages for the development of character than many of those who live in the city. The country child communes with nature and learns many of her secrets. For a portion of the time, at least, his companions are birds, plants, animals, trees, flowers, verdant hills and running brooks. The city child may be confined to streets and alleys for his playgrounds and may have vicious companions only for his associates.

Whether in city or country the home life should be made attractive. There should be no place where the child can find so much pleasure and enjoyment as at home. An atmosphere of love and kindness should pervade the home, and through his association with the other inmates, as well as by precept and example, the child should be led to practice the virtues we have named.

Mental Attitude. The mental attitude exerts a strong influence upon character. The child who is always happy is kind, truthful and honest. His desirable feelings are constantly active and they give little or no opportunity for fear, anger, hatred and other undesirable emotions to appear. Teasing, nagging and scolding by those who have the care of children are reprehensible, and their practice is a serious obstruction to the development of right character.

Example. In nothing is the adage "Example is better than precept" more clearly proven than in moral training. Children are imitators, and they strive to become like those whom they love. By the time he is ten every boy has a pattern that he is following. This pattern may be a living personality or it may be the hero of some tale. Parents and teachers should not only do what they wish their children to do, but it is equally or more important that they refrain from doing those things which they do not wish their children to imitate.

Books. A word should be said about the value of reading as an agency in the formation of character. Next to friends and associates, books exert the greatest influence over the young. A story like Ruskin's *King of the Golden River*, Hawthorne's *Great Stone Face*, Longfellow's *Evangeline* and scores of others that might be named, whether in prose or verse, will do more toward the development of character than any number of discourses on duty, honesty or other virtues. Many maxims gleaned from books when memorized are also helpful and often inspiring

Fortunately, school and other public libraries are now so common, and good books can be procured at such slight expense, that suitable reading can be placed in the hands of all. Just here a word of caution may not be out of place.

The young should be safeguarded from vicious literature as carefully as from evil associates. Both exert a baneful influence. Inhibition, or the power to arrest a previous action, is the highest prerogative of the will. The wise use of this power shows that the will has been well trained.

Self-Restraint. Thrice armed against evil is that young person who during childhood learned to say "No" and to stand by it. In the development of character restraint is as essential as action. One is led astray by first consenting to little things which are wrong. One step leads to another, and thus the character is lowered. Resistance to temptation must be acquired in the home if it is to be acquired at all.

Self-Reliance. In the formation of character it is necessary for the youth to learn to rely upon himself. In order that he may do this he must recognize his own powers and believe in them. Those who are unable to stand alone are easily led into temptation. From the beginning the child should be trained to do all that he can for himself. Too many parents and teachers do far too much for the children under their care. The maxim "Never do for the child what he can do for himself" may occasionally be taken too literally and cause waste of time and energy, but in general it is a safe maxim to follow. Within the capacity of his judgment the child should be led to decide moral questions for himself. Muscle, intellect and conscience gain strength only through exercise.

Reason and Judgment. We have seen that many moral questions are complex, and that often a right decision can be reached only through a careful investigation of all the circumstances involved. Questions of this kind can be decided only by those who can think clearly and exercise sound judgment. The thought powers develop later than the powers of observation and memory, hence young children can do but little reasoning and should not be asked to decide complex questions. During the period of youth, however, the thought-powers should receive particular attention. By discussion, illustration and experience, young people should be led to realize that hasty judgment is faulty judgment. Exercises for training the reason should not be confined to problems in arithmetic and grammar; the affairs of everyday life furnish many interesting and profitable problems for consideration.

Questions for Discussion

Ethical Training. The following questions are given as illustrations of what may be done in the home, the school or in clubs and other organizations to train one to reason along ethical lines. Some of the questions are very simple, while others are so complicated that they will tax the ingenuity of the keenest intellects. In every case the reasons for the decision should be given.

The discussion of two of these questions given below shows how they may be used. Considerable amusement can be derived from questions of this nature, whether in the home or school, or wherever any number of people are gathered. The discussions which are sure to follow their introduction serve the double purpose of training the reasoning powers and of showing those taking part the necessity of considering all the evidence in a case before a just decision can be reached.

Examples. At the close of school someone took Lucy's umbrella by mistake. Lucy remained to do some extra work, and when ready to depart she found only one umbrella. It was raining and she must take this umbrella or be exposed to the storm. On the way home she broke the umbrella. The next morning it was learned that the umbrella belonged to Fred. Who should pay for mending the umbrella?

"Lucy, of course," says Tom. "She broke it."

"Fred," says Nellie. "Boys, not girls, are always expected to pay such bills."

"Whoever took Lucy's umbrella," says Henry. "That person was responsible, for he made the mistake."

Are any of these answers right? If so, which one?

On examining Tom's answer we find that Lucy was obliged to use the umbrella as a means of defense against a boy who did not attend school and that it was in so doing that she broke the umbrella. The accident resulted from necessity, not carelessness.

We see at once that Nellie's answer is founded on sentiment, rather than justice. In discussing this answer George remarks that girls and women nowadays are trying to take the places of boys and men in almost all kinds of work, and if they want to do men's work he doesn't see why they should not take men's responsibilities.

Henry passes by those directly connected with the affair and strikes at the original cause; but no one is willing to own up to taking Lucy's umbrella.

Under the circumstances, who should pay for mending the umbrella?

Tom Brown on his way to high school one morning found a lady who had been run over and dangerously wounded. Tom saw that unless the lady received medical assistance at once she would die from loss of blood. A delivery team was standing near by and Tom lifted the lady into the wagon and drove rapidly to the hospital. He was so intent upon securing assistance for the lady that he did not stop to hitch the horse, and while they were carrying the patient into the hospital, Henry Adams came along and waved an umbrella at the horse, frightening it so that it ran away. The wagon was broken, a little girl was run over and seriously injured and the horse was killed. Who should pay the damages?

"Tom's father," says A.

"Henry's father," says B.

"The lady's husband," says C.

"The one who was responsible for the injury to the lady," says D.

Let us consider each of these answers in the light of the circumstances connected with the case.

A makes Tom's father responsible because he claims that in taking the team Tom did what he had no right to do, and in leaving the horse unhitched he was grossly careless. But A overlooks the fact that Tom was saving a life, and that this was of more importance than anything else connected with the affair.

B places the responsibility upon Henry's father, alleging that had Henry not frightened the horse, all would have been well. But Mr. Adams claims that Henry was a lad of seven and too young to realize the possible consequences of his act. He did not intend to frighten the horse; he was only interested in the peculiar way in which the horse looked at the umbrella.

C would throw the burden upon the lady's husband, because he claims that the husband should be willing and glad to pay any cost which resulted in saving his wife's life. But the lady was a widow; therefore, some other source of payment must be found.

D passes over all those immediately connected with the affair and places the responsibility upon the one who injured the lady. However, no one knows who he is.

The little girl's father had a heavy doctor's bill to pay, and the grocerymen lost [illegible]am. From whom are they entitled to colle[illegible]ges?

Two government officers are sent to the Yosemite with a large sum of money. As they drive round a corner in a rough part of the country, two highwaymen spring out and yell, "Hands up!" The officers at once obeyed. Did they do right?

Factories sell their typewriters to teachers for $70, but the price to other people is $100. Your principal buys a machine for $70 and decides in a few days that he does not care for it and offers to sell it to a lawyer. What should he ask the lawyer for it? Should the teacher or principal ask permission of the firm to sell the typewriter for less than $100?

Tom saw Fred cheating in an examination. After it was over Tom said to Fred, "You are a good friend of mine, but your cheating in the examination was wrong in four ways." What do you think were the four ways that Tom had in mind?

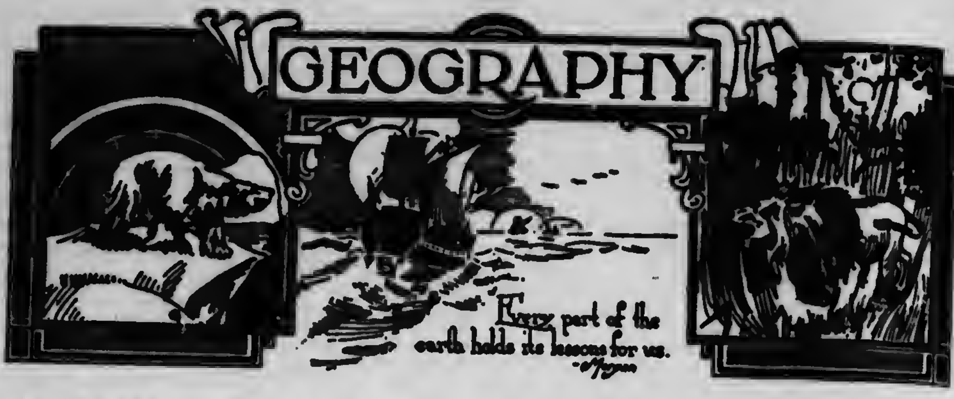
Henry is trying to decide whether or not he ought to go to college. He is talented, but poor; his father is dead and his mother is not strong. How ought Henry to decide the matter?

Dick and Keran are in the same room at school. Dick got mad at the teacher one day, and that evening when the two boys were going past the schoolhouse, Dick had revenge on the teacher by throwing a snowball through the window in the schoolhouse. Keran saw him do it. The next day the school-teacher asked each boy in the school privately what he knew about it. What should Keran say when she asked him?

A boy goes to spend the night with his friend, another boy about the same age. The boys' room is lighted by a defective lamp. In the night the visiting boy gets up in his sleep and lights the lamp. The lamp explodes and sets fire to the house, which is totally destroyed. The house was insured for two-thirds of its value. Who should pay for the house?

A boy has $1 which he received for 10 tickets which he sold for the school entertainment. A sudden freeze makes the skating good and he spends the money for a pair of skates, fully intending to replace it from his earnings which he would receive for delivering papers. He fails to get the money for his teacher for the tickets. Was he wrong?

A bank cashier takes money from the bank for speculation and loses it. A wealthy friend makes good the loss, so that none of the depositors loses any money. Should the cashier be punished? Did the cashier do wrong? Whom did he wrong?



Its Divisions. Geography is a highly specialized science, treating of the earth as the home of man ; for purposes of study it is usually divided into three general departments, namely, physical, mathematical and political geography. The first is known also by the name of physiography. Some authorities add a fourth: economic, or commercial, geography. The whole subject in all its parts is one of the most important branches taught in the public schools.

Physical Geography or Physiography. The scientists of the world classify known facts of physical geography from the viewpoint of today. The physical history of our planet does not belong here, but is discussed in the higher branch which we call geology. The relations of our earth to other members of the solar system are treated in astronomy. There is left, then, to be included in physical geography a study of the external appearance of the earth, and the changes wrought in land, water and air; the causes of the seasons and of the tides, the meaning of great earthquakes, and such oft-recurring phenomena.

Mathematical Geography. In mathematical geography man has adapted his carefully developed rules to physical conditions as he finds them. In our lives we find necessity for some knowledge of the simpler mathematical elements of the subject; so under the general term mathematical geography we study the earth as to its shape and its motions, the scheme of its measurement, the changing of its seasons and their length, the alternate rise and fall of the tides, and make graphic representations of all these, which we call maps and charts.

Political Geography. A part of geography is man-made. It is an interesting study to learn what part, and why, and how. In this sense geography and history are united and must be viewed together. The divisions of political geography result from the social and economic activity of the human race, influenced here and there materially by physical conditions. Political geography, then, is that branch of the subject outlining human governments, treating of boundaries of states and nations and the locations of cities, and pictorially preserving the present day results of the great events of history.

Commercial Geography. Some authorities take from political geography some of its features and shape them into economic, or commercial, geography, which treats of commodities, their places of origin, the world-wide demand for them, means of transportation, trade routes, etc.

An Intimate View. It may be assumed that the student desires quite fully to cover the general subject of geography. He will find it intensely interesting. The world is his home; in men of all tribes and races he should have an interest, and of them should possess some knowledge. He may never have traveled far from the place of his birth, but is free to follow his inclination and mingle with strange peoples and even live among them. Business interests may demand specific knowledge of some far-away corner of the world; the news of the day is best interpreted through positive information previously gained of places and peoples—everything practical in our experience or even within the range of possibility points to the need of precise geographical knowledge. In its study the more intimate view is desired—comparisons and contrasts of things unknown and distant with things which we know and understand. So, if you accept the brief outlines below for plans of study, by investigations based upon local knowledge to supplement what you read you should come to a better understanding of some of the world facts which you have viewed heretofore largely in the abstract. This spirit of personal investigation into relations and conditions finds explanation and partial elaboration in later pages devoted to this subject.

Study by Topics. Promiscuous reading is not to be commended, except in search of important news of the day and in getting the substance of leading magazine articles. When one turns to the serious questions involved in study, time is ill spent except when a definite plan is followed, by which, step by step, the whole of a topic or subtopic is covered. Confining ourselves just now to geography, let us suggest briefly how to arrange reading and study programs, based entirely upon THE NEW PRACTICAL REFERENCE LIBRARY.

The Weather, an Example. No more intimately related subjects may possibly be suggested than those connected with the weather. The topic is not exhausted when you have instinctively turned to the article *Climate* and have mastered it. The foundation only has been laid. The General Index discloses the presence in these volumes of related articles on *Wind, Rain, Cloud, Weather Bureau, Meteorology,* and the like. If you are ambitious, you will take them in order and become familiar with them. Resorting again to the Index it will be found that the various winds are described under their respective titles. As you read, topic by topic, cross-references to still other titles are given, none of which should be ignored. For example, the article *Cloud* contains a reference to *Fog,* in addition to others already brought to your attention. When reading about *Winds* you are referred to *Storms,* and under *Storms* attention is called again to the various severe winds, that no important item may possibly be overlooked by the investigator.

Your interest in the subject has doubtless increased with the lengthening of the inquiry. Therefore it is determined to go very fully into every subject dealing with the weather, and further information is sought from the Index. Under Geography the following topics are discovered relating to the investigation at hand, alphabetically arranged, and one is gratified to find the themes so fully covered:

Atmosphere	Cold Wave
Blizzard	Cyclone
Calms, Region of	Dew
Chinook	Doldrums
Climate	Etesian Winds
Clouds	Frost
Cloud Burst	Fog
Hail	Prevailing Westerlies
Haze	Rain
Horse Latitudes	Rainbow
Humidity	Simoon
Hurricane	Sirocco
Isobars	Squall
Isothermals	Storms
Khamsin	Temperature
Land and Sea Breezes	Tornado
Lightning	Trade Winds
Monsoon	Typhoon
Norther	Whirlwind
Northwesters	Wind

Having the list completed, rearrange it so all winds shall be grouped together, and thus may be studied together, as follows:

Chinook	Prevailing Westerlies
Etesian Winds	Simoon
Hurricane	Sirocco
Khamsin	Squall
Land and Sea Breezes	Tornado
Monsoon	Trade Winds
Norther	Typhoon
Northwesters	Whirlwind

Some topics will bring others to mind which have no relation to geography: *Temperature* suggests *Thermometer; Storms* suggests *Barometer,* and these will be transferred to your list. This group of forty-two articles, topically arranged and carefully studied, will give any family circle material for several evenings of profitable investigation, or will provide work in school calculated to give a class a really broad view of this common, yet not generally well-known, subject. The weather is only one of many themes which may be treated in this way with great profit. In no other way can the ill effects of haphazard reading be overcome.

A Study in Areas. It would be embarrassing to a Canadian abroad to admit that he knew nothing of some of his home wonder-spots. The rest of the world is inclined to think of Canada as merely a part of the North American continent, and thousands of our own men and women, not to mention boys and girls, admit a lamentable ignorance even of the more commonplace details of our geography. For instance, we must realize that Ontario's area was increased by 60 per cent in 1912 and still is only one-ninth of the Dominion. Few of us know that British Columbia is almost three times as large as Great Britain and Ireland and nearly twice as large as France, yet is only one-tenth of the Dominion.

Tables for Comparisons. Especially helpful in reaching an understanding respecting comparative areas, density of population and other interesting data are tables like the following. The Dominion, the United States and your own province are compared; then in alphabetical order all the countries in a continent are arranged, to be compared with the three above them. This chart may be varied, and the lessons learned from each new compilation will be valuable :

The above suggestions open a wide field to the ingenuity of teachers, parents, and the children themselves. Out of such exercises will come a better understanding of the greatness of our national domain.

Political Divisions. Earlier in this discussion it was stated that political divisions are almost entirely man-made. In a sense this statement admits of no exceptions, but physical conditions have in many instances influenced man, or have practically determined some

COUNTRY	AREA IN SQUARE MILES	POPULATION IN ROUND NUMBERS	POPULATION PER SQUARE MILE	MILES OF RAILROADS	PRINCIPAL PRODUCTS NAME FIVE OF EACH COUNTRY
Canada	3,745,574	7,200,000	2	25,000	
United States	3,000,000	92,000,000	31–	237,000	
Ontario	407,262	2,525,000	6	8,250	
Argentina	1,114,000	5,000,000	4	14,000	
Bolivia	729,000	2,000,000	3–	700	
Brazil	3,218,000	17,000,000	5	11,000	
Chile	308,000	3,000,000	10–	3,000	
Colombia	513,000	4,000,000	8–	500	
Ecuador	116,000	1,500,000	12–	200	
Guiana, British	90,500	300,000	3	1,000	
Guiana, Dutch	47,000	84,000	1	40	
Guiana, French	30,500	30,000	1–	..	
Paraguay	157,000	630,000	4	150	
Peru	696,000	4,000,000	6–	1,400	
Uruguay	72,000	1,000,000	14–	1,300	
Venezuela	594,000	2,000,000	4–	600	

Suggested by the Chart. How do the size and population of French Guiana compare with your own province? With those of the United States?

If Brazil's population should suddenly increase five times, how would it compare with that of the United States? Which has the larger area?

Which has more miles of railroad, Brazil or Ontario? Brazil or your own province?

If New Brunswick were no more thickly populated than Bolivia, what would be its population?

How many South American countries have a larger population than Ontario?

things for him. The questions that follow not only explain the statement, but suggest themes on which to base research :

1. As Spain and France were not destined to be one nation, could the boundary between them reasonably have been placed elsewhere?

2. If the racial characteristics of the peoples to the north and south of the Pyrenees are so different that union would be unwise, are the Pyrenees in the least responsible for the fact?

3. Would the Swedes and Norwegians have been justified in making an arbitrary boundary line between their countries?

4. What man was largely responsible for

pushing Italy's boundary up to the Alps. Did he try to go farther?

5. Locate several natural boundary lines between the provinces of the Dominion, and endeavor to find reasons from our history why in some cases arbitrary lines were chosen rather than natural.

Geography Presented by Outlines

In this subject, as in every other, it must be kept in mind that successful results are reached only by proceeding from the known to the unknown. The child learns the geography of the yard around his home, without knowing that he has mastered the first elements of geographical science. He knows the directon of one object with respect to another and has an idea of relative distances. In play he may imaginc the grass area a vast plain; the vines and bushes, trees and forests.

When he goes to school the geography of the schoolyard is to be learned, and if he is in the country, he is soon to know *as geography* the strip of land between home and school. In his geographical plays the brooks are dignified as rivers; the hills become mountains; stretched before him are valleys, plateaus, forests. Such is his introduction to the science of geography. When he is able fairly well to understand distance and elevation he can imagine the contour of a mountainous country, the appearance of a great river, the vastness of the ocean. A great deal of foundation work may be thoroughly done through the medium of local geography, without passing the physical bounds named.

The School District. The smallest political division is the school district. The pupils should know enough of the terms township, county and province to realize that they are more important geographical units. The geography of the district may then be outlined for study, somewhat as follows:

GRAPHIC ILLUSTRATION OF AREAS OF CANADA AND OTHER POLITICAL DIVISIONS

SCHOOL DISTRICT
- (a) Political features
  - (1) Map
  - (2) Location in township
  - (3) Numbers or names of surrounding districts
  - (4) Area (sections included)
  - (5) Roads
  - (6) Population
  - (7) School population
- (b) Physical features
  - (1) Rivers
  - (2) Creeks
  - (3) Valleys
  - (4) Plains
  - (5) Hills or mountains
  - (6) Swamps

The Township. From the school district to the township is an easy step; the following outline is suggested, with the expectation that local needs may vary it in any necessary degree:

THE TOWNSHIP

(a) Political features
- (1) Map
- (2) Location in county
- (3) Names of surrounding townships
- (4) Number of school districts
- (5) Area (miles in each direction)
- (6) Location of villages or cities
- (7) Public buildings
- (8) Population
- (9) Government

(b) Physical features
- (1) Rivers
- (2) Creeks
- (3) Deep valleys
- (4) Plains
- (5) Heavy forest areas
- (6) Mountains or great hills
- (7) Lakes
- (8) Swamps

It may be difficult to learn the physical geography of the entire township, for neither pupils nor teacher may have personal knowledge of the facts, and the subject is one on which it is impossible to read for information.

Months will pass in learning the facts relating to local geography as above explained and outlined, and this is well. Relatively small children must not be required to push their investigations far beyond their immediate surroundings. To attempt excursions too far distant invites confusion. Introduce larger political units for study only when the boys and girls are prepared by knowledge of the township to understand the step. In the following outlines on the county and the city it will be wise to omit some of their features, except with more advanced pupils.

The County. As a political unit, the county is the division next superior to the township, and is composed of a number of townships grouped together for governmental purposes. The relation of the township to the county should be closely studied. It will be well to find answers to the following questions, and to others which these will naturally suggest:

What officer or officers of the municipality participate in the government of the county?

Does any authority in the county pass laws to be enforced within the township?

Is there any law-making power in the township?

Does a township pay any taxes to support the county government?

Do the people of a whole county vote for officers of a township?

Does a township pay any taxes to support county government?

Do the people of each township vote for county officers?

Out of what treasury are county officers paid?

Does any portion of the tax collected in the county go to the provincial government?

What authority locates the county seat? the county poorhouse?

Does the county have control of the affairs of an incorporated city within its limits? of an unincorporated village?

Most of the questions above relate to the subject of civil government more than to geography, but there is certainly opportunity for practical correlation here of government and geography, and much in connection with the former should be learned by the child long before he is of age to study the formal subject of civil government.

In studying a county from the viewpoint of its history, geography and government, the following outline is recommended. It may be changed in any respect to meet local conditions:

The County

I. MAP OF COUNTY, SHOWING TOWNSHIPS, CITIES, VILLAGES, RAILROADS, RIVERS AND LAKES

II. DESCRIPTION
- (a) Size
- (b) Number of townships
- (c) Boundaries
- (d) Position in province
- (e) Physical features
  - (1) Surface
    - (a) Mountains
    - (b) Hills
    - (c) Valleys
  - (2) Lakes
  - (3) Rivers

III. GOVERNMENT
- (a) County officers
  - (1) How elected
  - (2) Terms of office
  - (3) Duties of each
  - (4) Salaries
- (b) County buildings
- (c) Taxes
  - (1) How levied
  - (2) How collected
  - (3) How applied
- (d) In what electoral district

IV. Institutions
(a) Penal
(b) Charitable
(c) Educational
(1) Public
(2) Private
V. Industries
(a) Agriculture
(1) Leading crops
(2) Markets
(b) Manufactures
(1) Leading articles
(2) Markets
(c) Mining
(1) Leading products
(2) Markets
(d) Transportation
(1) Rail
(2) Water
VI County Seat
(a) How and when located
(b) Reason for present location
(c) Rank among county's cities and towns
(d) Distance from other cities in province
(e) Industrial life
(1) Banking
(2) Commercial
(3) Manufacturing
VII. History
(a) When settled
(b) When organized as county
(c) Famous men produced
(d) Events which were notable

The City. An incorporated village or a city is a portion of a township so thickly settled that its increasing necessities cannot be met by the governmental facilities of the township. It must have the privilege of providing many things for itself that the remainder of the township does not need. Here again geography and government are found in strong correlation, but we cannot remove this subject entirely to the department of civil government, for any outline for study of a city or village must unite its geographical and governmental features.

Bring to mind a mental picture of a much-traveled four-corners well located in a populous township, and let it assist us in a discussion of the growth of a village and the needs that this growth imposes. At an early day there was a blacksmith shop established on the four corners around which the village was afterwards built. Soon a general store was opened there and houses were erected for the blacksmith and the storekeeper. Two farmers built homes near the corner and soon a carpenter chose the locality for his residence. No special needs arose with these improvements on and near this corner, so the small village still remained a part of the township, its inhabitants bearing their portion of township expenses and sharing in whatever was done for the good of all within the township.

Many things may happen which contribute to the growth of a community. This little group of dwellings with its small commercial center begins to expand. Soon there are more than a dozen business houses, a mill or two supplying local needs, and possibly a hundred residences. Now sidewalks are a necessity. Better streets than ordinary country roads are required, and possibly the inhabitants wish to secure a municipal lighting plant. The township at large will object to helping pay for improvements within the area of the village when the benefits will not be shared by the township at large. The people of the village may therefore apply to the provincial assembly for permission to organize a separate governmental body to be known as an incorporated village. All people then living within the incorporation lines come within the control of this new organization. It can provide for itself whatever improvements it requires, but within itself must find the means of meeting the expense.

The community may continue to grow rapidly and soon may become a very important commercial center. Its needs multiply, and a more complex system of government is required. The provincial authorities are appealed to for enlarged liberties and a city charter is provided. The city is divided into small divisions called wards, and further divided into precincts. It may go into debt more than was possible under the village government and has the privilege of expansion to meet every necessity.

In studying a city in all its phases we include not only its geography, but its history and its government. No class in school or children in the home, of an age to master these three divisions, should be permitted to drop the subject until they have secured a copy of the city or village charter and have studied this basic document and understand from it the machinery of government as applied to their particular locality. A topical outline of a city is given below. It is subject to such amendment as may be necessary to meet local needs:

The City

I. Map of City, Showing Principal Streets, Location of Principal Buildings, Waterways, etc.

II. Description
- (a) Area and population
- (b) Location
  - (1) In township
  - (2) In county
  - (3) In province
  - (4) Direction from other cities

III. Government
- (a) Chief executive
  - (1) Title
  - (2) How cho n
  - (3) Length of term
  - (4) Duties
- (b) Other elective officers
  - (1) Financial
    - (a) Treasurer
    - (b) Assessor
    - (c) Collector of taxes
  - (2) Clerk
  - (3) Fire
  - (4) Police
  - (5) Judicial
- (c) Appointive officers
  - (1) Health
  - (2) Education
  - (3) Parks
  - (4) Streets
  - (5) Water Supply

IV. Education
- (a) Board of Education
- (b) Inspector of Schools
- (c) Public schools and buildings
- (d) Private institutions
  - (1) Kinds
  - (2) Endowments
  - (3) Rank among other schools of same kind

V. Public Utilities
- (a) Rail and water communication
- (b) Street railways
- (c) Water supply
- (d) Lighting systems; how owned
  - (1) Electric light
  - (2) Gas

VI. Parks and Boulevards
- (a) Parks
  - (1) Number
  - (2) Area
  - (3) How controlled
  - (4) How supported
- (b) Boulevards
  - (1) Extent
  - (2) Special rules governing

VII. Commerce and Industry
- (a) Banking strength
- (b) Manufactured articles
  - (1) Kinds
  - (2) Market
  - (3) Annual value
  - (4) Persons employed in manufacture
  - (5) Wages paid annually

VIII. Study of Charter

IX. History
- (a) When settled
- (b) Date of organization as a village
- (c) Date of change to city government
- (d) Notable events
- (e) Persons more than locally known

The Province. When the pupil begins the study of the province as a unit in political geography he should have set before him the reasons for the division of the whole country into relatively small areas, each subdivided portion a province.

The thousands upon thousands of square miles of our national domain could not be

THE RESULT OF CENTRALIZED CONTROL

The density of shading suggests the degree of control, or the lack of it. The closest supervision is nearest the source of power

governed properly from one point, no matter if it were centrally located. The national capital was placed at the extreme eastern part of the country; except for inconvenience in traveling to it there can be no objection to its present location, in view of the divisions we have made for purposes of local government. Were one capital city the source of all our authority and were we governed exclusively from it, we might justly believe that sections near at hand would be well governed, and that within such area the interests of every person would be protected, while regions far distant would suffer for lack of properly exercised control. The chart herewith graphically illustrates the idea; the darkest areas nearest the capital city represent those sections which would be best governed and the lighter portions show areas of relatively relaxed authority, owing to greater distances from the governing center.

When the pupil begins the study of civil government he will learn that for most purposes of government—for all purposes purely local—the national government yields its control to the provinces. In such matters as only concern the people in their relation to the province, the authority of the province is supreme. The national government controls affairs within the province only so far as the welfare of all of the people of all of the provinces is concerned. The chart below shows the locations of many capital cities, each the absolute center

OUR CAPITAL CITIES
Each star locates the seat of a nearly independent government.

of authority in all matters pertaining to the every-day needs of the people within that province. The controlling power is thus always near to all the people; that this necessary condition might prevail our provincial boundaries were located and provincial governments were organized.

We desire to study the geography of a province systematically and to cover every essential feature. Such a determination will lead older students to add to the merely geographical outlines something of government and history; a general view of a province is not complete without these features. In following the outline below, such parts may be omitted for younger children as may seem justifiable:

The Province

I. Location
- (a) Latitude
- (b) Longitude
- (c) Boundaries

II. Extent
- (a) Length
- (b) Breadth
- (c) Area
- (d) Compare with other provinces

III. Outline
- (a) General form, regular or irregular
- (b) Boundaries, natural or artificial
- (c) If there is coast line
  - (1) Length
  - (2) Indentations
  - (3) Projections

IV. Surface
- (a) General facts
  - (1) Mountains or great hills
  - (2) Plains
  - (3) Valleys
  - (4) Watersheds
- (b) Effects on climate

V. Drainage
- (a) River systems
  - (1) Main streams
  - (2) Branches
- (b) Lakes
- (c) Springs

VI. Climate
- (a) Natural conditions expected, due to latitude
- (b) How changes are wrought by physical features
- (c) Effect on health
- (d) Compared with other provinces or countries in same latitude
- (e) Average annual rainfall

VII. Products
- (a) Agricultural
  - (1) Grains
  - (2) Stock raising
  - (3) Dairying
  - (4) Fruits, etc.
  - (5) Rank among provinces
- (b) Mineral
  - (1) Precious metals
  - (2) Iron, coal, copper, zinc, etc.
  - (3) Oil and gas
  - (4) Rank among provinces

VIII. COMMERCE AND INDUSTRY
- (a) Railways and canals
- (b) Navigable rivers
- (c) Commercial centers
  - (1) Ten largest cities, in order
  - (2) Population of each
  - (3) Distances from other cities
- (d) Principal manufactures
  - (1) Where sold
  - (2) Value yearly output

IX. POPULATION
- (a) Rate of increase
- (b) Per cent of native Canadians
- (c) Countries furnishing foreign-born proportion
- (d) Where densest, and why

X. GOVERNMENT
- (a) Provincial departments
  - (1) Executive
  - (2) Legislative
  - (3) Judicial
  - (4) How officers are chosen
  - (5) Length of terms
  - (6) Duties
- (b) Number of counties
- (c) Number of members in Parliament
- (d) State institutions
  - (1) Penal
  - (2) Charitable
  - (3) Education of defectives
  - (4) Location of each
  - (5) How each is conducted

XI. EDUCATION
- (a) Public school system
  - (1) Common schools
  - (2) High schools
  - (3) Normal schools
  - (4) Industrial education
    - (a) School of Mines
    - (b) Agricultural College
  - (5) Provincial University
- (b) Colleges
- (c) Private and separate schools

XII. HISTORY
- (a) Exploration
- (b) First settlements
- (c) Date made a territory
- (d) When admitted to Dominion
- (e) Events that are historical
- (f) Famous men and women

XIII. STATISTICAL
- (a) Rank among provinces in mineral products
- (b) Rank in farm products
- (c) Rank in area
- (d) Rank in population

Geography in Picture and in Questions. A few pages farther on in this volume there appears the first of a series of graphic outlines on leading features of each province. Many of these illustrations are of such a simple character that they can easily be copied on the blackboard and thus made available for a large number of pupils. Opposite these graphic representations are questions and references to items of interest in each province. It would have been possible to include hundreds of questions in each instance, but the design has been merely to indicate one direction for the activities of pupil and instructor, and to inspire one to search for further material along the same lines. Make good use of these helps; they begin on page 293.

The Dominion. The geography of the Dominion is first studied as a unit. When the general facts with relation to it are well understood each province may be studied separately and with more attention to particular detail.

A complete outline of the Dominion will include a few facts relating to its history and government, but in studying it as much may be omitted as it is beyond the capacity of the student to understand:

The Dominion

I. LOCATION AND EXTENT
- (a) Latitude
- (b) Longitude
- (c) Boundaries
- (d) Area
- (e) Comparison with other countries

II. SURFACE AND DRAINAGE
- (a) Coastal plain
- (b) Appalachian highlands
- (c) Great central plain
- (d) Rocky Mountain highlands
- (e) Pacific slope
- (f) River systems
  - (1) Main streams
  - (2) Branches
- (g) Lakes

III. CLIMATE
- (a) Natural conditions expected, due to latitude
- (b) Changes wrought by physical conditions

(c) Average temperature
(1) Maritime provinces
(2) Ontario and Quebec
(3) Northwest provinces
(4) Pacific slope
(5) Yukon
(d) Average rainfall in various sections
(e) Need for irrigation
(1) Extent of irrigation service
(a) Reclamation projects
(b) Extent of irrigated lands

IV. INDUSTRIES
(a) Mineral resources
(1) Gold and silver
(2) Iron, copper, coal, lead, etc.
(3) Oil
(4) Granite and building stone
(5) Where each is found
(6) Annual output and value
(7) Provinces leading in each
(b) Agricultural products
(1) Cereals
(a) Wheat
(b) Oats
(c) Rye
(d) Barley
(e) Alfalfa
(f) Corn
(g) Other grains
(2) Fruits
(a) Apples
(b) Peaches
(c) Pears
(d) Berries
(e) Value of annual crop
(f) Provinces leading in production
(3) Market gardening
(a) Its importance
(b) Where most profitable
(4) Live stock and dairy products
(a) Great grazing sections
(b) Packing-house centers
(c) Domestic and foreign markets
(d) Creameries
(e) Milk and butter
(c) Manufactures
(1) Natural locations of districts
(2) Leading industries
(a) Food products
(b) Textiles
(c) Iron and steel
(d) Lumber
(e) Leather and leather goods
(f) Paper and printing
(g) Rank with other nations
(h) Laborers employed
(i) Value of annual output of leading products
(j) Leading foreign markets
(d) Commerce
(1) Domestic commerce
(a) By rail
(b) By water
(1) Inland water routes
(a) Navigable rivers
(b) Canals
(c) Coasting trade
(1) Nations which compete for carrying trade
(a) Proportion of foreign vessels
(b) Reasons for Canadian proportion
(2) Principal coast trade routes
(2) Foreign commerce
(a) With what countries
(b) Value of annual exports
(c) Value of annual imports
(d) Principal countries engaged in carrying trade

V. POPULATION
(a) Per cent of annual increase
(b) Center of population
(1) Rate of progress westward
(2) Density of population
(c) Comparative growth of cities and rural communities
(d) Immigration
(e) Races and colors represented

VI. GOVERNMENT
(a) General character
(b) Departments
(1) Executive
(a) Governor-general
(b) Cabinet
(2) Legislative
(a) Parliament
(1) Senate
(2) House of Commons
(3) Judicial
(a) Supreme court
(b) Courts of limited jurisdiction
(1) Exchequer court
(2) Admiralty court
(c) Provincial governments
(1) In what ways sovereign

(2) In what subordinate to Federal government

(d) Territories

VII. Education in Canada

VIII. Cities

(a) List of twenty-five largest

(b) Forms of government

(1) Commission form

(2) Large elective list of officers

IX. History

(a) Periods

(1) Discovery and exploration

(2) Colonization

(3) Development of colonies

(4) Wars for control of North America

(5) Opening of the west

(6) The fur trade

(7) The struggle for representative government

(8) The union of Upper and Lower Canada

(9) Governmental reform

(10) Confederation

(11) Northwest territories established

(12) Industrial and agricultural expansion

(13) Territorial changes

(14) Foreign affairs

(15) Canada's position as a nation

There is material in the above outline for much profitable investigation and study. For instance, so extended is the area of the Dominion that there is great diversity in climate, ranging from mild temperate latitudes to the long and bitter cold winters of the Yukon and the northern territories. Great mountain ranges and ocean currents modify the temperature in some sections; lack of rainfall affects other localities. These physical facts influence all crops and vegetation. While the Yukon is freezing and under cover of heavy snowfalls the cattle are roaming on the plains of Saskatchewan and Alberta. Unlike the United States there is no section of Canada absolutely free from frosts. In some sections the warm season is short, though generally long enough for the ripening of all grains. Inquiry into the relation of physical geography to the industries and products will repay every student.

North America. In preparing an outline of a great continent one is confronted with the necessity of including an almost endless amount of detail or of limiting the record practically to its physical features. The latter is the logical method to employ, for a continent is always divided into countries and the countries still further subdivided, in detail. In a great land division of the immensity of a continent we seek only general physical characteristics, and leave more intimate study of peoples, governments, industries, and the like until we reach in turn its various political divisions. In the foregoing pages these smaller divisions have been given due consideration.

A satisfactory outline of North America, or of any other continent, should include every important physical feature in its boundaries, definitely named and in a general way located. The chief characteristics of the surface of the continent merit like careful treatment. The following may be considered a typical outline:

North America

I. Position

1. Latitude 9° to 70° 36″ n.

2. Longitude 47° 3″ to 168° w.

II. Extent

1. Length 4,500 mi.

2. Breadth (greatest) 3,000 mi.

3. Area 8,300,000 sq. mi.

4. Rank, 3d.

III. 1. Projections

(a) North

Cape Lisburne

Point Barrow

Cape Bathurst

Boothia Felix Peninsula

Melville Peninsula

Cape Wolstenholme

Labrador Peninsula

(b) East

Cape Charles (north)

Nova Scotia Peninsula

Cape Cod Peninsula

Cape Hatteras

Florida Peninsula

Yucatan Peninsula

(c) West

Lower California Peninsula

Cape Mendoceno

Cape Blanco

Cape Flattery

Alaska Peninsula

2. Coast Waters

(a) North

Arctic Ocean

Dophin and Union Strait
Gulf of Boothia
Committee Bay
Ferry and Hecla Strait
Fox Channel
Hudson Bay
Ungava Bay

(b) East
Atlantic Ocean
Gulf of St. Lawrence
Bay of Fundy
Massachusetts Bay
Long Island Sound
New York Bay
Delaware Bay
Chesapeake Bay
Gulf of Mexico
Gulf of Campeche
Caribbean Sea
Gulf of Honduras

(c) West
Pacific Ocean
Gulf of California
San Francisco Bay
Puget Sound
Strait of Juan de Fuca
Queen Charlotte Sound
Strait of Georgia
Prince Williams Sound
Cook Inlet
Bering Sea
Bristol Bay
Norton Sound
Kotzebue Sound

IV. Islands
1. Arctic Ocean
Greenland
Baffin Land
North Somerset
Prince of Wales Land
Prince Albert Land
Banks Land
Parry Islands
2. Atlantic Ocean
Newfoundland
Cape Breton Island
Prince Edward Island
Anticosti
Martha's Vineyard
Nantucket
Elizabeth Islands
Long Island
Bermuda Islands
Bahama Islands
West Indies
3. Pacific
Revillagigedo Islands
Santa Barbara Islands
Vancouver Island
Queen Charlotte Islands
Prince of Wales Island
Baranof Island
Kadiak Island
Aleutian Islands
Pribilof Islands

V. Surface
1. The Appalachian Highlands
(a) Mountain ranges
Notre Dame Mountains
White Mountains
Green Mountains
Adirondacks
Catskill
Allegheny
Cumberland
(b) Piedmont Plateau
(c) Coastal Plain
2. The Rocky Mountain Highlands
(a) Mountain Ranges
Rocky Mountains
Cascade Range
Sierra Nevada
Coast Range
(b) Eastern foothills
(c) Coastal Plain
3. Great Central Plain

VI. Drainage
1. Watersheds
2. River Systems
Atlantic System
Gulf System
Saint Lawrence
Hudson Bay
Mackenzie
Columbia
Colorado
Rivers of the Great Basin
3. Lakes
Lakes of the Appalachian Highlands
Lakes of the Great Central Plain
Lakes of the Rocky Mountain Highlands

VII. Climate
1. Temperature
2. Rainfall
3. Winds and storms

VIII. Minerals
1. Gold and silver
2. Iron

3 Copper
4. Lead
5. Other metals
6. Mineral fuels
   Coal
   Petroleum
   Natural gas
7. Building Stone

IX. Vegetation
1. Forest areas
   Hard-wood trees
   Soft-wood trees
2. Prairie regions
3. Desert regions

X. Animal Life
1. Large animals
2. Small animals
3. Birds
4. Fish
5. Insects

XI. Inhabitants
1. Indians and Eskimos
2. Other nationalities

XII. Political Divisions
1. Canada
2. Newfoundland
3. United States
4. Mexico

Methods of Teaching Geography

Methods in Geography

I. Purposes to be Gained
- (a) In primary and intermediate grades
  - (1) Knowledge of immediate surroundings
  - (2) Local plants and animals
  - (3) Occupations
  - (4) Elementary principles of political and mathematical geography
- (b) In grammar grades
  - (1) Principles and laws of the science
    - (a) Distribution of animal life
    - (b) Distribution of vegetable life
    - (c) Laws governing climate, tides, seasons, etc.
    - (d) Political geography
- (c) Application of general laws
  - (1) To special cases and places
  - (2) Exceptions due to local conditions

II. Preparation of Teacher
- (a) Knowledge of subject far beyond point class is expected to study
- (b) Ability to reduce to simple language scientific data of physical geography
- (c) Knowledge of general methods of teaching
- (d) Study of geographical topics in the best teachers' journals

III. Aids in Teacher's Preparation
- (a) Knowledge of correlated subjects
- (b) Reference works on topics of the day's lessons
- (c) Careful reading of current publications

IV. Equipment
- (a) Globe and wall maps
- (b) Indexed clipping file
- (c) Modern text-books for class use
- (d) Supplementary text-books for pupils' reference

V. Methods by Grades
- (a) Primary grades
  - (1) Make local geography real
  - (2) Acquaint pupils with technical geographical names of local objects
  - Use of maps
    - (a) Show relative distances and locations locally
    - (b) Make clear that a map is merely a picture on a small scale
- (b) Intermediate grades
  - (1) Apply general facts from local geography to world conditions
  - (2) Model continents from sand, locating river systems, mountains, valleys, with care
  - (3) Study cities
    - (a) Size
    - (b) Reasons for location
    - (c) Causes contributing to growth
  - (4) Text books
    - (a) Endeavor to visualize text, making descriptions seem real
    - (b) Basis of imaginary journeys
- (c) Grammar grades
  - (1) Text-books should be used daily in connection with good reference works
  - (2) Compile clippings on geographical subjects
  - (3) Make maps from memory, drawn to scale
  - (4) Study of types

ALBERTA

1. Irrigation Canal at Calgary
2. Colliery
3. Sugar Beets
4. Meat-Packing Plant
5. Oat Field
6. Moose
7. Grain Elevator nd Flour M
8. Buffaloes in th Park at B

Alberta

Items of Interest

[illegible] was established as a province in 1905. [illegible] for 750 miles from north to south— [illegible] a distance as from Land's End to the [illegible] the Shetland Islands.

[illegible] a total area of 255,285 square miles, [illegible] square miles less than Texas, the [illegible] in the United States.

[illegible] and southern parts its surface [illegible], but the soil yields good crops, [illegible] irrigated; the central part of the [illegible] the ordinary rainfall suffices, is [illegible].

[illegible] the snowfall is very light in the [illegible] and even this is frequently re- [illegible] warm "Chinook" winds from the [illegible] cattle may graze in the open [illegible] whole year.

[illegible] Mountains ascend by a very [illegible] from the east; the principal peaks [illegible] 13,500 feet; Athabasca, 13,700; [illegible] 830; Columbia, about 14,000; [illegible].

[illegible] four well-known Alberta passes [illegible] mountains: (1) Crow's Nest Pass, [illegible] southern boundary, through which [illegible] the Canadian Pacific runs; (2) [illegible] Pass, through which the [illegible] the Canadian Pacific runs; (3) [illegible] Pass, running west from the [illegible] of the Saskatchewan River, [illegible] in 1858; (4) Peace River [illegible] which Sir Alexander Mac- [illegible] celebrated trip to the Pacific [illegible].

[illegible] provided chiefly by two great [illegible] the Saskatchewan and the [illegible] of which have their origin in [illegible] small portion at the southern end [illegible] the Milk River into the Mississippi [illegible].

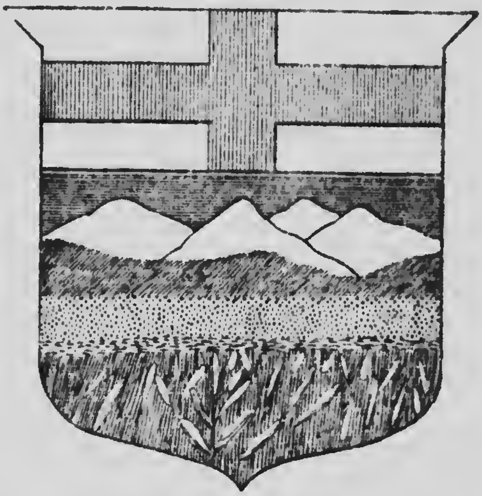
[illegible] rivers are the Peace, Athabasca, [illegible], which all flow into the Mack- [illegible] through Lake Athabasca and Great [illegible] and the North and South Saskatche- [illegible] many tributaries, which empty [illegible].

[illegible] has an area of 2,842 square [illegible].

[illegible] third of the province, increasingly [illegible] as the Rockies are approached, [illegible] but changeable climate; this has [illegible] ranching district, but is becoming known as the home of the celebrated "Alberta Red" winter wheat. Dry-farming is making great advances here.

The middle third averages four to five degrees lower in temperature in winter than the southern section, but it is less subject to change; roughly speaking, this is the farming district.

The northern third has a sub-arctic climate, but its low altitude gives an average summer



COAT OF ARMS OF ALBERTA.

temperature only 1.6° less than Calgary, and 1.8° less than the Edmonton district; the agricultural possibilities are as yet not fully appreciated.

Among wild animals several species of bears, wolves, panthers, wild sheep and goats occur in the wooded and mountainous districts.

In the northern section are found many fur-bearing animals, especially the mink, marten, beaver, otter, ermine and muskrat; it is also a nesting-ground for vast numbers of ducks, geese, swans, pelicans, cranes and partridges. The hunting of beaver is prohibited until December 31, 1915. (See color plate facing page 447.)

Pike, pickerel, whitefish and sturgeon are the most important fishes.

There are large forests in the north and west; poplar, birch, and several varieties of pine, fir and spruce are common.

The chief industries are farming and ranching; of cattle the principal breeds are Shorthorn and Herefords, but Holsteins, Ayrshires and Jerseys are being introduced for dairying.

ALBERTA

1. Irrigation Canal at Calgary
2. Colliery
3. Sugar Beet
4. Meat Packing
5. Oat Field
6. Moose
7. Grain Elevator
8. Buffaloes

Alberta

Items of Interest

Alberta was established as a province in 1905.

It extends for 750 miles from north to south—as great a distance as from Land's End to the north of the Shetland Islands.

It has a total area of 255,285 square miles, about 10,000 square miles less than Texas, the largest state in the United States.

In the eastern and southern parts its surface is almost treeless, but the soil yields good crops, especially when irrigated; the central part of the province, where the ordinary rainfall suffices, is the most fertile.

In winter the snowfall is very light in the southern part and even this is frequently removed by the warm "Chinook" winds from the west, so that cattle may graze in the open practically the whole year.

The Rocky Mountains ascend by a very gradual slope from the east; the principal peaks are Alberta, 13,500 feet; Athabasca, 13,700; Assiniboine, 11,830; Columbia, about 14,000; Murchison, 13,500.

There are four well-known Alberta passes over the mountains: (1) Crow's Nest Pass, near the southern boundary, through which a branch of the Canadian Pacific runs; (2) Kicking Horse Pass, through which the main line of the Canadian Pacific runs; (3) Yellow Head Pass, running west from the northern branch of the Saskatchewan River, and discovered in 1858; (4) Peace River Pass, through which Sir Alexander Mackenzie made his celebrated trip to the Pacific (see page 169).

Drainage is provided chiefly by two great river systems, the Saskatchewan and the Mackenzie, both of which have their origin in the province; a small portion at the southern end is drained by the Milk River into the Mississippi system.

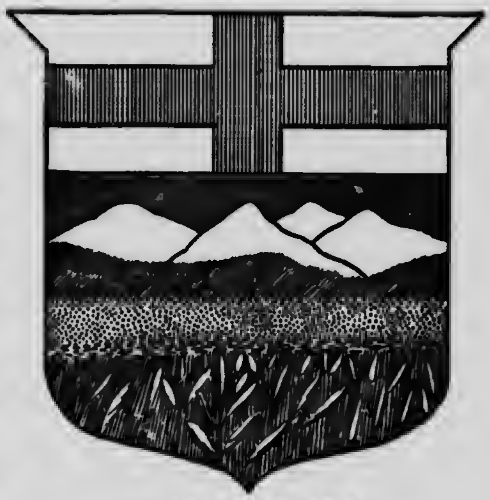
The principal rivers are the Peace, Athabasca, Smoky and Slave, which all flow into the Mackenzie system through Lake Athabasca and Great Slave Lake, and the North and South Saskatchewan, with their many tributaries, which empty into Lake Winnipeg.

Lake Athabasca has an area of 2,842 square miles.

The southern third of the province, increasingly mountainous as the Rockies are approached, has a moderate but changeable climate; this has been a great ranching district, but is becoming known as the home of the celebrated "Alberta Red" winter wheat. Dry-farming is making great advances here.

The middle third averages four to five degrees lower in temperature in winter than the southern section, but it is less subject to change; roughly speaking, this is the farming district.

The northern third has a sub-arctic climate, but its low altitude gives an average summer temperature only 1.6° less than Calgary, and 1.8° less than the Edmonton district; the agricultural possibilities are as yet not fully appreciated.



COAT OF ARMS OF ALBERTA.

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Pike, pickerel, whitefish and sturgeon are the most important fishes.

There are large forests in the north and west; poplar, birch, and several varieties of pine, fir and spruce are common.

The chief industries are farming and ranching; of cattle the principal breeds are Shorthorn and Herefords, but Holsteins, Ayrshires and Jerseys are being introduced for dairying.

There are about 300,000 horses in the province.

Alberta won the prize for the champion hackney at the Pan-American Exposition, Buffalo, in 1901, and also for the champion hackney stallion and hackney mare at the Louisiana Purchase Exposition, St. Louis, in 1904.

About 80,000 hogs are slaughtered annually.

The total number of cattle is estimated at 1,000,000 head.

The average value of horses under one year is $50; from one to three years about $100; and over three years, $165.

Practically no hay or fodder is cultivated, except alfalfa in the south, because there are forty-six varieties of native grasses, which make excellent hay.

There are 180,000 sheep and 150,000 swine in Alberta.

The great irrigation projects of the province will provide water for more than 3,500,000 acres (see page 33).

The total value of all field crops in 1910 was $16,582,000, but in 1911 this had risen to $47,750,000.

In 1911 Alberta produced 36,000,000 bushels of wheat, nearly one-fourth of which was winter wheat.

The average yield of wheat per acre is over 20 bushels, as compared with 12 to 15 bushels in North Dakota, Iowa, and Minnesota.

According to the Calgary *Herald*, the net profit per acre under wheat is $10.54, in a good season.

The average yield of oats per acre is over 48 bushels, the total crop in 1911 being nearly 57,000,000 bushels.

Other important crops are barley, rye and flax.

Small fruits do well in nearly all parts; apples, crab apples and plums are the principal orchard fruits.

The government maintains ten small-fruit experiment stations in Alberta.

Sugar beets are grown in large quantities in the vicinity of Raymond, where there is a factory for the extraction of sugar; in 1911 the total production was about 15,000 tons.

The annual factory production of butter is about 2,500,000 pounds, and of cheese about 200,000 pounds. The total value of all dairy products is nearly $1,000,000 and there are over twenty creameries, formerly managed by the government.

Approximately $100,000 worth of fish are taken from Alberta lakes each year; whitefish represents one-half of the total.

Rocky Mountain Park has an area of 4,500 square miles; in 1911 this park was included in a new Rocky Mountain Forest Reserve with a total area of 18,564.5 square miles.

The mineral products of Alberta rose from $6,000,000 in 1909 to $8,996,000 in 1910, but fell to $6,500,000 in 1911.

Coal represents over ninety per cent of the total product of the mines, but building stone, clays, gypsum, natural gas and salt are found in considerable quantities.

About 130 collieries are in operation and over 3,000,000 tons of coal, one-fourth of the total for the country, are produced annually.

There are over 800 arc lamps and nearly 60,000 incandescent lamps in Alberta.

According to an estimate of the railway lands branch of the department of the interior, there is about 1,500,000 horse power available for development; the Grand Rapids of the Athabasca River furnish 100,000 horse power; the Peace River Chutes about 250,000, and the Slave River, at Fort Smith, about 300,000.

There are about 60,000,000 acres of unsurveyed land in Alberta available for agriculture.

Over $20,000,000 of United States capital are invested in the province.

The value of the manufactured products rose from $1,900,000 in 1900 to over $5,000,000 in 1905 and $8,000,000 in 1911.

Flour and grist-mill products represent one-fifth of the total manufactures; lumber and timber products are second in importance.

There are over 1,600 miles of railways in operation in Alberta, 1,200 of which are included in the Canadian Pacific system.

The principal railroads are the Canadian Pacific, the Canadian Northern and the new Grand Trunk Pacific.

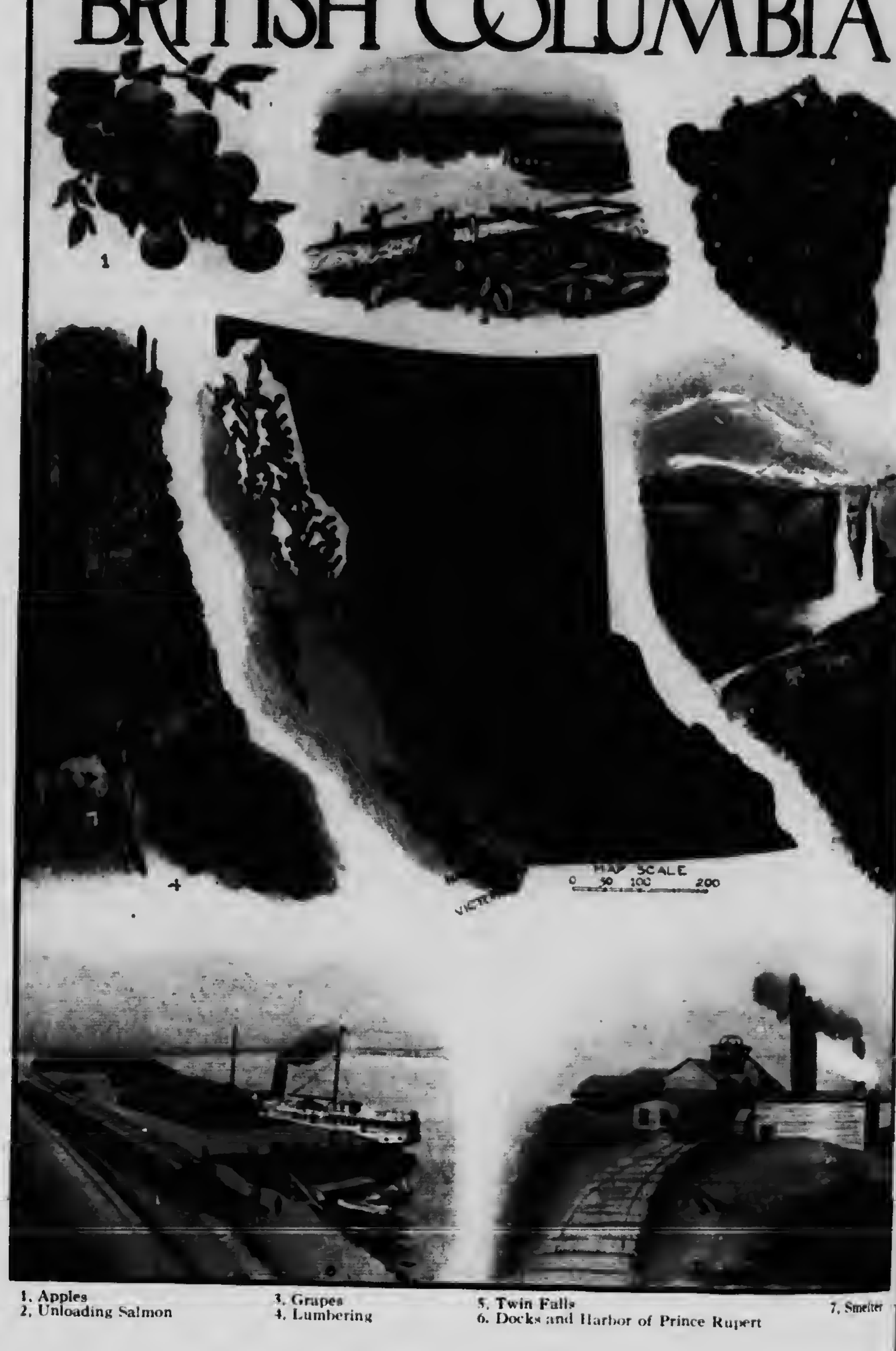
The liabilities due to commercial failures decreased from $410,000 in 1909 to $205,225 in 1910.

There are over 700 post offices in Alberta.

The bank clearings at Calgary rose from $64,815,000 in 1908 to $150,677,031 in 1910, and $218,681,921 in 1911; at Edmonton they rose from $38,486,000 to $71,633,122 in 1910 and $121,438,394 in 1911.

The province has an excellent public-school system, a normal school at Calgary, and collegiate institutes for secondary education at Calgary and Edmonton and high schools in all parts of the province. The provincial University of Alberta, situated at Strathcona (Edmonton

BRITISH COLUMBIA



1. Apples
2. Unloading Salmon
3. Grapes
4. Lumbering
5. Twin Falls
6. Docks and Harbor of Prince Rupert
7. Smelter

[illegible] courses in arts and engineering, [illegible] is also being established in [illegible] by private benefactions.

[illegible] twenty-six Indian schools, with a [illegible].

[illegible] province is Edmonton, [illegible]-governor and cabinet reside.

[illegible] of one house of forty-[illegible].

[illegible] the incorporation of the [illegible] Company (1670) till 1875 the dis[illegible] part of Rupert's Land.

[illegible] the district of Alberta was organized [illegible] the Northwest Territories and in [illegible] as a province and the pres[illegible].

[illegible] 29,859 immigrants from the [illegible] 1911.

[illegible] according to the census of [illegible], an increase of 301,641 or over [illegible] ten years.

[illegible] are Calgary, Edmonton, [illegible] Hat and Strathcona (now [illegible]).

Questions on Alberta

[illegible] Alberta organized as a province?

[illegible] governed previously?

[illegible] area of the province?

[illegible] Nova Scotias can be carved from [illegible].

[illegible] say of the surface and soil?

[illegible] great peaks of the Rockies, also [illegible] passes.

[illegible] explorer crossed the Peace [illegible]

Through which pass does the main line of the Canadian Pacific run?

What two great river systems have their source in the province?

What large lake lies on the boundary between Alberta and Saskatchewan?

What is the character of the climate?

Name several fur-bearing animals found here.

Where are the large forests found?

What is the area of the Rocky Mountain Forest Reserve?

What are the principal industries?

What is the estimated number of cattle in the province? Of sheep? Of swine?

What great irrigation projects are in operation?

How many acres are irrigable?

Compare the value of field crops in 1910 and 1911.

What was the yield of wheat in 1911?

What are some other important crops?

In what section are sugar beets raised extensively?

What is the average annual factory production of butter?

What is the principal mineral product?

What part of the coal production of Canada is mined in Alberta?

What are the important manufactures?

How many miles of railway are in operation?

What are the principal railroads?

What is the capital of the province?

How many members has the legislature?

What was the population in 1901? In 1911?

British Columbia

Items of Interest

[illegible] of British Columbia is 355,855 [illegible] twenty-two times that of Switzer[illegible] five times that of the state [illegible].

[illegible] a mountainous region, the [illegible], the Cascade or Coast Range [illegible] covering a large part of the [illegible].

[illegible] two ranges is an elevated tract [illegible] known as the "interior plateau."

[illegible] Island and the Queen Charlotte [illegible] remnants of still another range, [illegible] parallel to the coast, but is now sub[illegible].

[illegible] altitude of the Rockies at the [illegible] boundary is 8,000 feet, but the highest point in British Columbia is Mount Fairweather, 15,287 feet, also on the boundary.

Other high peaks are Assiniboine, 11,860 feet; Lyell, 12,000; Robson, 13,700; Grillon, 12,750 (see Alberta, page 293).

The highest pass over the Rockies is the South Kootenay or Boundary Pass, 7,100 feet.

The partially submerged valleys of the Coast Range form the many harbors and sounds which are characteristic of the coast. The coast line, including all inlets, is over 7,000 miles long.

On the southwestern side of the Rockies is a great valley in which the Kootenay, Columbia, Fraser, Finlay and other rivers have their upper courses; the northern part of the province is drained by tributaries of the Mackenzie and the Yukon.

BRITISH COLUMBIA

1. Apples
2. Unloading Salmon
3. Grapes
4. Lumbering
5. Twin Falls
6. Docks and Harbor of Prince Rupert
7. [illegible]

South) offers full courses in arts and engineering, and a university is also being established in Calgary by private benefactions.

There are twenty-six Indian schools, with a total attendance of 900.

The capital of the province is Edmonton, where the lieutenant-governor and cabinet reside.

The legislature consists of one house of forty-one members.

From the time of the incorporation of the Hudson's Bay Company (1670) till 1875 the district was a part of Rupert's Land.

In 1875 the district of Alberta was organized as a part of the Northwest Territories and in 1905 was established as a province and the present boundaries formed.

Alberta received 29,859 immigrants from the United States in 1911.

The population, according to the census of 1911, is 374,663, an increase of 301,641 or over 400 per cent, in ten years.

The principal cities are Calgary, Edmonton, Lethbridge, Medicine Hat and Strathcona (now a part of Edmonton).

Questions on Alberta

When was Alberta organized as a province? How had it been governed previously?

What is the area of the province?

How many Nova Scotias can be carved from Alberta?

What can you say of the surface and soil?

Name four great peaks of the Rockies, also four well-known passes.

What celebrated explorer crossed the Peace River Pass?

Through which pass does the main line of the Canadian Pacific run?

What two great river systems have their source in the province?

What large lake lies on the boundary between Alberta and Saskatchewan?

What is the character of the climate?

Name several fur-bearing animals found here.

Where are the large forests found?

What is the area of the Rocky Mountain Forest Reserve?

What are the principal industries?

What is the estimated number of cattle in the province? Of sheep? Of swine?

What great irrigation projects are in operation?

How many acres are irrigable?

Compare the value of field crops in 1910 and 1911.

What was the yield of wheat in 1911?

What are some other important crops?

In what section are sugar beets raised extensively?

What is the average annual factory production of butter?

What is the principal mineral product?

What part of the coal production of Canada is mined in Alberta?

What are the important manufactures?

How many miles of railway are in operation?

What are the principal railroads?

What is the capital of the province?

How many members has the legislature?

What was the population in 1901? In 1911?

British Columbia

Items of Interest

The area of British Columbia is 355,855 square miles, twenty-two times that of Switzerland and more than five times that of the state of Washington.

It is essentially a mountainous region, the two great chains, the Cascade or Coast Range and the Rockies, covering a large part of the area.

Between the two ranges is an elevated tract of hilly country known as the "interior plateau."

Vancouver Island and the Queen Charlotte Islands are remnants of still another range, which ran parallel to the coast, but is now submerged.

The average altitude of the Rockies at the United States boundary is 8,000 feet, but the highest point in British Columbia is Mount Fairweather, 15,287 feet, also on the boundary.

Other high peaks are Assiniboine, 11,860 feet; Lyell, 12,000; Robson, 13,700; Grillon, 12,750 (see Alberta, page 293).

The highest pass over the Rockies is the South Kootenay or Boundary Pass, 7,100 feet.

The partially submerged valleys of the Coast Range form the many harbors and sounds which are characteristic of the coast. The coast line, including all inlets, is over 7,000 miles long.

On the southwestern side of the Rockies is a great valley in which the Kootenay, Columbia, Fraser, Finlay and other rivers have their upper courses; the northern part of the province is drained by tributaries of the Mackenzie and the Yukon.

In the southern half of the province July is the month of least and December of greatest rainfall.

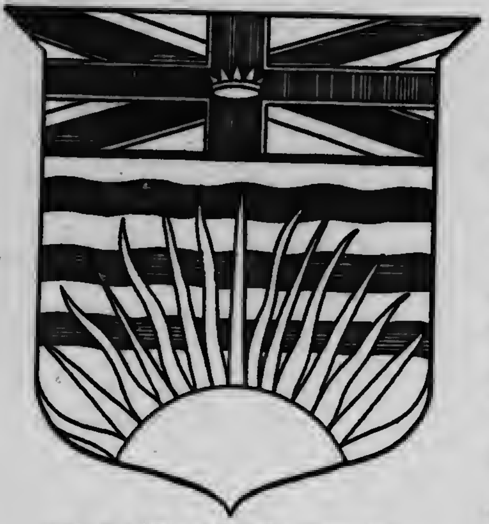
The mean temperature for the year is about 47° Fahrenheit.

On the mainland are found the mountain sheep and goat, bear, moose, caribou, deer, coyote and grizzly bear; the black bear, wolf, lynx, and Columbian or coast deer are also found on the islands.

Sea-lions, sea-otters, fur-seals and harbor-seals were formerly abundant, but are growing scarce.

About 340 species of birds are found.

Mining is the principal industry; from 1894 to 1904 the mineral output increased from $4,225,717 to $18,977,359 and in 1911 to



COAT OF ARMS OF BRITISH COLUMBIA

$22,000,000, over twenty per cent of the mineral product of the country.

About 3,000,000 tons of coal, 2,600,000 ounces of silver and over $5,000,000 worth of gold are produced annually.

About one-half of the coal mined each year is exported to the United States; most of the present coal supply comes from Vancouver Island and from the western slope of the Rockies near Crow's Nest Pass.

The Rossland, Boundary and Kootenay districts are the centers of vein-mining for gold and silver.

The output of copper is worth more than $5,000,000 a year.

Over 4,000,000 pounds of zinc were produced in 1911.

In 1911 the value of the fisheries' products was $9,163,235, as compared with $10,314,755 the year before and $6,465,038 in 1900.

The most valuable catch is the salmon, valued at $6,744,000 in 1911.

The quantity of salmon packed fluctuates, due to lack of proper co-operation between the state of Washington and the province; in 1905 the pack was 1,167,460; in 1908-9 it was only 542,000, but in 1910-11 it rose to 1,006,000 cases.

The total catch of herring is worth about $600,000 in a good year; most of the product is packed for exportation to China.

The seal fisheries yield about 3,800 skins a year, worth $125,000 to the fishermen.

Shrimps, clams, cockles and mussels are found everywhere along the coast.

About 600 whales are killed annually.

Other products of the British Columbia fisheries are cod, crabs, oysters and smelts.

There are seventy salmon canneries in the province.

Oysters from the Atlantic coast have been planted in Pacific waters but the industry is not yet of importance.

The Dominion government maintains eleven fish hatcheries, which planted 93,000,000 salmon, mostly fry, in 1911.

The forest area is estimated at 182,750,000 acres, of which 1,306,760 acres have been set aside as a Dominion forest reserve.

All lands within twenty miles on each side of the Canadian Pacific Railway, known as the "railway belt," are the property of the Dominion government; the total area of this belt is about 17,000 square miles.

The stand of merchantable timber is estimated at 130 billion feet.

The most important tree is the Douglas fir, but cypress, white spruce, white and yellow pine, maple, hemlock, red cedar and tamarack are all important.

The manufacture of wood pulp is still in the experimental stage, $2,200 worth being used in 1910 and $1,140 in 1911.

Log and lumber products are valued at $15,000,000 a year.

The products of the smelters are also about $15,000,000 each year.

The preserving and packing of fish is the third great manufacturing industry, the annual products being valued at about $6,000,000.

Minor industries are the manufacture of flour, bread and foundry products.

The annual total of manufactured commodities is about $50,000,000.

Oats represent about eighty per cent of the total value of field crops; in 1911 the total was $1,290,000.

The average value of farm lands is $74 per acre, as compared with $38.50 for Canada as a whole; the high value in British Columbia is due to fruit-farming.

In 1901 there were 7,400 acres in fruit farms, in 1911 about 110,000 acres.

Apples are the principal fruit, but peaches, apricots, almonds, small fruits and grapes are being successfully cultivated.

1,206,000 pounds of butter were produced in the factories in 1911, but nearly four times as much was imported in addition.

108 patents of invention were granted in 1911 to citizens of the province.

There are about 400,000 incandescent electric lights in use in British Columbia.

The province has about eighty saw mills.

The Canadian Pacific owns two large lines of steamships running from Victoria and Vancouver: (1) the *Empress*, to Japan and China; (2) the *Australian*, to Honolulu, Fiji Islands and Sydney.

There are 1,832 miles of railroad, of which over 1,200 are included in the Canadian Pacific system.

There are three classes of schools—common, graded and high—all free and undenominational.

There are two colleges in the province, McGill University College of British Columbia at Vancouver, one of the branch colleges of McGill University at Montreal, and Columbia College at New Westminster, affiliated with the University of Toronto. These will be absorbed by the new provincial university at Vancouver.

There are 62 Indian schools, with a total attendance of 2,225.

There were 204 branches of Canadian chartered banks in the province at the end of 1911.

On the basis of the census of 1911 British Columbia has twelve members in the House of Commons instead of seven as before.

The number of Indians on government agencies was 24,338 in 1911.

The population increased from 178,657 in 1901 to 392,480 in 1911, an increase of 119 per cent.

The average density of population, 1.1 per square mile, is less than that of any other province.

A graduated income tax is in force.

Geographical explorations of the Pacific coast began with Cook's voyage in 1778.

Vancouver (see page 189) surveyed almost the entire coast of the present province.

From 1821 to 1849 the country was controlled by the Hudson's Bay Company; it then became a province under royal government.

British Columbia joined the Confederation in 1871, one of the conditions being that the Canadian Pacific Railway should be finished as quickly as possible.

The principal cities are Vancouver, on the mainland, Victoria, the capital, on Vancouver Island, and New Westminster, Nanaimo, Rossland, Nelson, Prince Rupert are also important.

Questions on British Columbia

What is the area of British Columbia? How does it compare with Switzerland? With the United Kingdom?

What is the character of the surface?

Name the two great mountain chains and three of the highest mountain peak

How was Vancouver Island formed?

How long is the coast line?

What are the common wild animals found in the province?

Which are the principal rivers? In what direction do they flow?

What is the total forest area?

What is the principal industry?

What is the importance of the mining industry in British Columbia as compared with the rest of Canada?

Where are the coal-mining districts? The gold-mining?

What other minerals are important?

What is the principal product of the fisheries?

What percentage of the total does it represent?

What is the average value of the year's catch?

How do the fisheries of British Columbia rank?

How many salmon canneries are there in the province?

What is the "railway belt"?

What tree furnishes most of the lumber cut?

What is the total value of log and lumber products?

What is the acreage devoted to fruit-farming?

Which districts are especially famous for fruits?

Name five fruits raised in abundance.

How many miles of railroad has British Columbia?

How many representatives has the province in the Dominion House of Commons?

What is the population according to the last census?

Name five of the largest cities.

Who was Vancouver?

When did British Columbia join the Confederation?

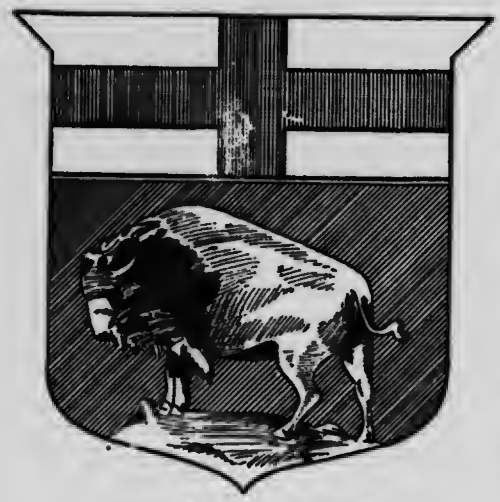
Manitoba

Items of Interest

Manitoba lies nearly midway between the Atlantic and the Pacific coasts.

Its area in 1870, when it became a province of the Dominion, was 13,500 square miles; in 1881 its area was increased to 73,732, only 10,000 of which were land; by an act of Parliament during the session of 1912, the province was further enlarged by the addition of a part of the district of Keewatin, so that its present area is 251,832 square miles.

The word Manitoba is a contraction of two Indian words, *Manito* (the Great Spirit) and *Waba* (the "narrows" of the lake); this strait in Lake Winnipeg was a sacred place to the Crees, who were impressed by the sound of the wind rushing through the narrows.



COAT OF ARMS OF MANITOBA

The word was formerly pronounced *Man-i-to-ba'*, with the accent on the last syllable, but the accent is now generally placed on the syllable next to the last.

The drainage of the province is entirely northeastward into Hudson Bay

The principal rivers are the Winnipeg and the Red, with its tributary, the Assiniboine, both of which empty into Lake Winnipeg, and the Nelson, which connects Lake Winnipeg with Hudson Bay.

The highest point in the province is in the Porcupine Mountains, 2,500 feet above sea level.

The surface is chiefly a prairie region, but the river banks are fringed with trees, sometimes forming forests of considerable size.

The Manitoba forest reserves have an area of 3,600 square miles.

Aspen, maple, oak, elm and willow are the important varieties of trees.

The strawberry, raspberry, currant, plum, cherry and grape are native fruits.

Agriculture is the principal industry; the following figures in bushels give an idea of its growth.

	1883.	1890.	1894.	1901.	1911.
Wheat ..	5,686,355	14,665,769	17,172,883	50,502,085	60,275,000
Oats ...	9,478,965	9,513,443	11,907,854	27,796,588	57,893,000
Barley...	1,898,430	2,069,415	2,981,716	6,536,155	14,447,000
Flax	No statistics collected.		366,000	266,420	1,123,000
Potatoes			2,035,336	4,797,433	5,122,000
Other roots...			1,841,942	2,925,362	1,600,000

The Dominion government maintains an experimental farm of 670 acres at Brandon.

The acreage under wheat is about 3,000,000, under oats about 1,300,000.

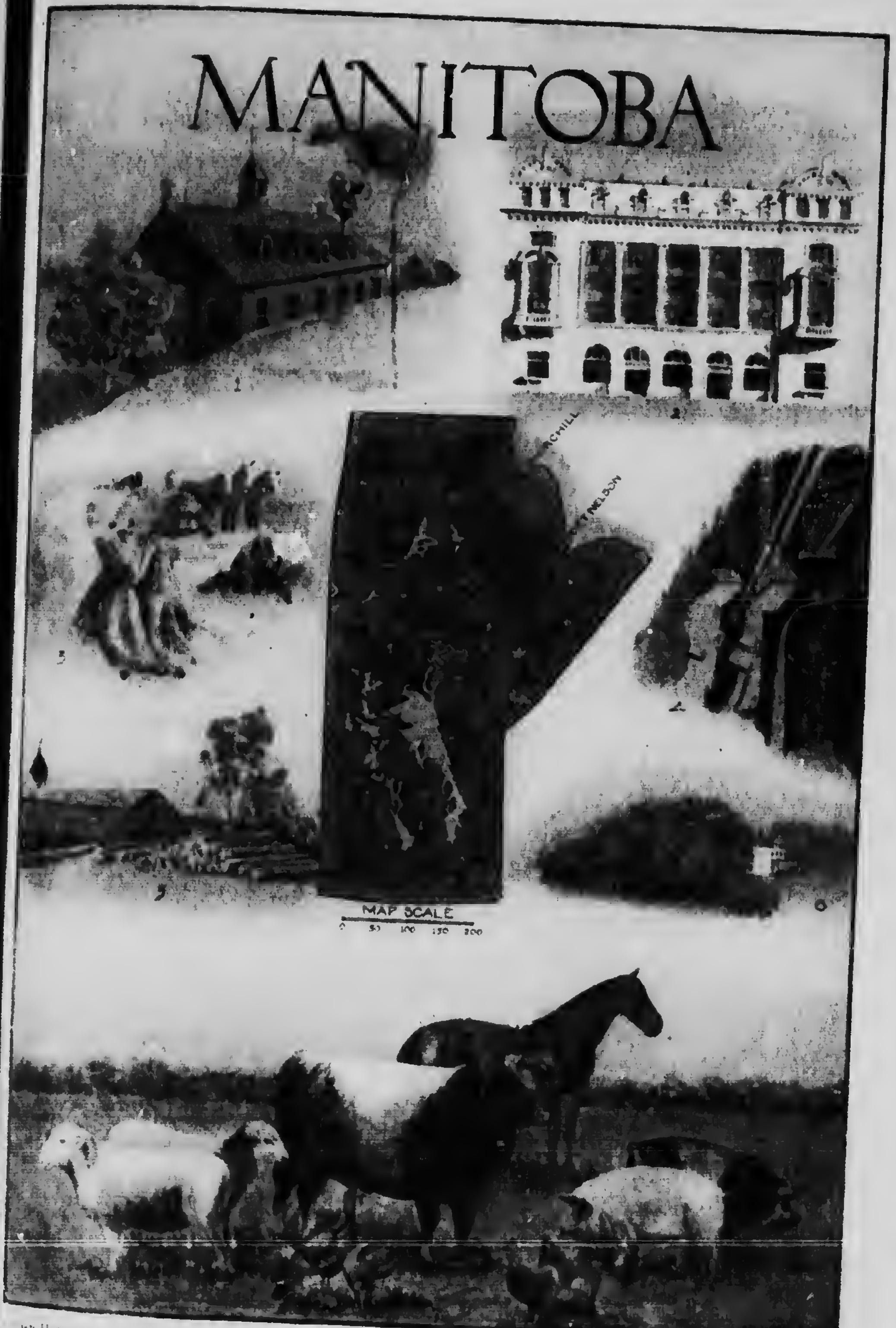
Factory dairying is still in its infancy; there are now 23 creameries and 31 cheese factories in operation, with a total annual product valued at over $600,000.

The total value of dairy products is about $1,600,000 a year.

The potato crop was 5,122,000 bushels in 1911, an average of 207 bushels per acre.

All classes of live stock, except horses, show a slight decrease in 1911 as compared with each year since 1908; the number of horses increased from 230,926 in 1908 to 244,987 in 1910 and to 251,800 in 1911.

There are great possibilities in poultry raising; about 700,000 chickens and 120,000 turkeys were sold by farmers in 1911 but there were also large imports of poultry and eggs for home consumption.



...ish H...t
Winnip...

3. Wheat Field
4. Interior of a Flour Mill.

5. Lumber Mill.
6. Windbreak of Trees

7. Live Stock and Poultr[illegible]

How many representatives has the province in the Dominion House of Commons?

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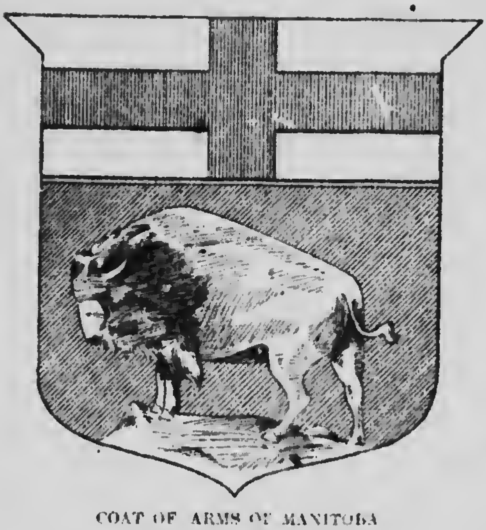

COAT OF ARMS OF MANITOBA

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1. Fish Hatchery.
2. Winnipeg Postoffice.
3. Wheat Field.
4. Interior of a Flour Mill.
5. Lumber Mill.
6. Windbreak of Trees.
7. Live Stock and Poultry.

There are 161,000 milch cows and 135,000 swine in the province.

The products of the fisheries in 1911, mostly whitefish and pickerel, were worth $1,302,000; lake Winnipeg contributes about half the total.

The mineral products are worth over $1,500,000 a year, chiefly cement, clays, gypsum and building stone; this is less than two per cent of the total mineral production of the Dominion.

Large deposits of metals and coal are said to exist in the Keewatin district.

Manitoba was the first province to set aside one section of land in each township for school purposes.

The Manitoba Agricultural College at Winnipeg was first opened in 1906; its new buildings are estimated to cost $1,000,000.

The provincial university stands at the head of the educational system.

Bank clearings at Winnipeg were over one billion dollars in 1911; only Montreal and Toronto have a greater total.

The total assessed valuation of property by municipalities is $360,000,000.

The population of the province in 1911 was 455,614, an increase of 78.5 per cent in ten years.

There are about 3,230 miles of railroad in operation.

The principal cities are Winnipeg, Brandon, St. Boniface and Portage la Prairie.

There are 190 branches of chartered banks in the province.

Manitoba is entitled to fifteen members in the House of Commons on the basis of the census of 1911; this representation will remain unchanged until after the census of 1921.

In 1911 one hundred and two patents of invention were issued to citizens of Manitoba by the Canadian patent office.

The manufacturing industries yield an annual product of nearly $40,000,000. The most important products are flour and allied products, which form twenty-five per cent of the value of all manufactures; Manitoba ranks second only to Ontario in this industry.

Other manufactures, in the order of their importance, are log and lumber products, slaughtering and meat products, printing and publishing.

The Dominion government maintains three fish hatcheries, two on Lake Winnipeg and one on Lake Winnipegosis; all three handle only whitefish.

There are 52 Indian schools, with a total attendance of 1,700 boys and girls.

The Indian population of the province is nearly 14,000.

Questions on Manitoba

What is the present area of Manitoba? When was the last change made in the provincial boundaries?

What is the origin of the word Manitoba?

What are the principal rivers?

Of what drainage system are they a part?

What is the highest point in the province?

What is the general character of the surface? What efforts are being made to improve the conditions?

What are the important native trees? Where are they found?

What are the two great grain crops?

What can you say of the importance of dairying? Of agriculture as a whole?

What is the acreage under wheat?

What is the average potato crop?

What is the probable future of poultry raising? Why do you think so?

Name three of the principal mineral products.

How does Manitoba rank in the production of flour?

Name several other manufactures.

How many miles of railroad are in operation?

How many representatives has the province in the Dominion House of Commons?

What was the precentage of increase in population between 1901 and 1911? What was the population in 1911?

Name the five largest cities. Which of these is the capital?

New Brunswick

Items of Interest

New Brunswick is 230 miles long from north to south, and its greatest breadth is 190 miles.

Its coast line is about 550 miles long.

The area is 27,985 square miles, slightly smaller than Scotland.

The surface is undulating in the eastern part, but in the north and northwest are several low ranges of hills, an extension of the Appalachian system.

The highest point in the province is Bald Mountain, 2,604 feet.

New Brunswick is a network of rivers, bays and lakes; the principal rivers are the St. John, Miramichi, Restigouche, St. Croix, Petitcodiac and Richibucto.

The St. John, which rises in Maine, is over 450 miles long, and is navigable for vessels of moderate tonnage from the city of St. John to Fredericton, a distance of 88 miles.

All the rivers have a general easterly direction.

The Bay of Fundy has a length of 140 miles and an extreme width of 45 miles; it is noted for its high tides.

The Basin of Minas, an extension of the Bay of Fundy, is the scene of Longfellow's *Evangeline*.

The Bay of Chaleur is 90 miles long.

COAT OF ARMS OF NEW BRUNSWICK

There are many excellent harbors; almost every river mouth is a deep and broad inlet.

The average mean temperature for the summer is 60° F. and in winter 19° F.

For the last thirty years the average annual rainfall is 32.6 inches.

The forest area is estimated at 20,000 square miles; black spruce, hemlock, cedar, birch, beech, oak, and ash are the principal kinds of trees.

In 1902 the provincial government set aside tract of 10,000 square miles as a national par_ and game preserve.

The value of the wood used in the making of pulp increased from $119,620 in 1910 to $251,858 in 1911; there are four pulp mills in the province.

In 1911 the field crops of the province were worth $16,797,000; hay and clover form the most important item, with a total of nearly $7,000,000.

8,627,000 bushels of potatoes were raised in 1911, an increase of 2,560,000 over the crop of 1910.

The oat crop is about 6,000,000 bushels.

Nearly 4,000,000 bushels of turnips are raised annually.

The only other field crop of importance is buckwheat, with a yield of 1,600,000 bushels in 1911, an increase of 20 per cent in one year.

The yearly output of factory-made butter is about 850,000 pounds; of cheese, nearly 1,250,000 pounds.

New Brunswick has 225,000 head of cattle, 66,700 horses and 93,000 swine.

The recent law permitting the shooting of stray dogs without liability and the increased use of woven instead of barbed wire for fences is largely responsible for the increase in the number of sheep from 143,000 in 1910 to 190,000 in 1911.

The estimated annual crop of apples is 650,000 bushels; about 600,000 quarts of berries and small fruits are raised.

The blueberry, raspberry and cranberry are native fruits.

The provincial government has established twenty-six model apple orchards in different parts of the province.

The fisheries' products are worth over $4,000,000 a year.

Herring yields about twenty per cent of the total value, lobsters fifteen per cent, cod twelve per cent, smelts twelve to fifteen per cent and sardines ten per cent.

The capital invested in fishing implement tackle and boats is $2,500,000.

There are 185 lobster canneries in New Br wick.

The government of the province leases its fishing waters to be used for "fly-fishing" only; licenses are granted for five or ten years to the highest bidder.

The total mineral production is $600,000.

New Brunswick produced 1,500 barrels of petroleum in 1911, and about 50,000 tons of coal.

Gypsum is the only other mineral of commercial importance, except building stones.

The manufacturing industries of New Brunswick produce about $30,000,000 worth of commodities a year.

The most important branch of manufactures is log and lumber products, about $7,000,000.

Other products, in the order of their importance, are cotton goods, foundry and machine-

NEW BRUNSWICK, NOVA SCOTIA AND PRINCE EDWARD ISLAND

3. Falls and Lumber Mill
4. Fruits and Vegetables
5. Iron and Steel Works
6. [illegible] Railway at Halifax

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NEW BRUNSWICK, NOVA SCOTIA AND PRINCE EDWARD ISLAND

1. Fishing Scene
2. Coal Mining
3. Falls and Lumber-Mill
4. Fruits and Vegetables
5. Iron and Steel Works
6. Terminal Docks of the Intercolonial Railway at Halifax

shop products, preserved fish, wood pulp, iron and steel.

There are 650 manufacturing establishments in the province.

There are 74 branches of chartered banks and 1,410 postoffices.

There are 1,800 Indians under the control of the agencies.

Thre are ten Indian schools, with a total attendance of 250; these schools are all Catholic.

The population in 1911 was 351,889.

The largest cities are Saint John, Moncton, Fredericton, Chatham and Woodstock.

There is little immigration (about 5,000 in 1911) and a steady emigration to the western provinces and to the United States.

Thre is a good system of free and undenominational primary schools.

The province also supports a normal school, a school for the deaf and dumb and the provincial university (founded in 1800), all at Fredericton, and a dairy school at Sussex, King's county.

New Brunswick was originally a part of the French province of Acadia; later it was a part of Nova Scotia.

It was declared a separate province in 1784.

Questions on New Brunswick

Compare the areas of New Brunswick and Scotland. Of New Brunswick and Saskatchewan.

Judging by the length of the coast line as compared with the length of the province from north to south, what would you say of the character of the coast?

What is the highest point in the province?

Name five important rivers. In what direction do they flow?

Where is the Bay of Fundy? The Basin of Minas?

What is the average annual value of the lumber products?

What are the leading crops?

What was the size of the potato crop in 1911?

Is dairying an important industry?

What can you say of the growth in sheep ranching?

What is the principal product of the fisheries?

Name three other fishes caught in large quantities.

How is the right to use New Brunswick waters for fishing acquired?

What are the most valuable minerals found?

Compare the importance of manufacturing with other industries.

What are the leading manufactures?

What is the population of the province?

Name four of the largest cities.

Of what French province was New Brunswick originally a part?

When did it become a separate province?

Nova Scotia

Items of Interest

The province of Nova Scotia is composed of the peninsula proper and the island of Cape Breton.

Its area is 21,428 square miles.

The isthmus of Chignecto, which connects it with New Brunswick, is eleven and a half miles wide.

The peninsula is intersected by several chains of hills, the Cobequid Mountains being the principal ones.

In Cobequid Bay, the eastern end of the Basin of Minas, the tides have risen as high as fifty-three feet; on the east coast of the province the tides seld[illegible]ed seven feet.

Sable Islan[illegible] miles southeast of Cape Canso, is compo[illegible] of shifting sands, with dangerous sandbars that run out into the ocean; because of the many wrecks which have occurred here it has long been known as "the graveyard of the Atlantic."

The principal rivers are the Annapolis, Avon, Shubenacadie, Musquodoboit and the East, Middle and West rivers of Pictou.

Lake Rossignol, in Queen's county, is the largest of the freshwater lakes.

There is considerable game, including moose, caribou, duck, teal, partridge, snipe and plover; the game laws are strict and well enforced.

Bears, foxes and wildcats are still found, but wolves are extinct.

The fisheries of Nova Scotia are the most important in the Dominion. In 1911 the value of the catch was $7,133,000 in the green state and $10,119,000 as marketed, or more than one-third of the total for Canada.

The industry employs nearly 27,000 men and $5,500,000 in capital.

The principal product of the fisheries is cod, with a value of over $4,000,000. Lobsters are second in importance, with $2,271,000 in 1911, and haddock third with $1,138,000. Herring, hake, pollock, mackerel, halibut and salmon are next valuable, in order. The lobster fisheries use 720,000 traps; there are over 200 lobster canneries in operation.

The value of all field crops in 1911 was $14,297,000.

The total value of farm property is over $90,000,000, over two-thirds being the value of land and buildings.

COAT OF ARMS OF NOVA SCOTIA

Hay and clover were worth $8,300,000 in 1911, only $200,000 less than the total of all field crops in 1901.

5,000,000 bushels of potatoes, 4,000,000 bushels of turnips and other roots, and 2,471,000 bushels of oats were raised in 1911.

Other important field crops are wheat, barley and alfalfa.

The exports of apples have risen from 70,000 barrels in 1880 to 1,250,000 barrels in 1911.

There are thirty-five model orchards, maintained by the Canadian government.

Nova Scotia captured the highest award for apples at the Royal Horticultural Show at London in 1909.

The crop of fruits and vegetables is valued at $3,000,000 a year.

The amount of live stock changes very little from year to year, the number of horses and milch cows increasing slowly and the number of other cattle and sheep decreasing in about the same ratio. The following table gives the number of each class in 1911 and 1908:

	1911	1908
Horses	69,000	67,857
Milch cows	151,700	143,362
Other cattle	180,900	190,907
Sheep	351,000	373,392
Swine	70,000	74,063

Nova Scotia produces annually 6,000,000 tons of coal, nearly one-half of the total for all the provinces.

The value of all mineral products is over $15,000,000 a year.

The total amount of gold produced from 1862 to 1912 was approximately 1,000,000 ounces, at the high average value of $20 an ounce.

The production of gold is gradually diminishing, being only $200,000 in 1911.

Nova Scotia produces each year 350,000 tons of pig iron, worth about $12 per ton.

Brick and fire clays, building stones, cement and gypsum are the remaining minerals of greatest commercial importance.

$40,000,000 worth of manufactured products are made in the province each year. The smelting industry represents about one-sixth of the total, log and timber products about one-eighth.

Other prominent industries, with average annual production, follow: canning and preserving fish, $2,500,000; foundries and machine-shops, $2,000,000; clothing, both men's and women's, $1,500,000; bread, biscuits and confectionery, $1,300,000.

The wood-pulp industry used $111,119 worth of wood in 1911, an increase of nearly ten per cent over 1910.

The province has 1,350 miles of railway.

There are wireless telegraph stations at Halifax, Cape Sable, Sable Island and Glace Bay.

The population, according to the census of 1911, is 492,338.

The density of population is 23.3 per square mile.

Primary education is free and compulsory; secondary education is also free but voluntary.

The universities are King's College at Windsor, Acadia University at Wolfville, St. Francois Xavier at Antigonish, and Dalhousie at Halifax; all except the last are denominational.

The province supports a normal school and schools of agriculture, horticulture and technology.

Until 1881 Nova Scotia had the largest shipping tonnage, in proportion to population, in the world.

1. Bridge at Niagara Falls.
2. Canadian Lock at Sault Ste. Marie.
3. Dairy Products.
4. Fruits.
5. Grain Elevator at Fort William.
6. University College, Toronto.
7. Smelter in the Cobalt District.

[illegible] Breton was visited by the Cabots (see [illegible]) in 1497-98, but no attempt at permanent colonization was made till 1604, when [illegible] was founded.

[illegible] 1713 the province was in constant [illegible] between French and English; by the [illegible] of Paris in that year France resigned [illegible]

[illegible] the governor, Charles Laurence, [illegible] about 6,000 French settlers exiled; [illegible] historical basis of Longfellow's *Evangeline*.

Questions on Nova Scotia

[illegible] the area of Nova Scotia?

[illegible] island is a part of the province?

[illegible] the isthmus of Chignecto?

[illegible] the principal range of mountains?

What is the term sometimes applied to Sable Island? Why?

Name the principal rivers.

Waht kinds of game are found?

How do the fisheries of Nova Scotia rank?

What is their principal product? Name four other fishes of importance.

How many people are employed in the fisheries?

What are the leading crops?

What can you say of the growth of the trade in apples?

In the production of what mineral does Nova Scotia lead the Dominion?

Is the production of gold increasing?

Name the four leading manufactures in the order of their importance.

Which are the principal universities?

What was the total population in 1911? The density of population?

Ontario

Items of Interest

[illegible] an area of 407,262 square miles, [illegible] 41,000 are water.

[illegible] larger population than any other [illegible] the total in 1911 was 2,523,208.

[illegible] of the inhabitants live in less than [illegible] the district between the [illegible] Lakes and the Ottawa and the St. Lawrence [illegible]

[illegible] this district is a part of the plain [illegible] It is divided into sections [illegible] escarpment, a line of cliffs running [illegible] Heights west to the head [illegible] near Hamilton and then north- [illegible] Peninsula on Georgian Bay.

[illegible] the northeastern part is from [illegible] than the southwestern.

[illegible] escarpment causes falls on the [illegible] Niagara Falls being [illegible]

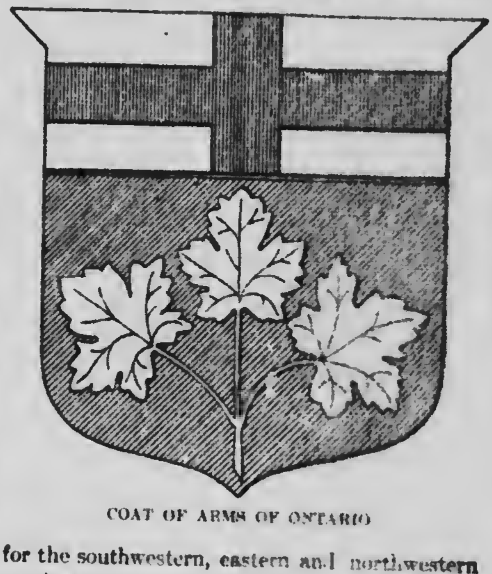
[illegible] feet above the level of the [illegible] as the headwaters of the [illegible] the Nipigon River is [illegible] Lakes.

[illegible] Lake Superior is bold and [illegible]

[illegible] all tributary to the St. [illegible] the Ottawa, Trent and [illegible]

[illegible] are the Albany, Moose, [illegible] which flow into [illegible] of these is navigable, [illegible]

The following table will give some idea of the normal climate (the temperature in Fahrenheit degrees and the rainfall in inches)



COAT OF ARMS OF ONTARIO

for the southwestern, eastern and northwestern portions:

	Toronto	Ottawa	Port Arthur
Dec., Jan., and Feb.	22.7	13.3	7.2
March, April, May	40.6	38.5	31.1
June, July, August	66.4	67.4	59.9
Sept., Oct., Nov.	47.0	44.8	39.5
Average annual rainfall, ins.	33.94	32.98	23.55

1. Bridge [illegible]
2. Canal [illegible] Sault Ste. Marie.
3. Dairy Products.
4. Fruits.
5. Grain Elevator at Fort William.
6. University [illegible]
7. Smelter [illegible]

Cape Breton was visited by the Cabots (see Volume I) in 1497-98, but no attempt at permanent colonization was made till 1604, when Port Royal was founded.

Until 1673 the province was in constant dispute between French and English; by the Treaty of Paris in that year France resigned all claim.

In 1755 the governor, Charles Laurence, ordered about 6,000 French settlers exiled; this is the historical basis of Longfellow's *Evangeline*.

Questions on Nova Scotia

What is the area of Nova Scotia?

What large island is a part of the province?

Where is the isthmus of Chignecto?

What is the principal range of mountains?

What is the term sometimes applied to Sable Island? Why?

Name the principal rivers.

Waht kinds of game are found?

How do the fisheries of Nova Scotia rank?

What is their principal product? Name four other fishes of importance.

How many people are employed in the fisheries?

What are the leading crops?

What can you say of the growth of the trade in apples?

In the production of what mineral does Nova Scotia lead the Dominion?

Is the production of gold increasing?

Name the four leading manufactures in the order of their importance.

Which are the principal universities?

What was the total population in 1911? The density of population?

Ontario

Items of Interest

Ontario has an area of 407,262 square miles, of which about 41,000 are water.

It has a larger population than any other province; the total in 1911 was 2,523,208.

Nine-tenths of the inhabitants live in less than one-tenth of the area, the district between the Great Lakes and the Ottawa and the St. Lawrence rivers.

Geologically this district is a part of the plain of the St. Lawrence. It is divided into sections by the Niagara escarpment, a line of cliffs running from Queenstown Heights west to the head of Lake Ontario near Hamilton and then northwest to Bruce Peninsula on Georgian Bay.

The altitude of the northeastern part is from 200 to 700 feet lower than the southwestern.

The Niagara escarpment causes falls on the rivers which plunge over it, Niagara Falls being the most important.

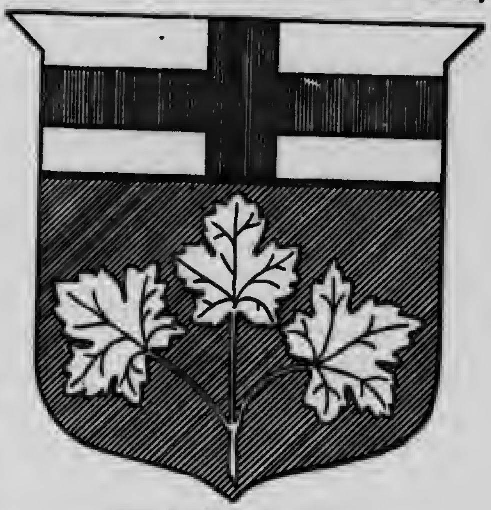
Lake Nipigon, 852 feet above the level of the sea, may be regarded as the headwaters of the St. Lawrence system, for the Nipigon River is the largest tributary of the Lakes.

The north shore of Lake Superior is bold and rugged, with few settlements.

The principal rivers, all tributary to the St. Lawrence system, are the Ottawa, Trent and Thames.

In northern Ontario are the Albany, Moose, Missanabi and Abitibi rivers, which flow into Hudson Bay, but none of these is navigable, except for canoes.

The following table will give some idea of the normal climate (the temperature in Fahrenheit degrees and the rainfall in inches)



COAT OF ARMS OF ONTARIO

for the southwestern, eastern and northwestern portions:

	Toronto	Ottawa	Port Arthur
Dec., Jan., and Feb.	23.7	13.3	7.3
March, April, May	40.6	38.5	31.1
June, July, August	65.4	67.4	58.9
Sept., Oct., Nov.	47.0	44.8	38.5
Average annual rainfall, ins.	33.94	32.65	23.58

In the Ottawa valley are quarried or mined granite, marble, felspar, talc, mica, graphite and corundum.

This district yields more corundum, which is used as a substitute for emery, than any other in the Dominion.

Gold, copper, lead, iron and arsenic are also found in this valley.

Practically all the silver comes from the Cobalt district; the annual production exceeds 30,000,000 ounces.

Ontario produces 20,000 tons of nickel annually, more than half of the world's total supply; five-sixths are exported to the United States.

Natural gas is produced in Welland and Essex counties and exported in pipes to Buffalo and Detroit.

About 30,000,000 gallons of petroleum are produced yearly, practically the whole output of Canada.

$1,000,000 worth of cement is manufactured each year.

The Porcupine district, the newest gold-producing camp in eastern Canada, produced more gold in six months in 1911 than all Ontario in 1910.

Ontario produced 447,000 tons of pig iron in 1910; the production of 1911 was over 526,000 tons.

The marble used in the Parliament Buildings at Ottawa was quarried near Arnprior, in Renfrew county.

20,000,000 pounds of copper were produced in 1911, principally as a by-product of the nickel ores.

Ontario's mineral products are worth about $40,000,000 a year.

The total value of all field crops in 1911 was $193,260,000, as compared with $204,000,000 in 1910.

The capital invested in agriculture is estimated at $1,260,519,000.

Farm land is worth about $50 an acre.

Hay and clover are the most valuable crops, worth $65,000,000 a year.

Other important crops, with their value in 1911, are as follows: oats, $37,000,000; wheat, $16,730,000; potatoes and other roots, $24,000,000; corn, $21,623,000; barley, $9,645,000.

Ontario also produced 162,000 tons of sugar beets, and 169,000 tons of alfalfa.

Flax is raised mainly for fiber; the annual crop is about 120,000 bushels.

Over 370,000 acres are under orchard and garden cultivation.

There are 12,000,000 apple trees in the province.

Nearly 4,000 cases of peaches are annually exported to Great Britain.

The counties of Lincoln, Welland and Wentworth produce 95 per cent of the grapes grown in the province; the annual output is about 20,000 tons, of which one-third is manufactured into wine.

There are seventy fruit and vegetable canning and preserving factories.

Over 900,000 bushels of beans are raised annually.

There are more than 100,000 colonies of bees.

Ontario exports more cheese than the whole United States.

The following table will give some idea of the growth of the dairying industry (these figures refer only to factory products):

		Pounds	Value
1900	Butter	7,5[illegible],[illegible]42	1,[illegible]
	Cheese	1[illegible]1,967,612	13,4[illegible]
1909	Butter	8,000,000	1,[illegible]
	Cheese	130,000,000	15,[illegible]
1911	Butter	13,[illegible],15[illegible]	3,4[illegible],171
	Cheese	157,631,[illegible]	14,[illegible]

Toronto uses from 2,000 to 3,000 ninety-pound bags of potatoes a day.

Other important vegetable crops are asparagus, cauliflower, peas, tomatoes and onions.

The following table gives the number of live stock on the farms of Ontario (*Census and Statistics Monthly*, July, 1912):

Horses	790,000
Milch cows	1,234,500
Other cattle	1,558,600
Sheep	975,400
Swine	1,469,800

The fisheries of Ontario yield a product of over $2,000,000 a year; trout, whitefish, fresh herring and pickerel are the most important varieties in the order named.

The trout catch was worth $690,000 in 1911.

The total number of men employed in the fisheries is nearly 4,000. The capital invested in fishing equipment was $1,165,229 in 1911, about 8 per cent of the total for Canada. Tugs and smacks represent one-third of the capital in Ontario.

The area of forest land in the province is estimated at 102,000 square miles; the forest reserves include an area of 17,860 square miles, with a stand of seven billion feet of pine.

There are fourteen mills, using 213,000 cords (1911) of pulp wood and manufacturing thirty per cent of the wood pulp made in Canada. 199,720 cords of spruce wood were used in 1911 in the manufacture of wood pulp alone.

Ontario used over 62,000,000 feet of timber in 1911 in the production of cars and furniture; oak, maple and elm are important.

The province leads in the manufacture of furniture and of musical instruments.

The maple lumber cut in Ontario is 87 per cent of all the maple used in the Dominion.

Ninety per cent of the agricultural implements and vehicles manufactured in Canada are made in Ontario.

The products of all the manufacturing industries of the province are worth over $400,000,000 a year, nearly double those of Quebec, which ranks second.

The principal manufactures, with their approximate annual value, are as follows:

Log and lumber products.........	$50,000,000
Flour and grist mills products.....	40,000,000
Slaughtering and meat packing....	20,000,000
Foundry and machine shop products	19,600,000
Butter and cheese...............	18,000,000
Smelting.........................	13,000,000
Printing and publishing...........	12,000,000
Bread, biscuits and confectionery..	11,000,000
Furniture, etc....................	9,000,000
Electrical apparatus and supplies..	9,000,000

Grain shipments from Port Arthur and Fort William by vessel in 1911 totalled 80,000,000 bushels. The Canadian Northern's grain elevator at Port Arthur is the largest in the world; it has a capacity of 7,250,000 bushels. (See page 329.)

Ontario has 8,250 miles of railway.

There are over 1,000 branches of chartered banks in the province.

The total annual bank clearings at Toronto are about $1,800,000,000; the clearings at Brantford, Hamilton, London and Ottawa are estimated at $400,000,000, making a total for the province of about $2,200,000,000.

Ontario is the premier province of Canada; it has a larger population, its crops and mineral products are more valuable and its manufacturing industries are greater than those of any other province.

The principal cities (over 20,000) are Toronto, Ottawa, Hamilton, London and Brantford.

The populations of the following cities are from 15,000 to 20,000: Berlin, Fort William, Guelph, Kingston, Peterboro and Windsor.

There is in force a direct tax on corporations (insurance, loan and railway companies), an inheritance tax, and a liquor license tax; none of the provinces has power to impose indirect taxation

In 1797 the first appropriation was made for an educational system; 500,000 acres of crown lands were set aside.

School attendance is compulsory for children between the ages of eight and fourteen.

The primary schools are free and undenominational; there are also a number of separate schools for Catholic children.

Secondary education is provided by high schools and collegiate institutes.

The provincial university is situated in Toronto; other important educational institutions are Upper Canada College, founded in 1829; MacMaster, Queen's, Kingston, Western and Ottawa universities.

Over eighty per cent of the teachers in the public schools of the province are women.

The province supports several model and normal schools, a dairy school and a large school of mining at Kingston, and the Ontario Agricultural College at Guelph.

There are also 93 Indian schools with a total attendance of over 3,000 children.

The total Indian population of the reservations is 18,000.

The first white man known to have set foot in what is now Ontario was Champlain; in 1613 he explored the Ottawa river as far as Allumette Island and in 1615 he reached Georgian Bay by way of the Ottawa.

In 1763, when Canada was ceded to Great Britain, there was a great revolt led by Pontiac in a vain attempt to drive out the white men.

The present province was formed into Upper Canada in 1791, but in 1841 it was again united to Lower Canada under one government. The population of Ontario in 1791 was probably less than 20,000; in 1824 it was 150,066, and in 1841 it was 455,688.

Questions on Ontario

What is the population of Ontario? The area?

In what part of the province do most of the inhabitants live?

Describe briefly the surface of this district.

What is the average density of population?

What is the difference between the levels of Lake Erie and Lake Ontario?

What is the Niagara escarpment?

What is the character of the north shore of Lake Superior?

What are the three principal rivers?

For what minerals is the Ottawa Valley famous?

Where is most of the silver mined?

What part of the world's supply of nickel does Ontario produce?

What is the extent of the production of petroleum?

For what is the Porcupine district famous?

Where was the marble for the Parliament Building at Ottawa quarried?

What is the total annual value of Ontario's mineral products?

What are the principal crops?

What is the estimated total of capital invested in agriculture?

What fruits are raised extensively?

What can you say of the importance of Ontario's dairying? Fisheries?

What is the extent of the forest area?

How does the province rank in the production of wood pulp?

How does the total value of manufactures compare with that of other provinces?

Name the leading manufactures, with their approximate annual value.

Where is the largest grain elevator in the world?

How many miles of railway are in the province?

Why is Ontario justly called the premier province of Canada?

Name five large cities of the province.

What can you say of the educational system?

Who is the first white man known to have set foot in what is now Ontario?

Who was Pontiac?

What was the population of the province in 1791?

Prince Edward Island

Items of Interest

Prince Edward Island, lying in the Gulf of St. Lawrence, is separated from the mainland

COAT OF ARMS OF PRINCE EDWARD ISLAND

by Northumberland Strait, which varies from nine to thirty miles in width.

Its total area is 2,184 square miles.

Its population is 93,728, a decrease of 9 per cent since 1901.

The average density of population is 42.4 per square mile, making it the most densely populated province.

The average number of persons to the family (5.51) is greater than in any other province.

The island is extremely irregular in shape and physical features; the width varies from one and one-half to thirty-four miles and the altitude from 150 to 300 feet.

Fredericton, 307 feet, is the highest point on the island.

The north shore, facing the gulf, is a series of beaches of fine sand and is a favorite summer resort.

The field crops of Prince Edward Island are worth less than those of any other province except British Columbia; in 1911 the total was $8,846,800, of which hay and clover represented $3,086,000.

The annual crop of oats is about 5,000,000 bushels, of potatoes 5,500,000, and of turnips and carrots 3,500,000.

579,500 bushels of wheat were raised in 1911.

The amount of live stock is slowly decreasing. The totals for 1911 follow: horses, 34,000; milch cows, 55,500; other cattle, 56,500 sheep, 108,600; swine, 46,400.

The province is a poor third in the production of factory-made cheese; it produces one-seven-

1. Citadel of Quebec.
2. Montmorency Falls.
3. Victoria Bridge, Montreal.
4. Tobacco Plant.
5. Apples.
6. Cathedral of Notre Dame, Montreal.
7. Lumbering.
8. Asbestos M[illegible]

...th as much as Quebec, which produces less ... half as much as Ontario.

The annual output of cheese is about 3,000,000 ...nds and of butter nearly 700,000 pounds; ...e figures refer only to factory production.

The annual production of eggs is about ...,000.

A unique industry on the island is fox ranching, the skins being sold for $300 to $2,000 each; ... 1911 the industry was valued at $2,000,000.

Apples, strawberries, plums and cherries are ... principal fruits grown.

The fisheries employ 8,000 men and capital ... over $600,000; the annual output is worth ...t $1,150,000.

...sters represent nearly 60 per cent of the ... fisheries; other important products are cod, ..., oysters, smelts and mackerel.

There are two lobster hatcheries, which dis... about 160,000,000 fry each year; there ... one salmon hatchery with an annual ... of 1,000,000.

... are supposed to be valuable mineral ... on the island, but they are as yet ...ped.

... manufactures total about $2,000,000 a ... chiefly the products of fisheries and ..., such as butter, cheese and preserved ...

There are 269 miles of railway, all belonging ... Canadian government (Intercolonial) ...

... the basis of the census of 1911 the province ... to three representatives in the House ...; it had six when it entered the Con... in 1873.

... capital and principal city is Charlotte...

The manufacture and sale of intoxicating liquors are prohibited.

Primary education has been free since 1852.

The principal institutions are the normal school, Prince of Wales College and St. Dunstan's College; these are of advanced secondary rather than of collegiate rank.

Jacques Cartier sighted the island in 1534, but mistook it for the mainland.

It was originally governed as a part of Nova Scotia, but later was given a separate government, its first parliament meeting in 1773.

The first survey of the island was made in 1764-5.

It received its present name in 1798, out of compliment to the Duke of Kent, father of Queen Victoria, then commanding the British forces in North America.

It became a province of the Dominion in 1873.

Questions on Prince Edward Island

What is the area of Prince Edward Island? The population?

When did it receive its present name? Why?

When did it become a province of the Dominion?

Compare its density of population with that of Ontario. British Columbia.

Describe the shape of the island.

What are the principal crops?

Is dairying important?

What can you say of fox ranching?

What are the principal fisheries' products?

How many representatives has the province in the House of Commons?

What is the capital? What is its population?

Quebec

Items of Interest

... of Quebec for many years (from ...) was 351,873 square miles, but by ... of Ungava in 1912 it was increased ... square miles.

... distance from the western end of the ... Belle Isle to Lake Temiscaming, that ... the eastern to the western boundary, is ... miles.

... are three main physical divisions: (1) ...ian highlands, really a plateau; (2) ... of the St. Lawrence; (3) the Notre ... mountains and the rolling country to the ... of this range.

The highest point in southern Quebec is Mount Logan, in Matane county, 3,708 feet; the highest point in the Ungava district is Nachvak Mountain, about 6,000 feet.

Some of the rivers draining the plateau run in deep, high-walled valleys cut in solid rock, such as those of the Hamilton, Mingan and Saguenay rivers. The walls between which the Saguenay flows in some places reach a height of 1,500 to 1,800 feet.

The Notre Dame Mountains are a continuation of the Appalachian range which runs north and south through the eastern part of the United States.

QUEBEC

1. Citadel of Quebec. 2. Montmorency Falls. 3. Victoria Bridge, Montreal. 4. Tobacco Plant. 5. Apples. 6. Cathedral of Notre Dame, Montreal.

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tenth as much as Quebec, which produces less than half as much as Ontario.

The annual output of cheese is about 3,000,000 pounds and of butter nearly 700,000 pounds; these figures refer only to factory production.

The annual production of eggs is about $625,000.

A unique industry on the island is fox ranching, the skins being sold for $300 to $2,000 each; in 1911 the industry was valued at $2,000,000.

Apples, strawberries, plums and cherries are the principal fruits grown.

The fisheries employ 8,000 men and capital of over $600,000; the annual output is worth about $1,150,000.

Lobsters represent nearly 60 per cent of the total fisheries; other important products are cod, herring, oysters, smelts and mackerel.

There are two lobster hatcheries, which distribute about 160,000,000 fry each year; there is also one salmon hatchery with an annual output of 1,000,000.

There are supposed to be valuable mineral deposits on the island, but they are as yet undeveloped.

The manufactures total about $2,000,000 a year, being chiefly the products of fisheries and agriculture, such as butter, cheese and preserved fish.

There are 269 miles of railway, all belonging to the Canadian government (Intercolonial) railway.

On the basis of the census of 1911 the province is entitled to three representatives in the House of Commons; it had six when it entered the Confederation in 1873.

The capital and principal city is Charlottetown.

The manufacture and sale of intoxicating liquors are prohibited.

Primary education has been free since 1852.

The principal institutions are the normal school, Prince of Wales College and St. Dunstan's College; these are of advanced secondary rather than of collegiate rank.

Jacques Cartier sighted the island in 1534, but mistook it for the mainland.

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Questions on Prince Edward Island

What is the area of Prince Edward Island? The population?

When did it receive its present name? Why?

When did it become a province of the Dominion?

Compare its density of population with that of Ontario. British Columbia.

Describe the shape of the island.

What are the principal crops?

Is dairying important?

What can you say of fox ranching?

What are the principal fisheries' products?

How many representatives has the province in the House of Commons?

What is the capital? What is its population?

Quebec

Items of Interest

The area of Quebec for many years (from 1898 to 1911) was 351,873 square miles, but by the addition of Ungava in 1912 it was increased to 706,834. square miles.

The distance from the western end of the Strait of Belle Isle to Lake Temiscaming, that is, from the eastern to the western boundary, is about 1,350 miles.

There are three main physical divisions: (1) the Laurentian highlands, really a plateau; (2) the valley of the St. Lawrence; (3) the Notre Dame Mountains and the rolling country to the southeast of this range.

The highest point in southern Quebec is Mount Logan, in Matane county, 3,708 feet; the highest point in the Ungava district is Nachvak Mountain, about 6,000 feet.

Some of the rivers draining the plateau run in deep, high-walled valleys cut in solid rock, such as those of the Hamilton, Mingan and Saguenay rivers. The walls between which the Saguenay flows in some places reach a height of 1,500 to 1,800 feet.

The Notre Dame Mountains are a continuation of the Appalachian range which runs north and south through the eastern part of the United States.

Quebec is exceptionally well watered and abounds in large rivers, bays and lakes.

Besides the St. Lawrence, the principal rivers are the Ottawa, 600 miles long, the St. Maurice, the Batiscan, the Jacques Cartier and the Montmorency, with its famous falls.

The island of Anticosti, in the Gulf of St. Lawrence, now used as a game preserve, is 135 miles long by 40 miles wide.

The field crops of Quebec in 1911 were worth $103,187,000.

Hay and clover, worth over $58,000,000, was the most valuable crop.

37,500,000 bushels of oats, worth $20,000,000, were produced in 1911.

The wheat crop is only spring wheat.

COAT OF ARMS OF QUEBEC

Nearly 18,000,000 bushels of potatoes are raised each year.

Other important crops are barley, buckwheat and turnips.

In 1910 the alfalfa crop was reported for the first time; it was 39,000 tons, valued at about $10 a ton.

The total value of farm property in Quebec is over $450,000,000.

The production of grapes is 1,000,000 pounds, and of apples over 2,000,000 bushels.

The crop of berries and small fruits is 3,000,000 quarts, greater than that of any other province except Ontario.

There are nine experimental fruit stations in Quebec.

The Montreal district is famous for its apples and melons.

$1,500,000 worth of maple sugar is made each year; Quebec produces about one-third of the world's supply.

There are 600 butter factories, 1,400 cheese factories, and over 700 factories manufacturing both cheese and butter.

The value of all dairy products is about $25,000,000 a year, second only to Ontario.

Flax is cultivated in small quantities chiefly for its fiber; it is manufactured into fabrics almost exclusively by hand.

The growing of tobacco for commercial purposes is confined to the district around Montreal; the total production of Canada, which is divided evenly between Ontario and Quebec, varies from 9,000,000 to 12,000,000 pounds.

Most of the cattle in Quebec are of French-Canadian strain, first brought to Canada about 1620; they furnish excellent milk and are good breeders, but are not as good for beef as the ordinary stocks.

The following table shows the amount of live stock:

	1911.	1910.	1909.	1908.
Horses	371,400	368,419	362,796	361,711
Cattle (not including milch cows	1,482,000	1,456,428	1,479,467	1,553,589
Sheep	533,400	549,068	570,342	600,992
Swine	697,500	651,415	670,042	751,336

The products of the fisheries were valued at $1,692,000 in 1911; this was a slight decline from 1909 and 1910.

The principal products are dried cod, which represents half the total value, canned lobsters and herring used as bait.

Only 1,200 seals were caught in the year 1911, but in good years as many as 40,000 have been taken; all the seals are caught off the Magdalen Islands.

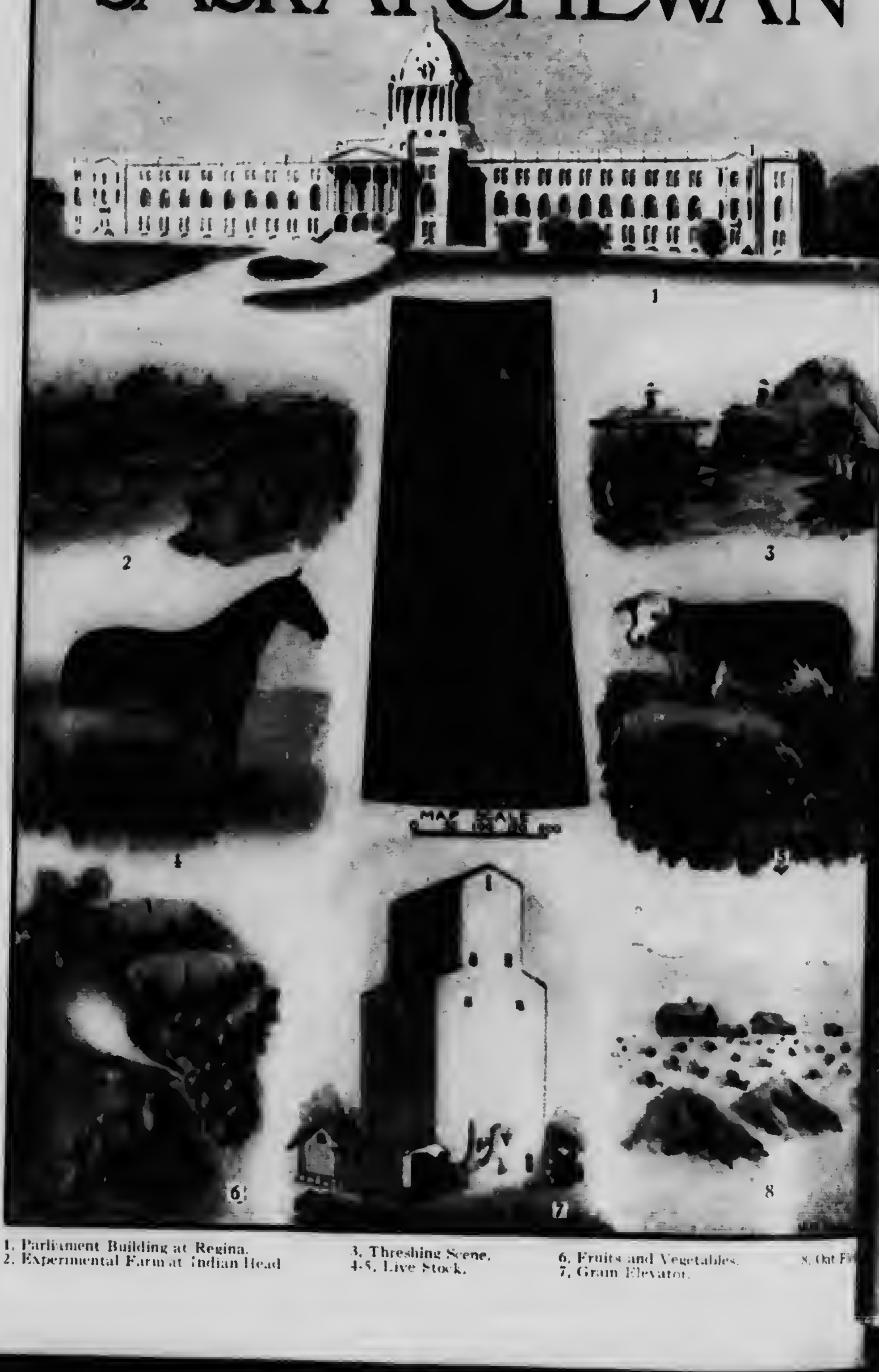
The forest area is 130,000,000 acres, or 203,125 square miles, of which nearly 175,000 are included in the forest reserves.

Quebec has twenty-eight pulp-wood mills, as many as the rest of the Dominion together; in 1911 these twenty-eight mills used 390,000 cords of wood, and produced 60 per cent of the wood pulp made in Canada. One cord of wood produces from 1,100 to 1,800 pounds of pulp, depending on the process (see *Paper*, Volume IV).

Five mills of average size could run on the amount of wood-pulp exported in 1911.

Nineteen species of wood are used in the manufacture of furniture in Quebec; about one-third

SASKATCHEWAN



1. Parliament Building at Regina.
2. Experimental Farm at Indian Head
3. Threshing Scene.
4-5. Live Stock.
6. Fruits and Vegetables.
7. Grain Elevator.
8. Oat Fi

[illegible] furniture manufactured in Canada is [illegible] the province of Quebec.

[illegible] ranks second in the total value of [illegible]ctured commodities, with over $230,-[illegible] a year.

[illegible] the Dominion in the production of [illegible] ($7,000,000 a year), refined sugar ($12,-[illegible]) and tobacco products ($12,500,000).

[illegible] important industries, with the average [illegible] value of products, are as follows:

[illegible] and timber products	$20,000,000
[illegible] and shoes	16,000,000
[illegible] and cheese (factory only)	16,000,000
[illegible] car works	11,000,000
[illegible] allied products	10,000,000
[illegible] goods	9,000,000
[illegible] steel	6,500,000
[illegible]ering and meat packing	6,000,000
[illegible] and furs	6,000,000

[illegible] leads the world in the production of [illegible] the annual product being valued at [illegible],000,000. Thetford, in Megantic coun-[illegible] center of this industry.

[illegible] mineral products of the province are [illegible],000,000 a year.

[illegible] annual output of copper is 1,000,000 [illegible] of low-grade ore.

[illegible] $1,000,000 worth of brick and [illegible] worth of cement are produced.

[illegible] granite, graphite, iron, ochre and talc [illegible] found in small quantities.

[illegible] department of the interior estimates that [illegible] power that may be developed in the [illegible] nearly 14,000,000 H. P. at minimum [illegible].

[illegible] about 850,000 incandescent lamps [illegible] arc lights in use in the province.

[illegible] 2,400 post offices in Quebec.

[illegible] railway mileage is 3,000.

[illegible] June 30, 1911, Quebec had granted [illegible] and about 13,500,000 acres of land [illegible] railways.

[illegible] branches of chartered banks.

[illegible] clearings of Montreal are over two [illegible] billions of dollars a year; this is [illegible] than Toronto, the next highest

42,900 immigrants arrived in 1911.

The population in 1911 was 2,002,712, an increase of nearly 22 per cent over 1901; this is 28 per cent of the total population of Canada.

Eighty per cent of the inhabitants over five years of age can read and write.

The leading educational institutions are Bishop's College at Lennoxville, Laval University at Quebec and McGill University at Montreal.

The principal cities (over 10,000) are Montreal, Quebec, Maisonneuve, Hull, Sherbrooke, Verdun and Lachine.

Questions on Quebec

What is the present area of Quebec? When was the boundary changed?

What is the length of the province from east to west?

What are the three main physical divisions?

Name some of the principal rivers.

What and where is Anticosti?

What is the principal crop? What part of the value of all field crops does it represent?

Name four other large crops.

What fruits are raised in Quebec? For what fruits is the Montreal district famous?

What is the relative importance of the dairy industry?

In what part of the province is tobacco raised?

What kind of live stock predominates?

What are the principal products of the fisheries?

Where are the seal fisheries?

What is the approximate forest area?

How does Quebec rank as a producer of wood pulp? Of all manufactures? Of paper? Of tobacco products?

Name four other leading manufactures.

What are the principal mineral products?

What is the total railway mileage?

What is the annual total of Montreal's bank clearings?

What are the leading educational institutions?

Name five of the large cities.

What was the population of the province in 1911?

Saskatchewan

Items of Interest

[illegible]wan has an area of 250,650 square [illegible] that of Great Britain and 50,000 [illegible] more than that of Germany.

"Saskatchewan" is a Cree Indian word meaning "rapid-flowing river."

The southeastern part of the province is chiefly prairie, a continuation of the Manitoba prairies.

1 Parliament B[illegible]
2 Experimental [illegible]
3 Threshing Scene.
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Quebec leads the world in the production of asbestos, the annual product being valued at nearly $3,000,000. Thetford, in Megantic county, is the center of this industry.

The mineral products of the province are worth $10,000,000 a year.

The annual output of copper is 1,000,000 pounds of low-grade ore.

About $1,000,000 worth of brick and $2,000,000 worth of cement are produced.

Gold, granite, graphite, iron, ochre and talc have been found in small quantities.

The department of the interior estimates that the water power that may be developed in the province is nearly 14,000,000 H. P. at minimum flow.

There are about 850,000 incandescent lamps and 6,000 arc lights in use in the province.

There are 2,400 post offices in Quebec.

The total railway mileage is 3,000.

Up to June 30, 1911, Quebec had granted $20,000,000 and about 13,500,000 acres of land as subsidies to railways.

There are 400 branches of chartered banks.

The bank clearings of Montreal are over two and a quarter billions of dollars a year; this is 30 per cent more than Toronto, the next highest city.

What are the three main physical divisions?

Name some of the principal rivers.

What and where is Anticosti?

What is the principal crop? What part of the value of all field crops does it represent?

Name four other large crops.

What fruits are raised in Quebec? For what fruits is the Montreal district famous?

What is the relative importance of the dairy industry?

In what part of the province is tobacco raised?

What kind of live stock predominates?

What are the principal products of the fisheries?

Where are the seal fisheries?

What is the approximate forest area?

How does Quebec rank as a producer of wood pulp? Of all manufactures? Of paper? Of tobacco products?

Name four other leading manufactures.

What are the principal mineral products?

What is the total railway mileage?

What is the annual total of Montreal's bank clearings?

What are the leading educational institutions?

Name five of the large cities.

What was the population of the province in 1911?

Saskatchewan

Items of Interest

Saskatchewan has an area of 250,650 square miles, double that of Great Britain and 50,000 square miles more than that of Germany.

"Saskatchewan" is a Cree Indian word meaning "rapid-flowing river."

The southeastern part of the province is chiefly prairie, a continuation of the Manitoba prairies.


SASKATCHEWAN

of the furniture manufactured in Canada is made in the province of Quebec.

Quebec ranks second in the total value of manufactured commodities, with over $230,-000,000 a year.

It leads the Dominion in the production of paper ($7,000,000 a year), refined sugar ($12,-000,000) and tobacco products ($12,500,000).

Other important industries, with the average annual value of products, are as follows:

Lumber and timber products	$20,000,000
Boots and shoes..................	16,000,000
Butter and cheese (factory only)...	16,000,000
Cars and car works...............	11,000,000
Flour and allied products.........	10,000,000
Cotton goods.....................	9,000,000
Iron and steel....................	6,500,000
Slaughtering and meat packing....	6,000,000
Hats, caps and furs..............	6,000,000

Quebec leads the world in the production of asbestos, the annual product being valued at

42,900 immigrants arrived in 1911.

The population in 1911 was 2,002,712, an increase of nearly 22 per cent over 1901; this is 28 per cent of the total population of Canada.

Eighty per cent of the inhabitants over five years of age can read and write.

The leading educational institutions are Bishop's College at Lennoxville, Laval University at Quebec and McGill University at Montreal.

The principal cities (over 10,000) are Montreal, Quebec, Maisonneuve, Hull, Sherbrooke, Verdun and Lachine.

Questions on Quebec

What is the present area of Quebec? When was the boundary changed?

What is the length of the province from east to west?

What are the three main physical divisions? Name some of the principal rivers.

The highest point is "The Nose," 2,995 feet, in the Neutral Hills.

The principal rivers are the Saskatchewan, which gives its name to the province, the Qu'Appelle and Souris, both of which are tributaries of the Assiniboine.

From the junction of the north and south branches of the Saskatchewan to its mouth is a distance of 300 miles; but the river is navigable for shallow-draught vessels as far as Edmonton, Alberta, over 500 miles farther.

North of the Saskatchewan river are the great forests, chiefly of spruce and tamarack.

The climate may be roughly described as like that of Alberta (see page 293).

Except in the southwest, the province is well watered.

COAT OF ARMS OF SASKATCHEWAN

The wild-animal life is practically the same as that of Alberta, except that the mountain sheep, goat and lion are lacking.

The chief industries are cattle-raising in the northern part and grain-growing in the southern, though the extreme northern section is also important for its furs.

Nearly 60,000,000 acres of good land are available for cultivation.

The total value of all field crops in 1911 was $107,147,000, exceeded only by Ontario, with $193,260,000.

The wheat crop in 1911 was 97,665,000 bushels (an average of 21 bushels to the acre), valued at $56,548,000.

The total crop of oats for the year was 97,962,000 bushels; Saskatchewan produces more oats than any other province.

The annual crop of potatoes is about 5,000,000 bushels; of turnips and other roots, 3,000,000 bushels.

The average yield of potatoes is 148 bushels per acre.

The following tables are of interest as showing the great advance in agriculture in the past few years (1910 shows a decline on account of the great drought):

YIELD OF WHEAT, OATS AND BARLEY IN BUSHELS

	1911	1910	1909	1905	1900
Wheat.....	97,665,000	81,139,000	85,197,000	31,799,193	4,306,091
Oats.....	97,962,000	61,367,000	91,796,000	26,683,249	2,270,087
Barley....	5,445,000	3,303,000	4,493,000	1,196,419	187,211

AREAS IN WHEAT, OATS AND BARLEY IN ACRES

	1911	1910	1909	1905	1900
Wheat.....	4,704,680	4,848,000	3,685,000	1,377,281	487,170
Oats......	2,124,087	1,973,000	1,847,000	605,346	141,817
Barley....	428,067	187,400	126,000	40,732	11,768

At the experimental farm at Indian Head, the potato crop averages 519 bushels per acre.

Flax, which is recognized to be the best crop for breaking new ground, is cultivated as yet only for seed; in 1910 the production was 3,448,000 bushels, and in 1911 it was over 10,000,000 bushels; the acreage in flax increased from 110,308 in 1909 to 438,000 in 1910, and to 690,000 in 1911.

The hay crop is valued at $5,000,000 a year.

The climate is well adapted to the raising of the small bush fruits, but this branch of agriculture is yet in its infancy.

There are 588,300 head of cattle in the province.

The following table is significant as showing that the live stock industry is barely holding its own, whereas the raising of staple crops has largely increased (see table above):

	1911	1910	1909	1908
Horses....................	365,500	332,922	279,063	250,811
Milch Cows...............	143,600	133,455	124,186	119,375
Other Cattle..............	444,700	431,164	391,789	373,240
Sheep.....................	111,300	135,360	120,630	116,438
Swine.....................	130,300	126,788	131,757	141,284

The horses in the province are valued at $60,000,000.

There are no pork-packing plants; practically all the swine are raised for home consumption.

The value of all kinds of poultry is about $1,700,000.

There are seven coöperative creameries under provincial control, four private creameries and one cheese factory.

About $200,000 worth of fish are taken from the lakes of Saskatchewan each year, over half being whitefish.

Lignite coal is found in extensive beds in the Souris River field; sand suitable for glass-making, salt and sulphur are found in various sections but are not yet of commercial importance.

It is estimated that the manufactured products are worth $4,000,000 a year, chiefly flour and lumber.

There are 310 branches of chartered banks in the province.

The bank clearings of Moose Jaw, Regina and Saskatoon aggregated $170,000,000 in 1911.

In 1909 it was decided to establish a provincial agricultural college and experimental college at Saskatoon in connection with the University; classes began in the fall of 1911.

There are thirty-four Indian schools with a total attendance of over 1,200 pupils.

About $2,000,000 were spent in Saskatchewan for construction and improvement of public works in 1911.

The educational system of the province includes free district and grade schools, high schools, collegiate institutes, normal schools and the provincial university at Saskatoon.

There are over 3,000 miles of railway in operation.

The total population, according to the census of 1911, was 492,432, an increase of 440 per cent in ten years.

On the basis of these figures the province is entitled to fifteen members in the House of Commons.

The principal cities are Regina (the capital), Moose Jaw, Saskatoon and Prince Albert.

Questions on Saskatchewan

What is the area of Saskatchewan? Compare it with that of Great Britain and with that of New Brunswick.

Describe the surface of the province.

Name the principal rivers.

What are the two great branches of industry?

Compare the wheat crop of Saskatchewan with that of the other provinces.

How does Saskatchewan rank as a producer of oats?

What other crops are of importance?

Does the live stock industry show any great changes? What seems to be its future?

Where is coal found in Saskatchewan?

What are the principal manufactures?

Where is the provincial university located?

Describe briefly the school system of the province.

What is the total railway mileage?

How many representatives has the province in the House of Commons?

What are the principal cities?

What was the population in 1911?

What would be the population of Saskatchewan if it were as thickly settled as New Brunswick?

Canadian Cities and Towns

One of the most noticeable features of the de-elopment of Canada is the growth of cities. his growth is greatest in the west, especially Alberta and Saskatchewan. In the year 1901 nly four cities—Calgary, Edmonton, Leth-ridge and Regina—had a population of more an 2,000. Calgary had 4,000; in 1911 the ominion census gave it 43,704, an average crease of almost 100 per cent a year. Regina 1901 had 2,249; in 1911 it had 30,213. Many the eastern cities show large increases; amilton, for example, increased from 52,000 nearly 82,000; Toronto jumped from 208,000 376,538 and Montreal from 267,730 to 0,480. Most of the large cities are found in the eastern part of the country, as the table below shows. The hundred largest cities are divided among the provinces as follows:

Ontario	43
Quebec	21
Nova Scotia	12
British Columbia	6
Alberta	5
Saskatchewan	4
Manitoba	4
New Brunswick	4
Prince Edward Island	1
	100

The Hundred Largest Cities. Below is given a table of the hundred largest cities in Canada, arranged according to size; reference to volume numbers shows where articles descriptive of them may be found. The descriptions of the cities and towns in Volume VI are given on pages 313 to 340, and in all the other volumes they are given in regular alphabetical order:

	City.	Province.	Population	In Vol
1.	Montreal.	Quebec.	470,480	III.
2.	Toronto.	Ontario.	376,538	V.
3.	Winnipeg.	Manitoba.	136,035	V.
4.	Vancouver.	British Columbia.	100,401	V.
5.	Ottawa.	Ontario.	87,062	IV.
6.	Hamilton.	Ontario.	81,969	II.
7.	Quebec.	Quebec.	78,190	IV.
8.	Halifax.	Nova Scotia.	46,619	III.
9.	London.	Ontario.	46,300	III.
10.	Calgary.	Alberta.	43,704	I.
11.	Saint John.	New Brunswick.	42,511	IV.
12.	Victoria.	British Columbia.	31,660	V.
13.	Regina.	Saskatchewan.	30,213	IV.
14.	Edmonton.	Alberta.	24,900	II.
15.	Brantford.	Ontario.	23,132	I.
16.	Kingston.	Ontario.	18,874	III.
17.	Maisonneuve.	Quebec.	18,684	VI
18.	Peterborough.	Ontario.	18,360	IV
19.	Hull.	Quebec.	18,222	III.
20.	Windsor.	Ontario.	17,829	V.
21.	Sydney.	Nova Scotia.	17,723	V.
22.	Glace Bay.	Nova Scotia.	16,562	VI.
23.	Fort William.	Ontario.	16,499	VI.
24.	Sherbrooke.	Quebec.	16,405	V.
25.	Berlin.	Ontario.	15,196	I.
26.	Guelph.	Ontario.	15,175	II.
27.	Westmount.	Quebec.	14,579	VI.
28.	Saint Thomas.	Ontario.	14,054	IV.
29.	Brandon.	Manitoba.	13,839	VI.
30.	Moose Jaw.	Saskatchewan.	13,823	VI.
31.	Three Rivers.	Quebec.	13,691	V.
32.	New Westminster	British Columbia.	13,199	IV.
33.	Stratford.	Ontario.	12,946	V.
34.	Owen Sound.	Ontario.	12,558	IV.
35.	Saint Catherine's	Ontario.	12,484	IV.
36.	Saskatoon.	Saskatchewan.	12,004	VI.
37.	Verdun.	Quebec.	11,629	VI.
38.	Moncton.	New Brunswick.	11,345	VI.
39.	Port Arthur.	Ontario.	11,220	VI.
40.	Charlottetown.	Prince Edward Is.	11,203	I.
41.	Sault Ste. Marie.	Ontario.	10,984	IV.
42.	Chatham.	Ontario.	10,770	I.
43.	Lachine.	Quebec.	10,699	III.
44.	Galt.	Ontario.	10,299	VI.
45.	Sarnia.	Ontario.	9,947	IV.
46.	Belleville.	Ontario.	9,876	I.
47.	Saint Hyacinthe.	Quebec.	9,797	VI.
48.	Salaberry de Valleyfield.	Quebec.	9,449	VI.
49.	Brockville.	Ontario.	9,374	I.
50.	Woodstock.	Ontario.	9,320	V.
51.	Niagara Falls.	Ontario.	9,248	VI.
52.	Amherst.	Nova Scotia.	8,973	VI.
53.	Sorel.	Quebec.	8,420	VI.
54.	Nanaimo.	British Columbia.	8,306	VI.
55.	North Vancouver.	British Columbia.	8,196	VI.
56.	Lethbridge.	Alberta.	8,050	VI.
57.	North Bay.	Ontario.	7,737	VI.
58.	Saint Boniface.	Manitoba.	7,483	VI.
59.	Sydney Mines.	Nova Scotia.	7,470	VI.
60.	Levis.	Quebec.	7,452	III.
61.	Oshawa.	Ontario.	7,436	VI.
62.	Thetford Mines.	Quebec.	7,261	VI.
63.	Fredericton.	New Brunswick.	7,208	II.
64.	Collingwood.	Ontario.	7,000	VI.
65.	Lindsay.	Ontario.	6,964	III.
66.	Orillia.	Ontario.	6,828	VI.
67.	Fraserville.	Quebec.	6,774	VI.
68.	Yarmouth.	Nova Scotia.	6,600	V.
69.	Cornwall.	Ontario.	6,598	II.
70.	Barrie.	Ontario.	6,420	I.
71.	New Glasgow.	Nova Scotia.	6,383	VI.
72.	Smith's Falls.	Ontario.	6,370	VI.
73.	Joliette.	Quebec.	6,346	VI.
74.	Prince Albert.	Saskatchewan.	6,254	VI.
75.	Kenora.	Ontario.	6,158	VI.
76.	Truro	Nova Scotia.	6,107	VI.
77.	Saint Johns.	Quebec.	5,903	VI.
78.	Portage la Prairie	Manitoba.	5,892	VI.
79.	Chicoutimi.	Quebec.	5,880	VI.
80.	Spring Hill.	Nova Scotia.	5,713	VI.
81.	Cobalt.	Ontario.	5,638	VI.
82.	Pembroke.	Ontario.	5,626	VI.
83.	Medicine Hat.	Alberta.	5,608	VI.
84.	Strathcona.	Alberta.	5,579	VI.
85.	North Sydney.	Nova Scotia.	5,418	VI.
86.	North Toronto.	Ontario.	5,362	VI.
87.	Welland.	Ontario.	5,318	VI.
88.	Port Hope.	Ontario.	5,092	VI.
89.	Cobourg.	Ontario.	5,074	II.
90.	Dartmouth.	Nova Scotia.	5,058	VI.
91.	Outremont.	Quebec.	4,820	VI.
92.	Grand Mere.	Quebec.	4,783	VI.
93.	Ingersoll.	Ontario.	4,763	VI.
94.	Granby.	Quebec.	4,750	VI.
95.	Chatham.	New Brunswick.	4,666	I.
96.	Midland.	Ontario.	4,663	VI.
97.	Goderich.	Ontario	4,522	VI.
98.	Nelson.	British Columbia.	4,476	IV.
99.	Westville.	Nova Scotia.	4,417	VI.
100.	Arnprior.	Ontario.	4,405	VI.

Ottawa, Our Capital City. On page 286 is given a general outline which will serve, with small changes, for any city. Any necessary changes in the arrangement or choice of topics should be made. In order to show how easily this general outline may be applied to a particular city, the following outline has been prepared for Ottawa, the capital of the Dominion. The order of topics has been changed, new topics have been added and others have been dropped, but the principal facts about the city are included:

Outline on Ottawa

I. General Description
  (1) Location
  (2) Population
  (3) Plan of city
    (a) Central points
    (b) Principal streets
      (1) Metcalfe Street
      (2) Laurier Avenue
      (3) King Edward Avenue
      (4) Sparks Street

II. Public Buildings and Institutions
  (1) Parliament Buildings
  (2) Langevin Block
  (3) Royal Mint
  (4) Victoria Museum
  (5) Rideau Hall
  (6) Government printing office
  (7) Carnegie Library
  (8) City Hall
  (9) Experimental farm

III. Park System
  (1) Parliament Hill
  (2) Major's Hill Park
  (3) Strathcona Park

(4) Rockliffe Park

IV. PRINCIPAL MONUMENTS
  (1) Queen Victoria
  (2) Sir John Macdonald
  (3) Sir Georges E. Cartier
  (4) Alexander Mackenzie

V. EDUCATIONAL SYSTEM
  (1) Public Schools
  (2) Separate Schools
  (3) Collegiate Institute
  (4) Normal School
  (5) Ottawa University

VI. GOVERNMENT
  (1) Mayor
  (2) Board of control
  (3) Board of aldermen

VII. COMMERCE AND INDUSTRY
  (1) Manufactures
    (a) Lumber
    (b) Matches
    (c) Flour
    (d) Carbide
  (2) Transportation
    (a) Rideau Canal
    (b) Grand Trunk Railroad
    (c) Canadian Pacific Railway

VIII. HISTORY
  (1) Site first visited by Champlain, 1613
  (2) Portage for fur traders
  (3) Bytown, founded when the Rideau Canal was built, 1827
  (4) Incorporated as city of Ottawa, 1854
  (5) Chosen as capital of Canada, 1858
  (6) Recent growth

Items of Interest Regarding Ottawa

Ottawa stands on a small group of hills, from 0 to 155 feet above the Ottawa River.

The Rideau Canal cuts the city into two parts, e western portion being known as "Upper own" and the eastern portion as "Lower Town."

The Parliament buildings are in the Italian othic style of architecture; the cornerstone was id by the Prince of Wales (later King Edward I) in 1860. The Victoria Tower, on the ntral building, has a height of 180 feet.

The library of Parliament has over 200,000 lumes.

The new union railway station, just east of the deau Canal, was finished in 1912.

The Canadian government maintains a central perimental farm at Ottawa.

Ottawa is the seat of the anglican bishop of tario and of the Roman Catholic archbishop Ottawa.

The city is governed by a mayor and board of control (four members) elected by the city at large, and a board of aldermen, two elected by each of the eight wards. It elects two members to the provincial assembly and two also to the Dominion House of Commons.

About one-third of the population is French.

Rideau Hall, the residence of the governor-general, stands among beautiful trees a short distance outside the city.

Champlain visited the site of the city in 1613.

For two hundred years after Champlain's voyage the Chaudiere portage was the main avenue of travel from Montreal to the great western fur country.

Philemon Wright, of Woburn, Massachusetts, was the first settler at the portage. He built a hut in 1800 on what is now the Quebec side of the Ottawa River, but it was not until a quarter of a century later that the settlement grew large enough to be called a town.

Colonel John By, the builder of the Rideau Canal, is generally called the founder of Ottawa, for the opening of the canal created a fair-sized settlement at the northern end.

CITIES AND TOWNS

In the list of cities given below it was necessary to set an arbitrary limit of population. In the eastern provinces this limit is 3,000. In the newly settled sections of the west, however, a village of 400 or 500 may be of more relative importance than a town of 3,000 in Ontario. For this reason all villages with a population of 400 or over have been given brief but adequate treatment in proportion to their importance. The articles are based on special reports furnished by the local boards of trade wherever possible. The statistics of population are taken from the final reports of the census of 1911.

Amherst, Nova Scotia, the county-seat of Cumberland county, on the Bay of Fundy and on the Intercolonial Railway between Halifax and St. John. Industrially Amherst is of great importance; the neighborhood supplies coal, lumber and agricultural produce, and the town manufactures railroad cars, woolen goods, boots and shoes and malleable iron. Gypsum is also found in the vicinity. Population, 1911, 8,973.

Annapolis Royal, Nova Scotia, situated at the mouth of the Annapolis River on the Bay of Fundy. The Dominion Atlantic Railway and a line of steamers furnish communication. The town, which was founded in 1604, is the oldest

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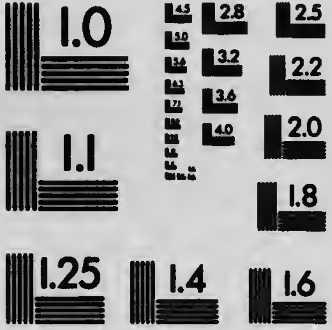


settlement on this continent north of Florida. It has a large trade in lumber, apples and fish. Population, 1911, 1,019.

OLD FORT ANNAPOLIS

Antigonish, the county-seat of Antigonish county, Nova Scotia, is situated on St. George's Bay, an arm of the Gulf of Saint Lawrence, and on the Intercolonial Railway. It is the seat of a Roman Catholic bishop, of Saint Francis Xavier College, and St. Bernard's Convent. Prominent among the industries are cheese-making, woodworking and grist milling. Population, 1911, 1,787.

Arcola, Saskatchewan, a divisional point on the Arcola branch of the Canadian Pacific Railway, 113 miles southeast of Regina. It is the center of the Cannington judicial district and of a fine wheat growing section. Population, 1911, 794.

Armstrong, a town of British Columbia, in Okanagan Valley, on the Canadian Pacific Railway. Numerous industries are located here, the most important being flour milling and lumbering. The district is famous for its fruits and mixed farming; an annual agricultural exhibition is held at Armstrong. Population, 1911, 810.

Arnprior, Ontario, at the junction of the Madawaska and Ottawa rivers, thirty-seven miles west of Ottawa, is on the Canadian Pacific and Grand Trunk railways. There are large lumber mills, also flour and woolen mills. In the vicinity are marble quarries and iron mines. The town has a beautiful site and is well laid out. Population, 1911, 4,405.

Arrowhead, British Columbia, on the Columbia River and Upper Arrowhead Lake, is on a branch of the Canadian Pacific Railway, twenty-eight miles south of Revelstoke. It is a landing and shipping port for the boats on the Arrowhead Lakes. Population, 1911, 600.

Ashcroft, British Columbia, on the Thompson River and the main line of the Canadian Pacific Railway, 200 miles northeast of Vancouver. It is the shipping and outfitting point for a promising copper district and is the gateway to the Thompson Valley, where large areas are being irrigated for fruit raising. Population, 1911, about 800.

Atlin, British Columbia, on Atlin Lake, is about forty-five miles from Kamloops. Lumbering and placer mining are the principal industries. The Atlin district yields about three-fourths of the placer gold mined in the province. Population, 1911, 800.

Aylmer, a town of Quebec, in Wright county, on Lake Deschenes, an expansion of the Ottawa River, and on the Canadian Pacific, eight miles from Ottawa. The manufacture of lumber products is the leading industry; there is also a large canning and preserving factory. Aylmer is a favorite summer resort. Population, 1911, 3,109.

Baddeck, the county-seat of Victoria county, Nova Scotia, on Bras d' Or Lake. There is some gold and gypsum mining in the neighborhood, but the town is better known as a summer resort and as the headquarters of Dr. Bell and other inventors, Population, 1911, about 1,200.

Banff, Alberta. See Volume I.

Bank Head, a village in Alberta, five miles from Banff, on the Canadian Pacific Railway. The coal mines here employ about 500 men. Population, 1911, 694.

Barrie, a town of Ontario, county-seat of Simcoe county, on the north shore of Lake Simcoe and on the Grand Trunk Railway. The principal industrial plants are breweries, tanneries, machine shops, woolen and flour mills. Owing to its pleasant climate and beautiful surroundings it is a popular summer resort. Population, 1911, 6,420.

Bassano, a village of Alberta, in the Medicine Hat district, is on the main line of the Canadian Pacific Railway, only three miles from Horseshoe Bend, where one of the main intakes of the Canadian Pacific's irrigation canals is located. Population, 1911, 540.

Bathurst, the county-seat of Gloucester county, New Brunswick, situated on the Intercolonial Railway. Four lumber and shingle mills, a brick yard and a grist mill are the principal plants here. There are large deposits of iron in the vicinity and also good salmon fishing and hunting. Four rivers flow into Bathurst harbor. Population, 1911, 960.

Battleford, a town of Saskatchewan, situated at the junction of the Battle and Saskatchewan rivers, on the Canadian Northern and Grand Trunk Pacific railways, 90 miles from Saskatoon. It is the center of a region devoted to the raising of grain and to mixed farming and is rapidly becoming a railroad and wholesale center. Battleford was the capital of the former district of Saskatchewan; the old government house is now occupied by an Indian industrial school. The district headquarters of the Royal Northwest Mounted Police are located here; there are also public schools, a high school and Protestant and Catholic parish schools. Population, 1911, 1,335.

Beausejour, a village of Manitoba, thirty-five miles east of Winnipeg, on the Canadian Pacific Railway. A pressed brick and a glass factory are here and there is good farming land in the neighborhood. Population, 1911, 847.

Belleville, Ontario. See Volume I.

Bellevue, a village in the Macleod district, Alberta. Population, 1911, 463.

Berlin, Ontario. See Volume I.

Big River, a village in Saskatchewan, in the Prince Albert district. Population, 1911, 516.

Birtle, Manitoba, a town on the Bird Tail River, 195 miles west of Winnipeg, on the Canadian Pacific and other railways. It is in a fine agricultural and ranching region. Grain elevators, flour mills, a creamery and lumber yards are important. Population, 1911, 437.

Blairmore, a village of Alberta, is situated on the Crow's Nest River and the Canadian Pacific Railroad, thirteen miles east of Crow's Nest Pass. The principal industries are lumbering and mining, Blairmore being a distributing point for the coal fields of the region. Population, 1911, 1,137.

Boissevain, *bwa se vane'*, a town in Manitoba, on the Canadian Pacific and Great Northern railways. Boissevain is the shipping point for a great wheat section and has five grain elevators, with a total capacity of 275,000 bushels. Population, 1911, 918.

Brampton, the county-seat of Peel county, Ontario, is on the Canadian Pacific and Grand Trunk railways, twenty-one miles northwest of Toronto. Brampton is a cattle and hog center and has a large trade in apples. The leading establishments of the town are a flour mill, boot and shoe factories, paper-box factory, grist mill and three large greenhouses. Population, 1911, 3,412.

Brandon, a city in Manitoba, on the Assiniboine River, the Canadian Pacific, the Canadian Northern and the Great Northern railways, 133 miles west of Winnipeg. It is a divisional point of the Canadian Pacific Railway and has extensive railway yards. The chief industries include flour mills, saw mills, a brick plant and establishments for manufacturing cement blocks, factories for the construction of sash and doors, furniture, farm implements and building materials. The city is also one of the most noted horse markets in the west. It is the seat of an Indian school and the home of the Western Agricultural and Arts Association, and there is a government experimental farm near by. The city maintains an excellent system of public schools and is the seat of two collegiate institutions and a Baptist college. It is well supplied with churches and has a fine Y. M. C. A. building, also a hospital, and is the seat of a provincial asylum for the insane. Population, 1911, 13,839.

SCENE IN CALGARY
(See Volume I)

Brantford, Ontario. See Volume I.

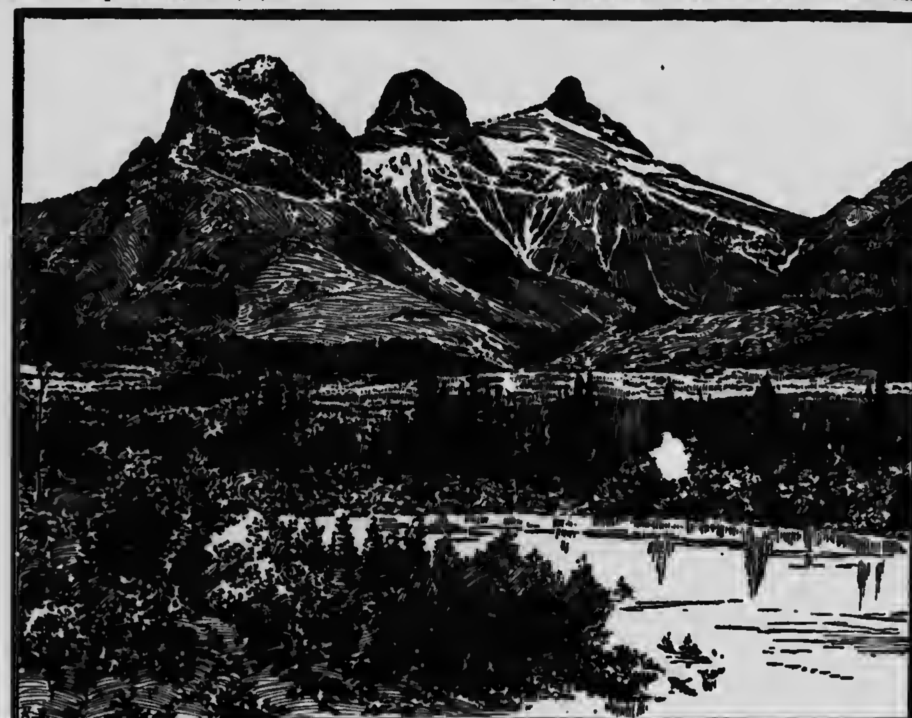
Bridgewater, a town of Nova Scotia, situated in Lunenburg county, at the head of navigation on La Have River and on the Halifax and Southwestern Railway, whose general offices and machine shops are located here. Bridgewater is a great center for the manufacture of lumber products and for export trade in lumber, pulpwood and bark. Population, 1911, 2,775.

Broadview, Saskatchewan, on the Canadian Pacific Railway, 72 miles east of Regina. Broadview has three grain elevators, two lumber yards and a brick plant. Population, 1911, 702.

Brockville, Ontario. See Volume I.

Brooks Alberta, is a growing town on the main line of the Canadian Pacific Railway, nearly in the center of the eastern section of the railway's great irrigation project. (See page 34.) Population, 1911, 486.

Buckingham, Quebec, the county town of Labelle county, is on the Canadian Pacific Railway and on the Riviere du Lievre, four miles from its junction with the Ottawa River. Lumbering is the principal industry, and there are also cheese and butter factories. Phosphate, mica and graphite are mined in the neighborhood. Population, 1911, 3,854.



THE THREE SISTERS, CANMORE

Calgary, Alberta. See Volume I.

Campbellford, a town in Northumberland county, Ontario, on the Grand Trunk Railway, twenty-seven miles west of Belleville. It has extensive water power, which is used in the development of manufactures. The chief industries include woolen mills, pulp and paper mills, flour mills, saw mills, a shoe factory, and steel and bridge works. Population, 1911, 3,051.

Campbellton, in Restigouche county, New Brunswick, is situated at the head of deep water navigation, on an estuary of the Restigouche River, on Chaleur Bay and on the Intercolonial Railway, sixteen miles west of Dalhousie. It is on the border of an extensive forest region and is one of the most important lumbering points in the Dominion. The town was totally destroyed by fire on July 11, 1910, but has been rapidly rebuilt. Trout and salmon fishing are important, as are also lumber mills, machine shops and a ginger ale factory. Population, 1911, 3,817.

Camrose, a town of Alberta, on the Canadian Pacific, Canadian Northern and Grand Trunk Pacific railroads, about twenty-five miles east of Wetaskiwin. It has seven churches, a fine public school and several banks. Camrose is in one of the most fertile regions of Alberta, and is a distributing point for the surrounding country. It has a large and growing wholesale business. Other important industries include brickyards, lumber mills and yards, creamery, tannery and grain elevators. There are two producing coal mines within the town limits. Population, 1911, 1,586.

Canmore, a mining town in Alberta, sixty-seven miles west of Calgary. Most of the population is employed in the neighboring coal mines. Population, 1911, 754.

Canora, Saskatchewan, on the Canadian Northern and Grand Trunk Pacific railways, is the market and distributing point for a mixed farming district. It is 190 miles northwest of Regina. Population, 1911, 435.

Canso, a town in Nova Scotia, on Chedabucto Bay, twenty-five miles from the Intercolonial Railway at Mulgrave. Eighteen ocean cables are landed here. Fishing and the preserving of fish are the principal occupations. Population, 1911, 1,617.

Carberry, a town in Macdonald county, Manitoba, located on the Canadian Northern and Canadian Pacific railways, twenty-eight miles east of Brandon. It has three churches, about thirty stores, grain elevators, banks, good schools and a fine park. Population, 1911, 878.

Cardston, a town of Alberta, on St. Mary's River and the Canadian Pacific Railway, sixty-five miles southwest of Lethbridge. There are three grain elevators, a large flour mill and a creamery. Shipments of dressed meats and coal are considerable. The farms in the surrounding country are especially known for sugar beets and other root crops, winter wheat and dairy products. Population, 1911, 1,207.

Carleton Place, a town in Lanark county, Ontario, on the Canadian Pacific Railway. Stoves, knitted goods and flour are manufactured here. The Canadian Pacific has large repair shops. Population, 1911, 3,621.

Carlyle, a town in Saskatchewan, on the Arcola branch of the Canadian Paciffc and the Maryfield-Lethbridge branch of the Canadian Northern Railway, ten miles east of Arcola. It has good public schools and is a grain and lumber center. Population, 1911, 358.

Carman, a town in Macdonald county, Manitoba, on the Boyne River, and on the Canadian Pacific, Canadian Northern and Great Northern railways, fifty-eight miles southwest of Winnipeg. Its annual shipments of grain average 400,000 bushels. Population, 1911, 1,271.

Carnduff, Saskatchewan, on the Estevan branch of the Canad' cific Railway, is in the southeastern corn.. the province. Wheat raising is the leading industry of the section. Population, 1911, 469.

Chambly, Quebec. See Volume I.

Charlottetown, Prince Edward Island. See Volume I.

Chatham, a town of Northumberland county, New Brunswick, is situated on the Miramichi River about twenty-five miles from its mouth. It has an excellent harbor, which will admit ocean-going steamers. The town owns its water works and electric light plants. The chief industries are the manufacture of lumber, which is largely shipped to British markets, and the manufacture of wood pulp, which is shipped to the United States. There are also wood working factories and two foundries. Chatham is the center of an important fishing industry and is noted for its salmon and smelt fisheries; the lobster fishing at the mouth of the river is controlled from this town. There is a good grammar school building, a hospital, and the exposition buildings for the northern part of the province are also located here. Population, 1911, 4,666.

Chatham, Ontario. See Volume I.

Chicoutimi, the county-seat of Chicoutimi county, Quebec, on the Saguenay River and Canadian Northern Railway. It is one of the most important centers for the manufacture of wood pulp, more than 60,000 tons being exported to England alone; other industries include foundries, machine shops, butter and cheese factories. Wheat, oats, hay, potatoes and blueberries are raised in large quantities in the surrounding region. The city is the seat of a bishop and has a Roman Catholic cathedral and college. Population, 1911, 5,880.

Chilliwack, a town in British Columbia, seventy miles from Vancouver, on the Fraser River, on the Canadian Northern and Great Northern railways. It is also the eastern terminus of the British Columbia Electric Railway, the longest electric road in the Dominion. The town has some manufacturing interests, chiefly lumber and dairy products. The fair grounds of the Agricultural Society are located here. The surrounding country is noted for its cement deposits, dairying and fruit farming. Population, 1911, 1,657.

Claresholm, a town in Alberta, on the Canadian Pacific Railway, eighty-two miles south of Calgary. Grain and lumber are shipped from here in considerable quantities. Population, 1911, 809.

Coaticook, *ko at'e kuk,* a town in Stanstead county, Quebec, on the Coaticook River and the Grand Trunk Railway, twenty-five miles south of Sherbrooke. It is a large manufacturing center for knitted and woolen goods, chemicals, butter, cheese, patent medicines and varied milling machinery. Population, 1911, 3,165.

Cobalt, *ko'balt,* a town in the Nipissing district, Ontario, on Cobalt lake and the Temiscaming and Northern Ontario Railway. The Cobalt region is one of the richest silver producers in the world. Cobalt silver was discovered here in 1904, and in 1911 the shipments of ore were valued at $16,000,000. Besides silver, nickel and arsenic are mined in considerable quantities. A large machine shop and foundry and thirteen ore concentrators are located here. The town is 300 miles north of Toronto. Population, 1911, 5,638.

Cobourg, Ontario. See Volume I.

Coleman, Alberta, on Old Man River and the Canadian Pacific Railway, ten miles from Crow's Nest Pass. Over one-half the population is employed in coal mining or dependent industries. The International Coal and Coke Company employs about 700 men. The town has electric light and water works, a good public school system and several churches. Population, 1911, 1,557.

Collingwood, a town in Simcoe county, Ontario, located on Georgian Bay and the Grand Trunk Railway, ninety-five miles northwest of Toronto. It is the headquarters of the Northern Navigation Company, whose shipyards and drydock are located here. The leading industries include tanneries, breweries, flour mills, lumber mills, brick yard and broom factory. The town has an extensive lumber and grain trade and is connected by steamer with Owen Sound, Mackinac, Sault Ste. Marie, Duluth and other ports. The public schools are very good; there is also a separate school for Catholics and a collegiate school. Population, 1911, 7,000.

Cornwall, Ontario. See Volume II.

Craik, Saskatchewan, on the Regina-Prince Albert branch of the Canadian Northern Railway, seventy-three miles north of Regina. The agricultural fair grounds are located here. Craik is a large distributing point, especially for farm implements. Population, 1911, 435.

Cranbrook, a town in British Columbia, a divisional point on the Crow's Nest branch of the Canadian Pacific Railway. The town and vicinity are extensively engaged in the lumber industry. It has five churches, several banks, telephone and electric light systems, excellent public schools and a good hospital. Population, 1911, 3,090.

Creston, British Columbia, on the Crow's Nest Pass division of the Canadian Pacific Railway, about midway between Nelson and Cranbrook. The Creston strawberries are famous more than locally for their excellence. Population, 1911, about 800.

Crystal City, a town of Manitoba, on the Canadian Pacific Railway and Crystal Creek, 130 miles southwest of Winnipeg. The elevators here have a capacity of 175,000 bushels. Population, 1911, 600.

Cumberland, a town of British Columbia, on Vancouver Island, sixty miles north of Nanaimo. A railway runs from Cumberland to Union Wharf, on Boyne Sound, and steamships connect it with Nanaimo, Vancouver and Victoria. Lumbering and coal mining are the important industries; the Canadian Collieries produce as much as 15,000 tons of coal a day. The town is supplied with electric light and water works. Population, 1911, 1,237.

Dalhousie, New Brunswick, in Restigouche county, on Chaleur Bay, at the mouth of the Restigouche River. The neighborhood has large spruce, maple, birch and cedar forests. Fishing and lumbering are the only industries of importance, but the town is also a popular summer resort. Population, 1911, 1,650.

Dartmouth, a town in Halifax county, Nova Scotia, on Halifax Harbor opposite Halifax, and on the Intercolonial Railway. The industries include cordage works, a sugar refinery, chocolate and molasses factories, ship repairing and boiler works. The town has six churches and several banks. There is a little gold mining and some agriculture in the vicinity. Population, 1911, 5,058.

Dauphin, *daw'fin,* a town in Marquette county, Manitoba, on the Vermilion River and Canadian Northern Railway, 178 miles northwest of Winnipeg. It has an extensive trade in grain and machinery; the most important industrial establishments are flour and grist mills, sash and door factory and lumber yards and mills. The town owns its electric light and power plant and water works. There are seven churches, three banks, two schools and a collegiate institute. The Riding Mountain forest reserve south of Dauphin is noted for moose, elk and deer. Population, 1911, 2,815

Davidson, a town in Saskatchewan, on the Regina-Prince Albert branch of the Canadian Northern, ninety-one miles from Regina. Population, 1911, 389.

Dawson, Yukon Territory. See Volume II.

Deloraine, a town in Souris county, Manitoba, on the Canadian Pacific Railway, 200 miles southwest of Winnipeg. It has a machine shop, flour mill, shoe factory and five grain elevators. There are coal deposits in the vicinity. Population, 1911, 808.

Diamond City a village in Southern Alberta, near Medicine Hat. Population, 1911, 510.

Didsbury, a town in Red Deer district, Alberta, forty-seven miles north of Calgary, is in a rich agricultural section which supplies the local elevators, flour mills and creamery. It also has lumber yards, planing mill and a steel culvert factory. Population, 1911, 726.

Digby, the county-seat of Digby county, Nova Scotia, on an arm of the Bay of Fundy and on the Dominion Atlantic Railway. The town has the county academy, box and barrel factories, fish-curing establishments and is a well-known summer resort. Population, 1911, 1,247.

Dominion, Nova Scotia, thirteen miles from Sydney, to which an electric railway runs. Coal mining is the principal industry. Population, 1911, 2,589.

Dorchester, the county-seat of Westmoreland county, New Brunswick, is situated on the Memramcook River and the Intercolonial Railway, twenty-one miles from Amherst. There are five large churches, and the county buildings and national penitentiary. Fishing is the principal industry. Population, 1911, 1,080.

Dundas, a town and port of entry in Wentworth county, Ontario, on the Grand Trunk and Toronto, Hamilton & Buffalo railroads. It is five miles from Hamilton, on Lake Ontario, with which it is connected by the Desjardines Canal. The town possesses unlimited water power and has manufactories of iron castings and machinery of all kinds, also paper, leather, woolen and cotton goods, flour and wooden-ware. It is situated in a valley famous for its beauty. Population, 1911, 4,299.

Edmonton, Alberta. See Volume II.

Edmunston, the county-seat of Madawaska county, New Brunswick, on the Canadian Pacific, Grand Trunk Pacific and Temiscouata railways. It is in a lumbering and farming district and is also headquarters for sportsmen. The manufacture of lumber products is the principal industry. Population, 1911, 1,821.

Edson, a village in the Edmonton district, Alberta, on the Grand Trunk Pacific Railway. Population, 1911, 497.

Elkhorn, a town of Manitoba, situated in Brandon county, on the Canadian Pacific Railway, sixty miles west of Brandon. It has a large flour mill and grain elevators. Population, 1911, 574.

Emerson, a town in Manitoba, on the Red River, and the Canadian Pacific, Canadian Northern, Great Northern, Northern Pacific and Soo Line railways. The town is the center of a rich agricultural section; its principal industries are the making of bricks and cement blocks. Population, 1911, 1,043.

Enderby, a city in British Columbia, on the Spallumcheen River and Canadian Pacific Railway, is beautifully situated in the Okanagan Valley, twenty-three miles south of Sicamous. Over 20,000,000 feet of lumber are cut here each year. Dairying and fruit raising are important industries, and the city also has growing manufactures and noteworthy public buildings. Population, 1911, 835.

Esquimalt, *es' ke mo*, a city on Vancouver Island, British Columbia, three miles from Victoria. Esquimalt has a fine harbor, naval yards and fortifications and a large dry dock. Shipbuilding and salmon canning are the principal industries. Population, 1911, 4,001.

Estevan, *este vahn'*, a town of Saskatchewan, situated on the main line of the Canadian Pacific Railway and the Estevan and Souris and the Minneapolis, St. Paul and Sault Ste. Marie divisions of the Canadian Pacific Railway, 290 miles southwest of Winnipeg. It is the headquarters of the Dominion Coal Company and an important railway junction. It is an important distributing point and makes extensive shipments of coal. Large brick yards are located here and nearby are deposits of pottery clay of excellent quality. The town has electric lights, water works and sewers The prominent public buildings include the public library, postoffice and city hall, and the hotels and several business blocks are also worthy of mention. There is an excellent system of public schools, including a high school, and a normal school is also located here. Population, 1911, 1,981.

Farnham, a town of Quebec, on the Yamaska River, and the Canadian Pacific and Central Vermont railways, thirty-five miles east of Montreal. The Canadian Pacific has divisional shops here, and there are also large factories for the manufacture of butter and cheese, furniture, tobacco products and safes. Farnham has excellent public schools and is the seat of a growing Roman Catholic college. Population, 1911, 3,560.

Fernie, a town in British Columbia, near Elk River, is on the Canadian Pacific, the Great Northern, and the Morrisey, Fernie and Michel railways, 700 miles east of Vancouver. Fernie is the center of the Crow's Nest Pass coal district, the annual production being over 1,500,000 tons; there are 500 coke ovens here with an estimated output of nearly 400,000 tons a year. The town is naturally the wholesale center for this great mining district; it also has large manufactures, mostly connected in some way with coal mining. The Elk River at this point furnishes extensive water power; the city owns its electric lighting system, water works, sewers, and a beautiful natural park of 200 acres. Fernie is a customs port of entry, a judicial center and the provincial police headquarters for East Kootenay. Population, 1911, 3,146.

Fort Saskatchewan, a town in Alberta, on the north branch of the Saskatchewan River and on the Canadian Northern Railway, eighteen miles northeast of Edmonton, was for many years one of the best known posts in the west. It is a division headquarters of the Royal Northwest Mounted Police. Population, 1911, 782.

Fort William, a city of Ontario, situated on the northern shore of Lake Superior and on the main lines of the Grand Trunk Pacific, Canadian Pacific and Canadian Northern railways, 861 miles from Winnipeg. The first settlement was made by French traders in 1669. Its railways and excellent harbor at the head of navigation give the city great commercial importance, and it is one of the largest traffic centers of Canada. During 1911 about 3,000 vessels, with an aggregate tonnage of 8,000,000, entered and cleared from its docks. The grain elevators have a total capacity of 22,000,000 bushels; from here 92,485,360 bushels of grain were shipped in 1911. The chief manufactures consist of flour, oatmeal, iron pipe, car wheels, tinware, brick, tile, brooms, wire nails, hardwood finishings, lumber, cigars, cheese, harness and aerated waters. In the vicinity are iron, copper and silver mines, blast furnaces and pulp mills. The city has an excellent system of public schools, including a high school, fifteen churches, a public library and several other buildings of note. Population, 1911, 16,499.

Frank, in the southwestern part of Alberta, is on the Canadian Pacific Railway, fifty-one miles east of Fernie, British Columbia. About 300 men are employed in the coal mines here. Frank is also well known as a health resort, especially for its sulphur baths. Population, 1911, 806.

Fraserville, Quebec. See Riviere du Loup.

Fredericton, New Brunswick. See Volume II.

Galt, a town in Waterloo county, Ontario, on the Canadian Pacific and Grand Trunk railways, thirteen miles from Berlin, fifteen miles from Brantford. Numerous electric lines connect it with neighboring towns. The vicinity supplies large quantities of lumber, limestone and sand. The principal products of the city's factories are edge tools, knitted goods, safes, boots and shoes, flour and foundry products. The public school system is very good and there are also several private schools. Population, 1911, 10,299.

Gananoque, a town in Leeds county, Ontario, at the eastern end of Lake Ontario, and on the Grand Trunk Railway. It is an important point for traffic on the lake and on the St. Lawrence River and it has many industries, the most important being direct or indirect products of iron, such as hinges, nails, hammers, shovels, rivets, bolts and carriage forgings. The town is also known as a summer resort. Population, 1911, 3,804.

Gilbert Plains, a village of Manitoba, twenty miles west of Dauphin, on the Canadian Northern Railway. The neighborhood is rich in brick clay, spruce, tamarack and poplar. Population, 1911, 542.

Gimli, Manitoba, on the southern end of Lake Winnipeg, twenty-seven miles from Selkirk. Large lumber yards and creameries are located here. A great deal of lumber from mills on the lake is brought here for reshipment. Population, 1911, 496.

Glace Bay is a town in Cape Breton county, Nova Scotia, on the Sydney and Louisburg Railway, fourteen miles from Sydney. The Dominion Coal Company, which has large mines here, has an average pay roll of $200,000 a month. Fishing and the manufacture of machines are also important industries. The town has an excellent electric lighting system, seven churches, three banks, and public and high schools. It is an important wireless telegraph station. Population, 1911, 16,562.

Gladstone, a town in Manitoba, thirty-five miles from Portage la Prairie, on the Canadian Pacific and Canadian Northern railways. It carries on an extensive trade in wheat, flour and building material. The churches, schools and public improvements are excellent. Population, 1911, 782.

Gleichen, a town in Alberta, about fifty miles east of Calgary. A creamery, bottling works, grain elevators and lumber yards are located here. Population, 1911, 583.

Goderich, the county-seat of Huron county, Ontario, is located on Lake Huron, at the mouth of the Maitland River. It has one of the best harbors on the east shore of Lake Huron and has good railroad connections through the Canadian Pacific and Grand Trunk railways. The neighborhood supplies limestone, salt, lumber, glass-sand and clays of various kinds. The manufacturing interests are extensive, the majority of the industries being dependent on the neighborhood's supply of the raw materials. Population, 1911, 4,522.

Golden, near the eastern boundary of British Columbia, on the Canadian Pacific Railway and the Columbia River, which is navigable for both passenger and freight boats. Golden is the northern gateway to the rich Kootenay Valley. Population, 1911, 953.

Granby, Quebec, fifty-five miles east of Montreal, is situated on the Yamaska River and the Central Vermont Railway. It is one of the most important of the smaller manufacturing centers of the province, especially for rubber goods, furniture, cigars, celluloid goods and baby carriages. There is abundant water power for future development. The schools are very good. Population, 1911, 4,750.

Grand Falls, in Victoria county, New Brunswick, at the head of navigation on the St. John River, and on the Canadian Pacific and Grand Trunk Pacific railways. Lumber and pulp wood are cut in large quantities in the neighborhood, and their products, especially dressed lumber, furniture, shingles, window sashes and doors are the principal manufactures. Maple sugar and syrup, potatoes, hay, oats, buckwheat, honey and many small fruits ar[illegible] from here. The falls of the St. John [illegible] ive feet high. Population, 1911, [illegible]

Grand Forks, a town i[illegible], British Columbia, on the Kettle [illegible]nd on the Canadian Pacific, Great Northern and Kettle Valley railways. It is a customs port, a railway divisional point and a great smelting center. The noted Granby Smelters, the Boundary Iron Works and the British Columbia Steel Works are located here. There are also breweries, machine shops and a saw mill. The surrounding country is well adapted to fruit farming. Population, 1911, 1,577.

Grand Mere, Quebec, twenty-one miles north of Three Rivers, on the St. Maurice River and on branches of the Canadian Pacific and Canadian Northern railways. The manufacture of wood pulp, paper and other lumber products is the leading industry. Grand Mere is in a good farming district. Population, 1911, 4,783.

Grand Pre, Nova Scotia. See Volume II.

Grand View, a town in Manitoba, on the main line of the Canadian Northern Railway, thirty miles west of Dauphin. Five grain elevators, a pump factory, a lumber mill and a machine shop are located here. The heavily timbered Duck Mountains north of Grand View are full of game. Population, 1911, 637.

Greenwood, a town in the Yale-Cariboo district, British Columbia, is a mining and smelting center for copper. Population, 1911, 778.

Gretna, Manitoba, a village on the Canadian Pacific and Great Northern railways, seventy miles south of Winnipeg, situated on the international boundary. Its leading industries are the manufacture of flour and the shipping of wheat and other grains. The town and the surrounding country are inhabited almost entirely by Mennonites. Population, 1911, 519.

Guelph, Ontario. See Volume II.

Haileybury, in the Nipissing district of Ontario, a town on the Temiskaming & Northern Ontario and the Nipissing Central railways. The town has some industries, but it is practically a residential suburb of Cobalt. Population, 1911, 3,874.

Halifax, Nova Scotia. See Volume III.

Hamilton, Ontario. See Volume III.

Hamiota, Manitoba, on the Oak River and Miniota branch of the Canadian Pacific Railway, fifty miles northwest of Brandon. Large elevators and several lumber yards are the principal industrial establishments. Population, 1911, 565.

Hampton, New Brunswick, the county town of King's county, is situated on the Kennebecasis River and the Intercolonial Railway. Hampton is a popular summer resort, especially for residents of St. John, twenty miles away. Population, 1911, 554.

Hartney, a town of Manitoba, situated on the Canadian Northern Railway and on the Estevan branch of the Canadian Pacific. There are six elevators, two lumber yards and a brick yard here, and there is fine goose and duck shooting on several lakes in the vicinity. Population, 1911, 623.

Hawkesbury, Prescott county, Ontario, is on the Ottawa River, the Canadian Northern and Grand Trunk railways, half-way between Ottawa and Montreal. The town has separate, public and high schools and a fine electric and power plant. Lumber and paper mills, a sash and door factory and a clothing factory are important industries. Population, 1911, [illegible].

Herbert, Saskatchewan, on the main line of the Canadian Pacific Railway, eighty-two miles west of Moose Jaw. Population, 1911, 559.

High River, a town in Macleod district, Alberta, on the Highwood River and Canadian Pacific Railway, forty miles south of Calgary. Lumber products are the principal manufactures of the town, and it also receives much grain, cattle and hogs from the surrounding country for shipment. Population, 1911, 1,182.

Hillcrest, a village in the Macleod district, Alberta. Population, 1911, 481.

Hillsborough, in Albert county, New Brunswick, on the Petitcodiac River. The gypsum mines in the vicinity have an annual output of 120,000 tons. The town has plaster mills, woodworking factories and railway machine shops. Population, 1911, 911.

Hosmer, British Columbia, on the Great Northern and Canadian Pacific railways, eight miles east of Fernie, is a great coal mining and coke manufacturing (240 ovens) town. Population, 1911, 2,000.

Hull, Quebec. See Volume III.

Humboldt, Saskatchewan, a divisional point on the Canadian Northern main line, eighty-one miles east of Saskatoon. A Dominion lands office, grain elevators, creamery and several general stores are located here. The Humboldt district is fine for wheat and mixed farming. Population, 1911, 859.

Indian Head, a town of Saskatchewan, on the main line of the Canadian Pacific Railway, forty miles east of Regina. It has large flour mills, window sash and door factories, and ten grain elevators with a total capacity of 4,500,000 bushels. The electric light system is owned and operated by the town. The Dominion experimental and forestry farms are located here. Population, 1911, 1,285.

Ingersoll, a town in Oxford county, Ontario, on the Grand Trunk and Canadian Pacific railways, ten miles southwest of Woodstock. Its principal industries use wool and agricultural products as raw materials; furniture, pianos, oatmeal, condensed milk and flour are among the manufactures. Their annual value is over $3,000,000. Population, 1911, 4,763.

Innisfail, Alberta, on the Calgary-Edmonton branch of the Canadian Pacific Railway, seventy-five miles north of Calgary, has a large saw mill, grain elevator, three creameries, brick plant and lumber yards. Population, 1911, 602.

Inverness, Nova Scotia, on the west coast of Cape Breton Island, is situated on Big River and on the Inverness Railway. Copper, gypsum and fireclay are found in considerable quantity, but the most important industry is coal mining. Population, 1911, 2,719.

Joliette, *jo li et'*, the county-seat of Joliette county, Quebec, is situated on L'Assomption River, about thirty-six miles north of Montreal. It is on the Canadian Pacific and Canadian Northern Quebec railways. Lumber, iron and steel, paper pulp, tobacco, biscuits and candies are the principal manufactures. The town is known for its excellent schools, academies and Joliette College. Population, 1911, 6,346.

Kamloops, a town in the Yale district of British Columbia, is situated at the junction of the North and South Thompson rivers, 250 miles from Vancouver. It is on the main line of the Canadian Pacific Railway, of which it is a divisional point, and it is also a divisional point on the Canadian Northern. The surrounding region is devoted to stock raising, mixed farming, fruit growing, lumbering and mining. In the town the leading industries are saw mills, sash and door factories, machine shops, a brick yard, a brewery and a cigar factory. The town owns its light and water systems and has good educational facilities. It supports a daily and weekly paper and is the seat of Dominion government land, Indian agent and customs offices. The site of Kamloops is 1,150 feet above sea level and the town is noted for its dry and healthful climate, which makes it a delightful summer resort. Population, 1911, 3,772.

Kamsack, Saskatchewan, a division point on the Canadian Northern Railway, about ninety miles northwest of Dauphin. Population, 1911, 473.

Kaslo, British Columbia, on the west shore of Kootenay Lake, is the terminus of the Kaslo and Slocan Railway; it also has steamboat connections with the Canadian Pacific and Great Northern railways at Nelson. The surrounding country is admirably suited to fruit growing and there are important deposits of sulphur, lead, zinc and copper. The town has a number of lumber and saw mills and also has a large trade in supplies for the mines. It owns its waterworks and has an electric lighting system. Population, 1911, 722.

Kelowna, a city on Okanagan Lake, British Columbia. The city is in a rich farming district, tobacco and fruits, especially apples, plums and cherries, being the principal products; other important crops are potatoes, celery, cabbage and tomatoes. There are several fruit packing and preserving plants, a cigar factory, brick yard and saw mills. Kelowna apples are famous and have taken prizes in the national apple shows at Vancouver and Spokane. Population, 1911, 1,663.

Kenora, Ontario, formerly known as Rat Portage, on Lake of the Woods, and the Canadian Pacific, Grand Trunk Pacific and Canadian Northern railways. It is the industrial center of the Lake of the Woods district and has large flour and lumber mills and two grain elevators. The town has splendid schools and public buildings. Good hunting and fishing in the neighborhood have made it one of the most popular summer resorts in Canada. Population, 1911, 6,158.

Kentville, county-seat of King's county, Nova Scotia, is on the Dominion Atlantic Railway. It is the business center of the Annapolis and Cornwallis valleys and is a prosperous residential town. Automobiles, carriages, gasoline engines and milling machinery are manufactured here. Population, 1911, 2,304.

Killarney, a town of Manitoba, on the Pembina branch of the Canadian Pacific Railway. It is the shipping point for the Turtle Mountain region, known for its mixed farming. It has an annual live stock exhibition, contains an up-to-date town hall, good school facilities and an adequate electric lighting system. Population, 1911, 1,010.

Kindersley, Saskatchewan, a divisional point on the Saskatoon-Goose Lake branch of the Canadian Northern Railway, 126 miles southwest Saskatoon. A Dominion lands office is ste. here. With its many supply hous projected additional lines of railroad Kindersley is destined to become a great distributing point for a prosperous agricultural district. Population, 1911, 456.

Kingston, Ontario, See Volume III.

Lachine, Quebec. See Volume III.

Lacombe, a town in Alberta, on the branch line of the Canadian Pacific Railway between Calgary and Edmonton, 115 miles from Calgary and eighty miles from Edmonton; also on the Canadian Northern Railway. The town is located in a very rich agricultural and grazing district. It has several grain elevators, brick yard, factory, iron foundry, planing mill, harness and broom factories. Population, 1911, 1,029

Ladner, a town in British Columbia, twelve miles by steamer from New Westminster, on the Great Northern Railway. Fish canneries, a creamery and saw mill are noteworthy. Population, 1911, 900.

Ladysmith, a town on the east coast of Vancouver Island, British Columbia, on the Esquimalt and Nanaimo Railway, eighteen miles from Nanaimo. The Tyee Copper Company has a large smelter here; there are also stove works, a brewery, shingle mill. Coal is extensively mined in the vicinity. Population, 1911, 3,295

Laggan, a station in Alberta, on the Canadian Pacific Railway, situated in the heart of the Rockies, 256 miles from Vancouver. The place has attained world-wide reputation because of the beauty and grandeur of the surrounding mountain scenery. Lake Louise, one of the most attractive of mountain lakes, is about two miles distant. The Canadian Pacific changes here from the Western to Pacific time.

Lanigan, Saskatchewan, on the Canadian Pacific Railway, eighty-one miles southeast of Saskatoon. Population, 1911, 392.

Lauzon, *lo zon'*, in the province of Quebec, a town in Levis county, lies just below Quebec on the opposite side of the Saint Lawrence; it is also on the Intercolonial and Quebec Central railways. Its principal industries are the manufacture of lumber products and shipbuilding. The trade in lumber is large. Population, 1911, 3,978.

Leduc, in Strathcona district, Alberta, eighteen miles south of Edmonton, on the Calgary-Edmonton branch of the Canadian Pacific Railway. Large grain elevators and lumber yards are located here. Population, 1911, 523.

Lethbridge, a city of Alberta, on the Canadian Pacific, Great Northern and Alberta railways, 109 miles from Medicine Hat. It is an important railway center and is the shipping point for a rich coal-mining and farming region. The crop shipments are large, averaging 3,500,000 bushels a year, mostly wheat, oats and flax. Six large coal mines are within sight of the city. The head office of the Alberta Railway and Irrigation Company, which is constructing and operating a great irrigation system in southern Alberta, is located here. The chief industries of the city include iron and brick works, flour and woolen mills and a large brewery. The city is the headquarters of a division of the Royal Northwest Mounted Police. Population, 1911, 8,050.

Levis, Quebec. See Volume III.

Lindsay, Ontario. See Volume III.

Liverpool, Nova Scotia, the county town of Queen's county, is situated at the mouth of the River Mersey and on the Halifax and Southwestern Railway. The town has the county academy, five churches, numerous industries, especially iron works, pulp and paper mills and shipworks, and has a large trade in lumber and fish. Population, 1911, 2,108.

Lloydminster, a town in the province of Saskatchewan, on the main line of the Canadian Northern Railway, 160 miles east of Edmonton and on the border line of Alberta and Saskatchewan. A government creamery, flour mills, schools and banks are evidence of the progressiveness of the town. Population, 1911, 441.

London, Ontario. See Volume III.

Longueuil, *long gé'y,* the county-seat of Chambly county, Quebec, is on the south bank of the Saint Lawrence River opposite Montreal. Its industries are small, but it is a noted residential suburb of Montreal and is also a popular summer resort. Population, 1911, 3,972.

Louisburg, Nova Scotia, on the eastern end of Cape Breton Island, is beautifully situated on a fine harbor, open all the year. Louisburg is of great historical interest to Canadians, as it was one of the points of attack throughout the wars between France and England in the eighteenth century; the ruins of the fortifications still remain. Lobster packing, fish curing and lumbering are the principal industries. Population, 1911, 1,006.

Lumsden, Saskatchewan, a town on the Qu'Appelle River and the Prince Albert-Regina branch of the Canadian Northern Railway, twenty miles northwest of Regina. Lumsden is in one of the richest grain sections of the northwest. Population, 1911, 695.

Lunenburg, the county town of Lunenburg county, Nova Scotia, is located on the Halifax and Southwestern Railway. Besides numerous industries, Lunenburg has a fishing fleet of over 150 vessels, with an average annual catch of 5,000,000 pounds. Population, 1911, 2,681.

Macleod, a town in the district of the same name in Alberta, located at the junction of the Crow's Nest Pass and the Calgary and Macleod branches of the Canadian Pacific Railway, 108 miles south of Calgary. It is a railroad divisional point, and is the district headquarters of the provincial courts and of the Royal Northwest Mounted Police. The Canadian Northern has been granted a large tract for yards and shops. Four grain elevators, a flour mill, soap factory, iron works and tannery are in operation. There are large deposits of coal, both anthracite and bituminous, in the neighborhood. Macleod is a town of growing importance as a distributing and general manufacturing center. Population, 1911, 1,844.

Magog, Quebec, a town on the Canadian Pacific Railway twenty miles southwest of Sherbrooke, is noted principally for its textile mills and butter and cheese factories. Population, 1911, 3,978.

Magrath, Alberta, on Pot Hole Creek and the Alberta Railway, twelve miles west of Raymond. It is a Mormon settlement, with a fine church of the Latter Day Saints. Population, 1911, 995.

Maisonneuve, a town in Hochelaga county, Quebec, on the Saint Lawrence River and on the Canadian Pacific, Great Northern and Montreal Terminal railroads; it was formerly a part of the town of Hochelaga. Much of its growth is due to its natural advantages as a manufacturing and shipping center, surrounded as it is by the city of Montreal, except on the river side. It is the most important of the industrial suburbs of Montreal; the principal industry is shoe manufacturing, but it also has a large sugar refinery, foundries, saw mills and lumber yards, cotton mills, biscuit and other factories. The school system is excellent and there are also two colleges and a good public library. Population, 1911, 18,684.

Manitou, a town in Manitoba, on the Canadian Pacific Railway, eighteen miles from the United States boundary. Wheat is raised in large quantities in the surrounding farming district. Manitou is the seat of a normal school and the county court. Population, 1911, 639.

Maple Creek, a town of Saskatchewan, in the southwestern part of the province, is on the main line of the Canadian Pacific Railway, eighty-six miles east of Medicine Hat. Sheep, horses and cattle are extensively raised in the neighborhood. Maple Creek is the headquarters of a division of the Mounted Police. Population, 1911, 936.

Marysville, a town in York county, New Brunswick, on the Intercolonial Railway, three miles from Fredericton. Lumber and cotton mills employ most of the inhabitants. Population, 1911, 1,837.

Medicine Hat, a city in Alberta, 660 miles west of Winnipeg, on the Canadian Pacific Railway. It is an important railroad point and has large repair shops. A flour mill, four brick yards, foundry, linseed oil mills, planing mills and rolling mills are among the important manufacturing plants. Coal mines and natural gas in the vicinity supply cheap fuel and power. Parks, churches and four large schools are features of the city. Population, 1911, 5,608.

Melfort, Saskatchewan, is on the Carrot River and the Canadian Northern Railway, eighty miles east of Prince Albert. It is a railroad divisional point, has a government customs and lands office and is the trade center for the Carrot River Valley, where lumbering is extensive. Population, 1911, 599.

Melita, Manitoba, on the Souris River and Canadian Pacific Railway, eighty-five miles southwest of Brandon. Five elevators here have a capacity of 160,000 bushels; there are flour mills, lumber yards, a brick plant and three public parks. Population, 1911, 690.

Melville, a town in Saskatchewan, on the main line of the Grand Trunk Pacific, on the Hudson's Bay branch and the Melville-Regina branch, was founded in 1908. Large warehouses and grain elevators have been erected here; there are also two breweries. As the nearest point on the Grand Trunk Pacific for the Qu'Appelle Valley, Melville seems destined to a rapid growth. Population, 1911, 1,816.

Merritt, a city of British Columbia, in the Nicola Valley at the junction of the Nicola and Coldwater rivers. It is a large producer of coal and coke and is also noted for Nicola Valley fruits. Three railroads meet here. Population, 1911, 703.

Michel, a town of British Columbia, twenty-two miles northeast of Fernie, on the Crow's Nest division of the Canadian Pacific Railway. Population, 1911, 662. Adjoining it is New Michel, with a population of 1,515.

Midland, a town of Ontario, in Simcoe county, on Georgian Bay. The Grand Trunk Railway and a line of steamers furnish transportation. The town has many large factories and mills, grain elevators, iron smelters, engine works, coal docks and a shipbuilding yard. Population, 1911, 4,663.

Milestone, Saskatchewan, fifty-four miles from Moose Jaw and about thirty-five miles south of Regina, on the Canadian Pacific Railway. Milestone has a meat packing plant, lumber yards and grain elevators. Population, 1911, 436.

Milltown, in Charlotte county, New Brunswick, one mile from St. Stephen. Large cotton mills are here, also a grist mill and a saw and edge tool factory. Population, 1911, 1,804.

Minnedosa, a town in Manitoba, on the Little Saskatchewan River and the Minnedosa branch of the Canadian Pacific Railway. Lumber and grain are the principal products of the region; Minnedosa has five grain elevators and two large lumber yards. It is the center of the northern judicial district of the province. Population, 1911, 1,483.

Moncton, a city in Westmorland county, New Brunswick, on the Petitcodiac River, which flows into the Bay of Fundy, and on the Intercolonial and Grand Trunk Pacific railways, eighty-nine miles northwest of St. John. Moncton has an excellent harbor and is a port of entry. The principal manufactures include lumber, stoves, woodenware, cotton and woolen goods, barrels and railroad cars. The city has the main repair shops of the Intercolonial Railway and is the eastern terminus of the Grand Trunk Pacific. There are eight churches and four schools. Population, 1911, 11,345.

Montreal, Quebec. See Volume III.

Moose Jaw, a city of Saskatchewan, at the junction of Moose Jaw River and Thunder Bay Creek, also a divisional point on the Canadian Pacific, Canadian Northern and Grand Trunk Pacific railways. The surrounding region is noted as one of the finest agricultural districts in western Canada; it lies in the heart of the greatest wheat belt in the world. The city is a large industrial center, the most important plants being bridge and iron works, slaughter and packing houses, tannery, engine and gas motor shops, flour mills, creamery and butter factory. A large company also manufactures brick and other clay products. The city has many beautiful buildings; especially noteworthy are the city hall, court house, Collegiate Institute and the new million-dollar public library. In addition to a fine public school system there are institutions for advanced study, including the Collegiate Institute and the new Saskatchewan College. A prominent feature of the city is the absence of telegraph and telephone poles in the streets, practically all wires and conduits being under ground. The city is experiencing an unusually rapid growth. Population, 1901, 1,558; in 1911, 13,823.

Moosomin, a town in Saskatchewan, on the main line of the Canadian Pacific Railway, eighty-seven miles west of Brandon. There is a flour mill and a government creamery here. It is the center of a judicial district and also district headquarters for the Royal Northwest Mounted Police. Population, 1911, 1,143.

Morden, a town of Manitoba, situated in Lisgar county, on Dead Horse Creek and on the Canadian Pacific and Great Northern railways, eighty-two miles southwest of Winnipeg. The chief manufactures are flour, lumber and machinery. The town contains a number of grain elevators. Morden is the center of the southern judicial land titles and surrogate court districts. It is also the county-seat, and among its public buildings contains a fine court house and a jail of the most approved pattern. Population, 1911, 1,130.

Morris, a town in Manitoba, situated on the Canadian Northern and Canadian Pacific railways and on the Red River, forty-two miles south of Winnipeg. Several grain elevators are located here. Population, 1911, 598.

Moyie, on Moyie Lake, British Columbia, twenty miles west of Cranbrook on the Crow's Nest and British Columbia Southern Railway. The largest silver-lead mine in Canada is in operation here, and there are many smaller mines. Population, 1911, 1,200.

Nanaimo, *nah ny' mo,* a town of British Columbia, on the east side of Vancouver Island, thirty-five miles from Vancouver and seventy-three miles from Victoria. Lumbering and coal mining are the principal industries, but the packing of salted herring for export to the orient is increasing in importance. Minor industries are brewing, brick-making and the manufacture of foundry and machine-shop products. The town has electric light and power plants, gas works, waterworks and good fire department. The neighboring districts produce copper and brick clay. Population, 1911, 8,306.

Nanton, Alberta, is a town on the Macleod branch of the Canadian Pacific Railway, about sixty miles south of Calgary. It is in a fine wheat and ranching district. Population, 1911, 571.

Neepawa, *nee paw' wah,* Manitoba, a town in Portage county, on White Mud River and the Canadian Northern and Canadian Pacific railways, sixty-one miles from Portage la Prairie. It has elevators, a machine shop, brick plant, sash and door factory and creamery, and excellent schools and churches. The town owns its electric light system. The annual Manitoba Fat Stock Show is held here. Population, 1911, 1,864.

Nelson, British Columbia. See Volume IV.

Newcastle, New Brunswick, the county-seat of Northumberland county, is situated on the left bank of the Miramichi River, eighteen miles from its entrance into Miramichi Bay, and on the Intercolonial Railway 78 miles from Moncton. Newcastle is the center of a great fishing and hunting district and has a large trade in fish and lumber. Four saw mills, two sash and door factories and a farm wagon factory are in operation. Population, 1911, 2,945.

New Glasgow, a town in Pictou county, Nova Scotia, on the East River and the Intercolonial Railway. The Nova Scotia Steel Works, employing over 1,000 men, are located here. Other establishments produce glass, agricultural machinery, bricks, mineral waters, steel and wire fencing, lumber and mill products. In addition to large quantities of coal, the district yields limestone, iron ore, spruce and some hardwoods. Population, 1911, 6,383.

New Westminster, British Columbia. See Volume IV.

Niagara Falls, a city in Welland county, Ontario, on the Niagara River, between Lake Erie and Lake Ontario. Its geographical position makes it a great railroad center; practically all of the great trunk lines, including the Canadian Pacific, Canadian Northern, Grand Trunk, Michigan Central, Lake Shore & Michigan Southern, Wabash, and Erie systems, have connections here. The great water power of the falls furnishes abundant power for many industrial establishments; the most important of these produce silverware, iron and steel, chemicals, leather and leather goods, neckwear, hosiery and hats, firearms, paper and paper boxes. The city has one of the finest park systems in the world, and it is the center of the boulevard system which extends from Lake Erie to Lake Ontario. Its proximity to the falls of the Niagara River makes it a great resort for tourists at all seasons of the year. Population, 1911, 9,248.

Nicola, British Columbia, on Nicola Lake, fifty miles south of Kamloops, is the terminus of the Nicola-Spence's Bridge Railway. The Nicola district is famous for its fine fruits. Population, 1911, about 300.

Nokomis, Saskatchewan, at the junction of the main line of the Grand Trunk Pacific and the Winnipeg-Saskatoon branch of the Canadian Pacific Railway, seventy-five miles north of Regina. The town has four lumber yards, a machine shop, flour mill and other industries Population, 1911, 374.

North Battleford, a town of Saskatchewan, on the main line of the Canadian Northern Railroad, of which it is a divisional point, and at the junction of the North Saskatchewan and Battleford rivers. The principal industries include railroad repairs, sash and door manufactures and grist milling. A foundry, machine shop, cement block and tile factory, and the town's light, power, and water systems are worthy of notice. Population, 1911, 2,105.

North Bay, the county-seat of Nipissing county, Ontario, on Lake Nipissing and the Canadian Pacific, Canadian Northern, Grand Trunk, Grand Trunk Pacific and Temiskaming and Northern Ontario railways. The Canadian Pacific Railway has extensive repair shops here and the town is also known as the gateway to the Cobalt and Porcupine mining districts. It is an important point for tourists and sportsmen, since there is excellent fishing and hunting in the immediate vicinity. It has two public schools, a high school, two separate schools and a provincial normal school. All of the leading denominations have churches here, some of which are fine edifices. The town owns and operates its water works, and is well lighted by electricty and gas. Population, 1911, 7,737.

North Sydney, a town in Cape Breton county, Nova Scotia, is situated on the Intercolonial Railway five miles north of Sydney. A steam ferry runs hourly to Sydney and there are also steamers running to Montreal, Quebec, Halifax, Charlottetown and St. John's. The coal docks of the Nova Scotia Steel and Coal Company make it an important coaling station. Fishing is extensively carried on and the town also has large granite quarries, planing mill, brick yards and a stove factory. Population, 1911, 5,418.

North Toronto, a town of York county, Ontario, on the Grand Trunk Railway. There are a few industrial plants here, but the town is better known as a residential suburb of Toronto. Population, 1911, 5,362.

North Vancouver, British Columbia, on the north shore of Burrard Inlet, opposite Vancouver, with which it is connected by ferry. Ship and boat building, the manufacture of sails, cigars, sash and doors are the principal industries. The Pullman Company plans to build a large steel car works and dry docks. North Vancouver is also popular as a residential suburb of Vancouver. Population, 1911, 8,196.

Oak Lake, a town in Manitoba, thirty-two miles west of Brandon, on the Canadian Pacific Railway. Lumbering and flour milling are the principal industries. Population, 1911, 449.

Okotoks, Alberta, on the Macleod branch of the Canadian Pacific Railway, is twenty-seven miles south of Calgary. It has grain elevators, flour mill, brick plant, lumber yard and other industries. Population, 1911, 516.

Olds, a town of Alberta, is on Little Red Deer River and the Edmonton branch of the Canadian Pacific, fifty-seven miles north of Calgary. There are two banks, a creamery, cement block plant, and it is in a fine farming district. Population, 1911, 917.

Orillia, *o ril' e ah,* a town located in Simcoe county, Ontario, on the Grand Trunk, Canadian Northern and Canadian Pacific railways. Though especially noted for its fine scenery, it is also an industrial center. The important manufactures are cheese, clothing, flour, woolen goods, carriages and wagons, furniture and wood pulp. The town has four public schools and a collegiate institute. Population, 1911, 6,828.

Oshawa, a town and port of entry in Ontario county, Ontario, thirty-three miles from Toronto, on the Grand Trunk, Canadian Northern and Toronto Eastern (electric) railways. The town has canning and evaporating factories and manufactures machinery, agricultural implements, malleable iron, musical instruments, woolen goods and flour. Sugar beets of high grade are raised in the vicinity. Population, 1191, 7,435.

Ottawa, Ontario. See page 312; also Volume IV.

Outlook, Saskatchewan, the terminus of the Moose Jaw-Lacombe branch of the Canadian Pacific Railway, is on the South Saskatchewan River. The new railroad bridge here is estimated to cost $1,000,000. Population, 1911, 685.

Owen Sound, Ontario. See Volume IV.

Oxbow, a town of Saskatchewan, is beautifully situated on a hill above the Souris River, forty miles east of Estevan. Oxbow lies in the great wheat belt and has grain elevators with a total capacity of 200,000 bushels. Population, 1911, 630.

Oxford, Nova Scotia, on the River Philip and the Intercolonial Railway, has woolen mills, furniture factory, foundry, machine shop, box factory, etc. The annual lumber shipments from here are over 10,000,000 feet. The neighborhood supplies good fishing and hunting. Population, 1911, 1,392.

Paris, a town of Brant county, Ontario, on the Grand Trunk and Grand Valley Electric railways, seven miles northwest of Brantford and fourteen miles south of Galt. Gypsum and lime are found in the vicinity, which is also a good mixed farming district. The chief industries include alabaster works, flour and woolen mills, refrigerator and screen door factories. Population, 1911, 4,098.

Parrsboro, Nova Scotia, on the Basin of Minas, has railway and steamer connection. Though especially known as a sportsmen's resort it is industrially important for its coal and lumber shipments and its shipbuilding yards. Population, 1911, 2,856.

Parry Sound, Ontario, the county town of Parry Sound county and the seat of the Parry Sound judicial district. The Grand Trunk, Canadian Pacific and Canadian Northern Ontario railways, beside the steamers of the Northern Steamship Company, furnish excellent transportation facilities. Wood alcohol is one of the principal manufactures; there are also five saw mills, veneer, boat, sash and door factories and machine shops. It is a distributing point for camping and tourist parties. Population, 1911, 3,429.

Pembroke, the county-seat of Renfrew county, Ontario, on Allumette Lake, an expansion of the Ottawa River, and on the Canadian Pacific and Grand Trunk railways, fifteen miles northwest of Renfrew. There is ample water power for many industries, including the manufacture of flour, axes, woolen goods, leather goods, stoves and carriages. The town also has an extensive trade in lumber. Five schools, besides a convent boarding school, furnish excellent educational facilities. There is also a well-equipped and well-managed public library. Population, 1911, 5,626.

Penetanguishene, a town in Simcoe county, Ontario, is situated on an inlet of Georgian Bay, about two miles west of Midland. Its chief manufactures are lumber, iron products (especially stoves), leather, boats and canoes. Population, 1911, 3,568.

Penticton, British Columbia, a town at the southern end of Okanagan Lake, seventy-five miles from Okanagan Landing, with which it has steamer connection. Fruit growing, brick making and lumbering are the principal industries. The town operates its own irrigation system. Population, 1911, 1,800.

Perth, the county-seat of Lanark county, Ontario, is situated on the Canadian Pacific Railway, forty miles northwest of Brockville. The Rideau Canal has been extended to Perth and has aided in local development. The town contains railroad shops, distilleries, woolen mills, knitting mills, cheese and butter factories. There are important mica deposits in this region. Population, 1911, 3,588.

Peterborough, Ontario. See Volume IV.

Petrolea, a town of Ontario located in Lambton county, fifteen miles southeast of Sarnia, is on the Grand Trunk and Michigan Central railways. The town is in the center of the great oil region of the province and has numerous oil wells and refineries, also saw mills, grist mills, boiler works and a fruit and vegetable cannery. The largest butter factory of Ontario is in operation here. Population, 1911, 3,518.

Phoenix, British Columbia, a mining camp thirty miles west of Rossland and only six miles from the international boundary. Low grade copper ore is mined here in large quantities. Population, 1911, 662; also a floating population of about 900.

Picton, the county-seat of Prince Edward county, Ontario, is situated on the Bay of Quinte (*kwin-te*), an arm of Lake Ontario, and on the Central Ontario Railway, forty miles southwest of Kingston. It is a port of entry. Canning and packing fruits and vegetables is the principal industry. In the navigation season steamers ply daily to Kingston, Belleville, Rochester and other nearby towns. Population, 1911, 3,564.

Pictou, the county-seat of Pictou county, Nova Scotia, is on the Intercolonial Railway and has steamship connection with Charlottetown, Montreal and other ports. It is the seat of Pictou Academy, founded in 1818, and has large manufactures, including flour, biscuits, candy, motorboats and foundry products. The town has a beautiful Young Men's Christian Association building, and is also noted for its excellent schools and fine churches. Coal, lumber and orchard fruits are abundant in the surrounding country. Population, 1911, 3,179.

Pincher Creek, a town of Alberta, on the Crow's Nest section of the Canadian Pacific Railway. The completion of the Canadian Northern Railway will give it additional transportation advantages. The town is the center of a mixed farming and coal-mining district, which gives it a large jobbing and supply trade. Population, 1911, 1,027.

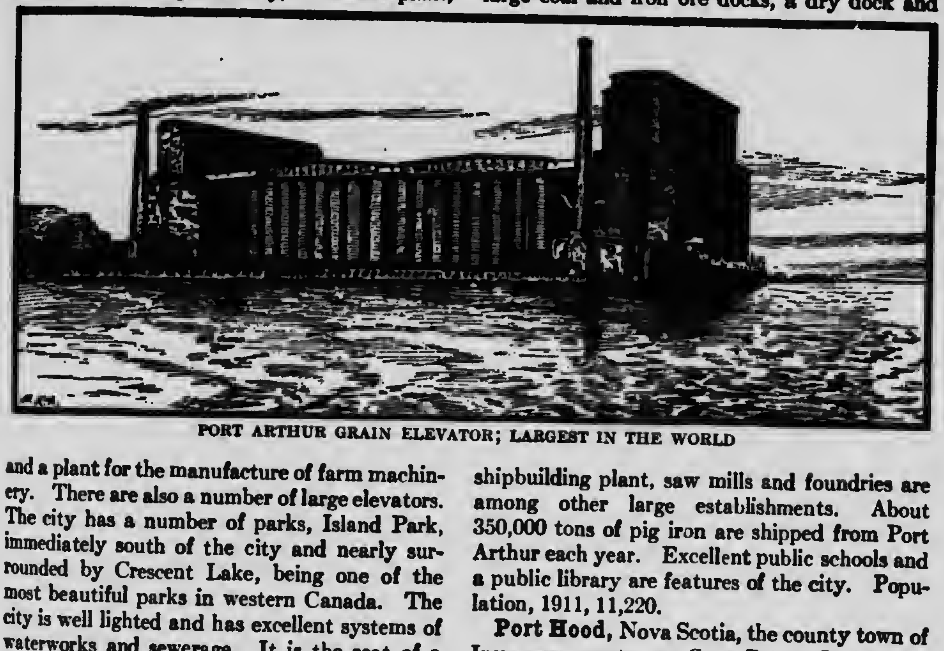
Ponoka is a town in Alberta, sixty-two miles south of Edmonton. Large fair grounds and a race track are located here; there are also elevators (65,000 bushels), creameries and lumber yards. Population, 1911, 642.

Porcupine, Ontario, on Porcupine Lake and the Temiskaming & Northern Ontario Railway, 450 miles north of Toronto. The town is composed of three settlements: Golden City, Pottsville and Southend. It is one of the greatest gold mining camps in Canada. Since the big fire in 1911, the town has been solidly rebuilt. Population, 1911, largely floating, 5,000.

Portage la Prairie, a city of Manitoba, is situated on the Portage plains, fifty-six miles west of Winnipeg. It is located on the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific, the three great trans-continental railways of Canada, and its connection with the Great Northern gives it direct communication with Minneapolis, St. Paul and other large American cities. This makes it a natural distributing point for manufacturers and shippers. The chief industries include flour and oatmeal mills, brick yards, a sash and door factory, a pump factory, a cigar factory, a radiator plant, and a plant for the manufacture of farm machinery. There are also a number of large elevators. The city has a number of parks, Island Park, immediately south of the city and nearly surrounded by Crescent Lake, being one of the most beautiful parks in western Canada. The city is well lighted and has excellent systems of waterworks and sewerage. It is the seat of a collegiate institute, normal school and business college. These institutions, with the excellent system of public schools, give Portage la Prairie exceptional educational facilities. Population, 1911, 5,892.

Port Alberin, British Columbia, the terminus of the Esquimalt & Nanaimo Railway, owned by the Canadian Pacific, is situated on a deep natural harbor on the west coast of Vancouver Island. It is the distributing point for a great lumber, coal, fruit and fishing district. Population, 1911, 891.

Port Arthur, a city in the Thunder Bay district of Ontario, at the head of Lake Superior, two and one-half miles from Fort William. The Canadian Northern, Canadian Pacific and Grand Trunk Pacific railways, together with the exceptional opportunities for water transportation, make Port Arthur an important collecting and distributing point, especially for the grain-growing regions. The report of the Board of Trade shows a total of over 92,000,000 bushels of grain shipped from Port Arthur and Fort William in 1911; the Canadian Northern's great elevator, with a capacity of 7,500,000 bushels, is said to be the largest in the world. There are also large fishing, mining and lumbering interests. The blast furnace of the Atikokan Iron Company, large coal and iron ore docks, a dry dock and shipbuilding plant, saw mills and foundries are among other large establishments. About 350,000 tons of pig iron are shipped from Port Arthur each year. Excellent public schools and a public library are features of the city. Population, 1911, 11,220.



PORT ARTHUR GRAIN ELEVATOR; LARGEST IN THE WORLD

Port Hood, Nova Scotia, the county town of Inverness county, on Cape Breton Island, has steamship connections with Halifax and other large ports; the Inverness Railway and Coal Company's Line connects with the Intercolonial Railway at Mulgrave. Coal mining and fishing are among the leading industries. Population, 1911, 1,078.

Port Hope, a town in Durham county, Ontario, on Lake Ontario, the Ganeraska River, and three railways: the Grand Trunk, Canadian Northern and Canadian Pacific. It has a fine harbor and a very active trade in lumber, grain and dairy products. There are manufactories of woolen goods, flour, steel, porcelain and enamel ware, leather belting, plows, etc. The canning of fruits and vegetables is also important. It is the seat of Trinity College School, in affiliation with Trinity University, Toronto. Population, 1911, 5.092.

Port Moody, a town in British Columbia, at the head of the Burrard Inlet, on the main line of the Canadian Pacific Railway. Sawmills, a shingle mill, brick plant, and oil refinery, are the leading manufactories. Population, 1911, 1,100.

Port Simpson, a town in British Columbia, twenty-five miles northwest of Prince Rupert, has an extensive harbor with direct approach from the ocean. Fishing, especially for halibut, salmon and herring, is the principal industry, but there is also some lumbering and mining. The Hudson's Bay Company has offices here, and there are Indian schools and provincial buildings. Population (mostly Indians), estimated at 1,000.

Preston, a town of Ontario, in Waterloo county, on the Grand Trunk and Canadian Pacific railways; electric railways connect it with Berlin, Galt, Paris and Brantford. The chief manufactures are agricultural implements, woolen goods, furniture and shoes. The district produces live stock, grain and vegetables. Mineral springs make the town a popular resort. Population, 1911, 3,883.

Prince Albert, a city in Saskatchewan, on the Canadian Northern, Canadian Pacific and Grand Trunk railroads, and on the North Saskatchewan River, is the northernmost of the large cities of the province. The city is in a beautiful country, especially suited to spring wheat and oats, but also known for fishing and shooting. Three large lumber companies here cut about 100,000,000 board feet a year. Other large industrial plants include four brick plants, three flour mills, a brewery, planing mills, marble and granite works, and saddlery factory. Two public schools, a collegiate institute, business college, convent and separate school, numerous churches, electric light and water works, and sewerage system are evidence of the progressiveness of the city. Prince Albert is the headquarters of a judicial district and of the Royal Northwest Mounted Police for central and northern Saskatchewan, and is the seat of the provincial jail and penitentiary. Population, 1911, 6,254.

Prince Rupert, a city on Kaien Island, British Columbia, 550 miles from Vancouver. It is the western terminus of the Grand Trunk Pacific Railway and has direct steamship communication with important foreign ports. The city is located on an excellent harbor, just east of the Queen Charlotte Islands, and just south of the most southern point of Alaska. The surrounding country has unlimited agricultural, mineral and forest resources and the bay and nearby rivers abound in fish so that extensive fishing industries are already established. With the completion of the railway, Prince Rupert will become one of the most important ports of the Pacific coast. It is 400 miles nearer Japan than any other Pacific port of North America. Before lots were offered for sale the city was laid out and grades established by engineers acting conjointly with the government and the railway company; the first lot was sold in May, 1909. Immense cold storage and fish-curing plants, creameries and a large sash and door factory are worthy of mention. Population, 1911, 4,184.

Princeton, a town in British Columbia, on the Great Northern Railway, a direct route to Spokane, Washington. Gold, silver, copper and coal are mined. Population, 1911, 600.

Qu'Appelle, *ka pel'*, Saskatchewan, a town on the main line of the Canadian Pacific, thirty-two miles east of Regina. It is in the midst of a rich wheat and oats raising section, for which it provides elevators and shipping facilities. There are excellent public and high schools, and an Indian mission school is located about eight miles from the town. Fort Qu'Appelle, twenty miles distant, is an old post of the Hudson's Bay Company. Population, 1911, 851.

Quebec, Quebec. See Volume IV.

Queenstown, a village of Alberta, about fifty miles southeast of Calgary, lies just north of the new reservoir, Lake McGregor. Population, 1911, 666.

Rapid City, Manitoba, in Marquette county, on the Little Saskatchewan River and a divisional point on the Canadian Pacific Railway, thirty-six miles north of Brandon. Four grain elevators, flour mill, brick and lumber yards are important. Population, 1911, 580.

Raymond, a town in southern Alberta, on the Alberta Railway, It is situated in a well irrigated section which raises good live stock and sugar beets. A flour mill, beet sugar factory and two brick plants are important. Population, 1911, 1,465.

Red Deer, a town of Alberta, on Red Deer River and the Canadian Pacific and Canadian

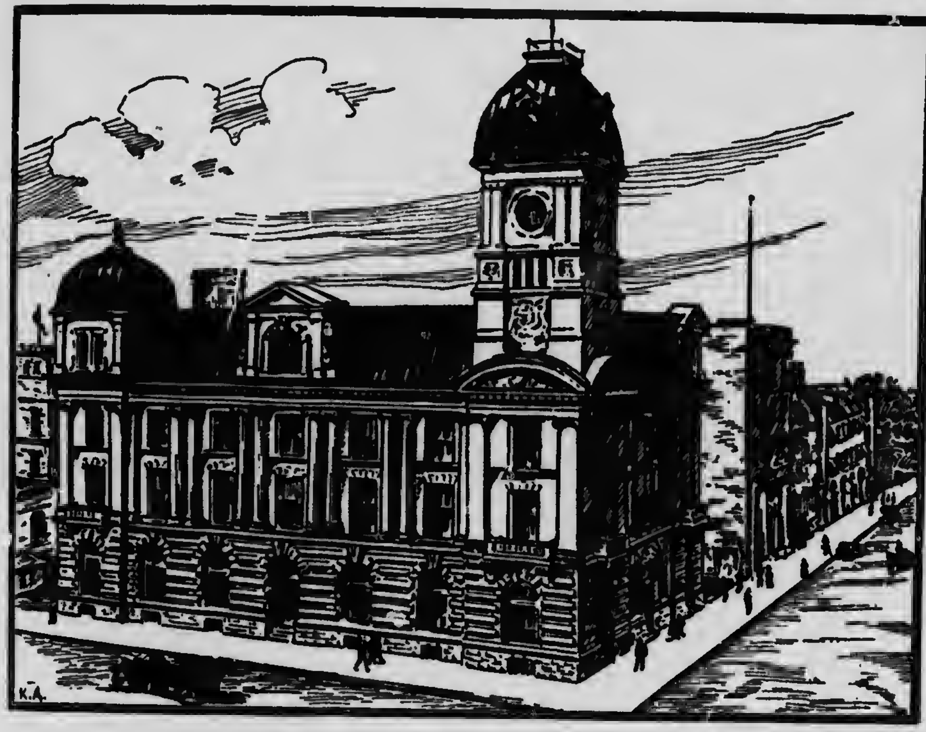
Northern railways. There is abundant water power for manufacturing purposes as well as for electric lighting. Two brick and tile factories, lumber mills, concrete works and a tannery furnish the chief manufactures. A Dominion lands office is located here. Population, 1911, 2,118.

Regina, Saskatchewan. See Volume IV.

Renfrew, a town of Ontario, is situated in Renfrew county, on the Bonnechere River and on the Canadian Pacific and other railways. The river at this point affords abundant water power and the town contains numerous manufactories, including woolen mills, flour mills, a tannery, brick and tile factories and one of the largest creameries in the Dominion. Its educational facilities include a public school system, extending from the kindergarten to the high school, and a good collegiate institute. Population, 1911, 3,846.

Reston, a village in Manitoba, on the Canadian Pacific Railway, twelve miles from the provincial boundary and about 180 miles west of Winnipeg. Population, 1911, 416.

Revelstoke, a city in the Kootenay district of British Columbia. It is a divisional point on the Canadian Pacific Railway and has large repair shops, which are the largest industry at the present time. As the gateway to the Kootenay country, it is the headquarters for mine supplies and also for tourists and sportsmen. North of Revelstoke is the Big Bend mining region. The neighborhood also supplies large quantities of strawberries, vegetables, lumber and brick clay. (See illustration on next page.) Population, 1911, 3,017.



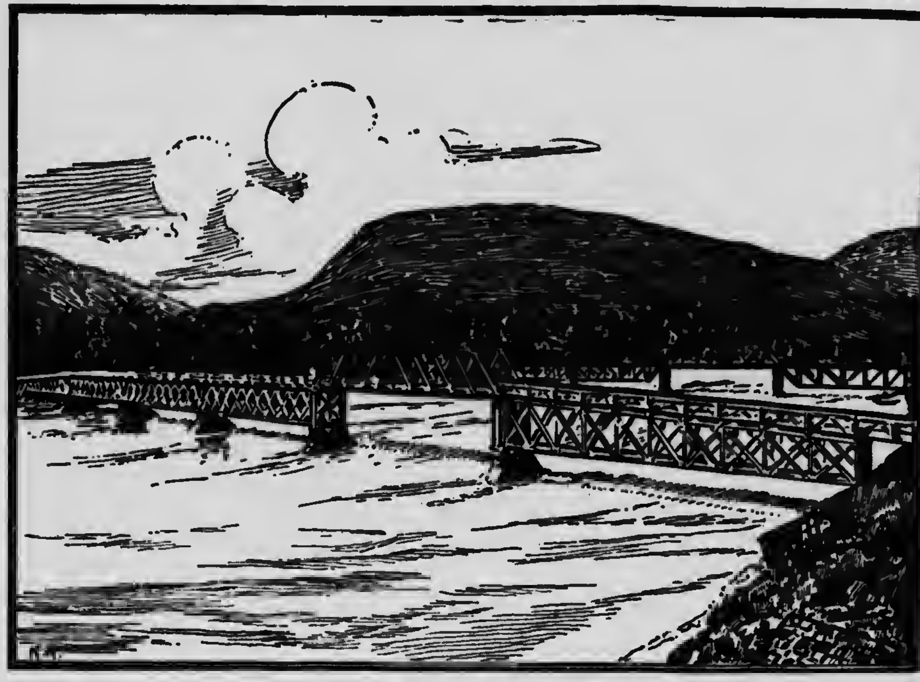
THE PUBLIC BUILDING, REGINA

Richibucto, the county-seat of Kent county, New Brunswick, on Northumberland Strait, has a fine harbor. Coal mining and lobster fishing are the leading industries. Population, 1911, 871.

Rimouski, the county town of Rimouski county, Quebec, on the south bank of the St. Lawrence River, 180 miles below Quebec. It is the seat of a Roman Catholic bishopric and has a seminary, three convents, normal and other schools. Lumber and potatoes are the leading products. Population, 1911, 3,097.

Rivers, a town in Brandon district, Manitoba. Population, 1911, 950.

Riviere du Loup or **Fraserville,** in Temiscouata county, Quebec, on the Intercolonial and the Temiscouata railways. It is situated at the junction of the Riviere du Loup with the Saint Lawrence. Both the railways have repair shops here and there are numerous factories and mills, mostly for lumber and its products. The town is known as a resort for fishermen and hunters. Population, 1911, 6,774.



THE COLUMBIA RIVER AT REVELSTOKE
(See page 331)

Rockland, a town of Ontario, in Russell county, on the Grand Trunk and Canadian Northern railways and on the Ottawa River, twenty-two miles east of Ottawa. A large mica factory, flour and lumber mills are located here. Population, 1911, 3,397.

Roland, a village of Manitoba, fifty-five miles southwest of Winnipeg, situated on the Canadian Northern Railway. There is a large trade in wheat and agricultutal implements. Population, 1911, 433.

Rossland, a town of British Columbia, on the Great Northern and Canadian Pacific railways. It is the center of the West Kootenay mining district, noted for its rich gold and copper mines. Among the chief gold mines located here are the War Eagle, Le Roi and Center Star. Fruit growing is a profitable industry in the vicinity, the climate being especially adapted to apples, pears, plums and small fruits. Population, 1911, 2,826.

Rosthern, a town in the province of Saskatchewan, situated on the Regina-Prince Albert branch of the Canadian Northern Railway, fifty miles south of Prince Albert. Rosthern is the shipping center for a great wheat raising district; its grain elevators are the largest west of Winnipeg. Flour mills and brick yards are the chief industries of importance. A government experimental farm is located here. Population, 1911, 1,172.

Rouleau, Saskatchewan, on the Canadian Pacific Railway, thirty-two miles southeast of Moose Jaw. The town has two lumber yards, oil storage tanks and other industries. Population, 1911, 679.

Russell, a growing town in Manitoba, situated on branches of the Canadian Pacific and Canadian Northern railways, ninety-five miles northwest of Brandon. Russell is in a fine agricultural section. Population, 1911, 562.

Sackville, a town in Westmorland county, New Brunswick, is the terminus of the New Brunswick and Prince Edward Island Railway. It is the seat of Mount Allison University and of a college for women. Stoves, carriages, stone and leather goods, especially boots and shoes, a the most important manufactured products of the town. Population, 1911, 2,039.

is the most important industry. Population, 1911, 987.

Saint Anne de Beaupré, a village of Montmorency county, Quebec, at the junction of the Saint Anne and Saint Lawrence rivers. For over two centuries Saint Anne has been known as a Roman Catholic shrine, and many miraculous cures are said to be performed through the intercession of the saint. In the basilica are great piles of crutches cast aside by pilgrims. The permanent population is about 2,000, but on such feast days as that of Saint Anne (July 26) over 25,000 have often been present. About 200,000 pilgrims visit the village each year.

SAINT ANNE DE BEAUPRÉ

Saint Albert, a town in Alberta, is nine miles northwest of Edmonton, on the Sturgeon River and Canadian Northern Railway. It is the seat of a Roman Catholic bishop and has two large churches and a convent. Population, 1911, 614

Saint Andrews, the county-seat of Charlotte county, New Brunswick, on Passamaquoddy Bay and Saint Croix River. It is the Atlantic terminus of the Canadian Pacific Railway and has a deep harbor which will accommodate the largest vessels. Catching and packing of fish

Saint Boniface, a city of Manitoba, on the Red River, opposite Winnipeg, with which it is connected by four bridges. The Canadian Northern, Canadian Pacific, Grand Trunk Pacific, Great Northern and an electric railway serve the city and afford excellent transportation facilities. The surrounding country is a splendid agricultural section and sends great quantities of wheat to the mills of St. Boniface. Besides flour, lumber and building materials are the important manufactures. It is the seat of the Roman Catholic see of Manitoba. A Jesuit college, an academy for boys, excellent schools and churches make it a pleasant home town. Population, 1901, 2,019; in 1911, 7,483.

Saint Catherine's, Ontario. See Volume IV.

Saint George, New Brunswick, on Passamaquoddy Bay, opposite Saint Andrews. Considerable fishing is carried on in the neighborhood. Population, 1911, 988.

Saint Hyacinthe, a city of Quebec, the county-seat of Saint Hyacinthe county, located on the Yamaska River, which almost encircles the city, and on the Grand Trunk, Canadian Pacific, Intercolonial and Quebec Southern railways. Saint Hyacinthe has excellent schools and is the seat of a seminary, two convents, the Academie Prince for girls and Academie Girouard for boys. It also has a branch of the Sacred Heart College of Arthabaska and the provincial dairy school, probably the first dairy school in Canada. The principal manufactures are boots and shoes, threshing machines, musical instruments, corsets, biscuits and knit goods. Population, 1911, 9,797.

Saint Jerome, Quebec, the county-seat of Terrebonne county, is on the Riviere du Nord, and the Canadian Pacific and Great Northern railways, thirty miles from Montreal. Saint Jerome is an important manufacturing point, especially for pulp and other wood products, pianos and rubber goods. The school system is excellent. Population, 1911, 3,473.

Saint John, New Brunswick. See Volume IV.

Saint John's or **Saint Jean,** Quebec, the county town of Saint John's county, twenty-seven miles from Montreal, on the Richelieu River, Grand Trunk, Canadian Pacific and other railways. The town has a large trade in lumber and grain. Sewing machines, silk thread and goods, drain pipe, straw hats, furniture, umbrellas and canned vegetables are the principal manufactures. Population, 1911, 5,903.

Saint Laurent, Manitoba, in the Macdonald district. Population, 1911, 581.

Saint Mary's, in Perth county, Ontario, twenty miles north of London, on the Grand Trunk and Canadian Pacific railways. There are large stone quarries in the neighborhood. The principal factories make agricultural implements, butter and flour, and fruit is dried. The schools are excellent, and there is a public library. Population, 1911, 3,388.

Saint Stephen, a seaport and port of entry of New Brunswick, situated at the junction of the Denny's and St. Croix rivers. The Canadian Pacific, New Brunswick Southern and Maine Central railways (via Calais, Maine) provide transportation. It has large manufactures of chemicals, edge tools, bricks and soap and is a point for the shipping of lumber. Population, 1911, 2,836.

Saint Thomas, Ontario. See Volume IV.

Salmon Arm, British Columbia, on Shuswap Lake and the main line of the Canadian Pacific Railway, has steamboat connection with Kamloops and other lake points. A government fish hatchery is located here. Fruit growing and dairying are very profitable in the vicinity. Population, 1911, 1,500.

ENTRANCE TO TUNNEL UNDER THE SAINT CLAIR RIVER, SARNIA

Saltcoats, Saskatchewan, on Saltcoats Lake and the Winnipeg-Saskatoon branch of the Canadian Pacific Railway, seventeen miles southeast of Yorkton. Oats and wheat are the principal products of the surrounding sections. Population, 1911, 432.

Sarnia, Ontario. See Volume IV.

Saskatoon, a city of Saskatchewan, is situated on the Saskatchewan River and the Canadian Pacific, the Canadian Northern, the Grand Trunk Pacific and other railways, 466 miles west of Winnipeg. Branches of these three railroads radiate from Saskatoon in all directions, making the city one of the most important railway centers in western Canada. This gives Saskatoon great advantage as a distributing point, and it has an extensive wholesale trade. Many large firms from Canada and the United States have established offices and warehouses here The trade includes groceries, provisions, hardware, lumber and agricultural implements. The city has a number of banks and is an important financial center. There are excellent public schools and numerous churches. The University of Saskatchewan and the agricultural college and experimental farm of the province are located here. Saskatoon is also the seat of the Saskatoon Collegiate Institute. Population, 1901, 113; in 1911, 12,004.

Sault Sainte Marie, Ontario. See Volume IV.

Scott, a town of Saskatchewan, in the Battleford district. Population, 1911, 420.

Selkirk, a town in Selkirk county, Manitoba, is situated on the Red River, twenty-two miles north of Winnipeg, with which an electric line and the Canadian Pacific Railway furnish connection. It is the seat of a customs house, an inland revenue station and an Indian agency; one of the provincial asylums is also located here. Selkirk is the center of the Lake Winnipeg fishing industry, the annual shipments being over 7,000,000 pounds. The chief industries are the packing and preserving of fish, the manufacture of lumber products, and flour milling. Population, 1911, 2,977.

Shawinigan Falls, Quebec, on the Saint Maurice River and the Canadian Northern Quebec and Canadian Pacific railways. The falls of the river furnish 200,000 horsepower. Aluminum, manganese, carbide, paper and wood pulp are the products of the principal industries. There are four public schools and several churches. Population, 1911, 4,265.

Shediac, in Westmorland county, New Brunswick, is on Shediac Bay, Northumberland Strait, eighteen miles northeast of Moncton; it has steamship connection with Prince Edward Island and is on the Intercolonial Railway. There are large lobster fisheries near Shediac and lobster packing is one of the town's leading industries. Several lumber and saw mills and a tannery are also located here. Population, 1911, 1,442.

Shelburne, Nova Scotia, county town of Shelburne county, on Roseway River and Shelburne Harbor and on the Halifax & Southwestern Railway. Shelburne has seven churches, the county academy, two shipyards, lath and stave mill, granite quarry and monument works. Population, 1911, 1,113.

Sherbrooke, Ontario. See Volume V.

Shoal Lake, Manitoba, on the Canadian Pacific Railway, 180 miles west of Winnipeg. Five grain elevators, a creamery, lumber yard and a cement block plant are the leading industries. Population, 1911, 591.

Simcoe, the county-seat of Norfolk county, Ontario, on the Grand Trunk and Wabash railways. The rich farms of the neighborhood send their products to the town's creamery, oatmeal mill, canning and pickling factories. There are also woolen mills, clothing factories, foundries and planing mills. Population, 1911, 3,227.

Sintaluta, Saskatchewan, fifty-three miles from Regina, on the main line of the Canadian Pacific Railway, is a large shipper of grain and a distributing point for farm machinery. Population, 1911, 391.

Slocan, a mining town on Slocan Lake, British Columbia, is on the Canadian Pacific Railway. It is the principal town of a zinc and silver-lead district. Population, 1911, 500.

Smith's Falls, a town in Lanark county, Ontario, on the Rideau Canal and the Canadian Pacific Railway, twenty-eight miles northwest of Brockville. A large agricultural implement factory is located here; also stove factories, woolen, flour and planing mills. The town has five public schools and a collegiate institute. Population, 1911, 6,370.

Sorel, a city of Quebec, the county-seat of Richelieu county, is situated on the right bank of the Richelieu River at its junction with the St. Lawrence, and also on the Quebec Southern Railway, forty-two miles northeast of Montreal. The ship-building establishments and foundries are important. There are also manufactories of agricultural implements, sash and doors, clothing and native wines. Population, 1911, 8,420.

Souris, *soo' ris*, a town of Manitoba, on the Souris River and Canadian Pacific Railway, twenty-five miles from Brandon. The chief industries include flour mills, grain elevators, a furniture factory and a foundry. The town is beautifully situated on the bank of the river and is in the center of a rich wheat belt. It has a good system of public schools, hospital, electric lights, sewers and waterworks. Population, 1911, 1,854.

Souris, in King's county, Prince Edward Island, on Colville Bay, and on the Prince Edward Island Railway. Fishing is the principal industry; large quantities of lobster, codfish, hake and haddock are caught each year. There are also a sawmill, planing mill and motor boat factory here. Population, 1911, 1,089.

South Vancouver, British Columbia, adjoins Vancouver and is on the Canadian Pacific and Great Northern railways. It has fifteen churches, eleven fine schools and two large parks. Saw mills, foundries, and a furniture factory are important; there are also large creosote works. Population, 1911, 16,021.

Spring Hill, a town in Cumberland county, Nova Scotia, on the Cumberland Railway, is noted for its coal mines, whose annual output is over 500,000 tons. Five churches, three schools and three banks are supported by the community. There is also a wood-working factory and an aerated water plant has been established. Population, 1911, 5,713.

Stellarton, Nova Scotia, is located in Pictou county, two miles from New Glasgow. It is the industrial center of a great coal region, has railway repair shops, cigar factories, wood-working factories, and is a distributing center for the International Harvester Company. The thickest known coal seam in the world, thirty-seven feet, is located there. Population, 1911, 3,910.

Stettler, a town of Alberta, is situated on the Lacombe branch of the Canadian Pacific Rail-

UNIVERSITY OF ALBERTA, STRATHCONA

way, and on the Vegreville & Calgary branch of the Canadian Northern Railway, fifty miles east of Lacombe. The town is an important distributing point, contains large grain elevators and a flour mill and lumber yards. There are considerable deposits of coal in the vicinity. Population, 1911, 1,444.

Steveston, a town of British Columbia, on Lulu Island, at the mouth of the Fraser River, has steamship connection with Victoria and electric railway to Vancouver and New Westminster. Fifteen salmon canneries are in operation here. Population, 1911, 1,100.

Stonewall, Manitoba, a town in Selkirk county, twenty-one miles northwest of Winnipeg, on the Canadian Pacific Railway. The surrounding wheat section supplies Stonewall's elevators and flour mills; there are also several lime kilns, stone quarries, cement works, and a fair-sized baking powder factory. Population, 1911, 1,005.

Stony Plain, Alberta, a town about twenty miles west of Edmonton, on the Canadian Northern Railway. Population, 1911, 505.

Strassburg, Saskatchewan, on the Canadian Pacific Railway, fifty-five miles north of Regina, in Lost Mountain Valley. The town has fine churches and good schools. Population, 1911, 811.

Stratford, Ontario. See Volume V

Strathcona, Alberta, now a part of Edmonton, on the south bank of the North Saskatchewan River and on the Canadian Pacific, Canadian Northern and Grand Trunk Pacific railways There are important mining interests in and near the town, and large quantities of coal are mined and exported. Gold is found in paying quantities in the river. The city is a divisional and distributing point of the Canadian Pacific and Canadian Northern railways for all their branches south of the North Saskatchewan River. The principal manufactures are brick, lumber, concrete blocks, sewer and drain pipes, leather goods, caskets, flour and oatmeal. The city is the seat of the University of Alberta and also of a collegiate institute and high school. The municipality owns its electric light power. Population, 1911, 5,579.

Sudbury, a town in Sudbury county, Ontario, on the Canadian Pacific and other railways. There are some manufacturing interests in the town, and it is also a distributing point, but its importance is due to its position in the nickel mining district. Over 60 per cent of the world's output of nickel comes from the Sudbury district. Population, 1911, 4,150.

Summerland, British Columbia, on Okanagan Lake, fifty-five miles south of Okanagan Landing, is the seat of Okanagan College. The district is famous for fruits, especially peaches. There is a large canning factory. The town operates the irrigation system within its borders. Population, 1911, 1,800.

Summerside, Prince Edward Island, a seaport, the county-seat of Prince county. The harbor is large and accommodates sea-going vessels. The Richmond Bay oyster fisheries, three miles away, are famous. A creamery, flour mill and lobster packing plant are noteworthy. Population, 1911, 2,678.

Sussex, a town in King's county, New Brunswick, is on the Intercolonial Railway. It is the seat of the provincial dairy school, and has the provincial militia drill grounds and county exhibition buildings. Refrigerators, tinware, butter and cheese, canned vegetables, dressed pork and farm implements are the leading manufactures. Population, 1911, 1,906.

Sutherland, a village in the Saskatoon district, Saskatchewan. Population, 1911, 421.

Swan River, a village of Manitoba, on the Swan River and Canadian Northern Railway, 100 miles northwest of Dauphin. Flour milling and lumbering are the important industries. Population, 1911, 574.

Swift Current, Saskatchewan, a town on Swift Current Creek and on the main line of the Canadian Pacific Railway. The surrounding region is a fine agricultural country, noted for grain; in 1911, over 1,500,000 bushels were marketed here. Large lumber yards and flour mills are the principal manufactories. As a distributing point for an area of 3,000 square miles, the town is rapidly becoming an important railway center. Population, 1911, 1,852.

Sydney, Nova Scotia. See Volume V.

Sydney Mines, a town in Cape Breton county, Nova Scotia, is three miles from North Sydney, on the north shore of Sydney Harbor. The Intercolonial Railway Tram and the Nova Scotia Steel & Iron Company's railway furnish transportation. The last named corporation employs nearly 4,000 men in the mines, furnaces and foundries located here. The annual output of coal is over 900,000 tons. Practically the entire population (7,470 in 1911) is dependent on the coal mines.

Taber, a town in southern Alberta, on the Belly River and the Crow's Nest Pass division of the Canadian Pacific Railway. Eleven coal mines in the neighborhood and large shipments of wheat make it an important center. Electric light, waterworks and telephone systems are in operation. Population, 1911, 1,400.

Thetford Mines, a city in Megantic county, Quebec, on the Quebec Central River, seventy-six miles from Quebec. The name indicates sufficiently the character of the industries; the city is in the richest asbestos district in the world. There are three sash and door factories, also sawmills and foundries. Population, 1911, 7,261.

Three Rivers, Quebec. See Volume V.

Tofield, Alberta, is a flourishing town on the main line of the Grand Trunk Pacific and also on the Calgary-Edmonton branch. Three coal mines, lumber yards and a grain elevator are located here. It is a station of the Royal Northwest Mounted Police. Population, 1911, 586.

Toronto, Ontario. See Volume V.

Trail, British Columbia, a town on the Columbia River and the Canadian Pacific Railway, seven miles east of Rossland. Trail is the natural outlet and supply point for a rich mining country, producing silver, lead and copper. The Consolidated Mining and Smelting Company has a large smelter here. The town also has a large lumber yard and saw mill. Population, 1911, 1,460.

TORONTO CITY HALL

Trenton, a town in Pictou county, Nova Scotia, is on the Intercolonial Railway, about seven miles southeast of Pictou. Trenton is in the center of a great coal-mining district. Population, 1911, 1,749.

Trenton, a port of entry in Hastings county, Ontario, is situated at the mouth of the Trent River near the west end of the Bay of Quinte. It is on the Grand Trunk and Central Ontario railways. Its industries include a foundry, cannery, grist mill, clothing factory, sugar refinery, bridge works and many other manufactories. The town is near iron mines and limestone quarries. Population, 1911, 3,988.

Truro, the county town of Colchester county, Nova Scotia, on the Intercolonial and Dominion Atlantic railways. It is situated on the Salmon

River about two miles from the head of Cobequid Bay, the easternmost arm of the Bay of Fundy. The manufactures include lasts, pegs, hats and caps, knitted goods, leather, foundry products and condensed milk. The town is noted for its fine public buildings, among which are the county buildings, the provincial, normal and model schools and Truro Academy. Population, 1911, 6,107.

Valleyfield, Quebec, on the Grand Trunk and the Saint Lawrence & Adirondacks railways, is the western terminus of the Beauharnois canal. The town has large cotton and flour mills, twelve foundries and other industrial

THE PUBLIC BUILDING, VANCOUVER

plants. It is the seat of a Roman Catholic bishop. Considerable lumbering and iron ore mining is done in the vicinity. Population, 1911, 9,449.

Vancouver, British Columbia. See Volume V.

Vegreville, a town of Alberta, on the Vermilion River and a division point on the main line of the Canadian Northern Railway, seventy-three miles east of Edmonton; it is also the terminus of the Calgary-Vegreville branch of the Canadian Northern. The town is growing steadily; its flour mills and creamery receive most of the product of the district. There are also brick yards, machine shop, sash and door factory, and four large grain elevators. Population, 1911, 1,029.

Vermilion, Alberta, on the Vermilion River, is a divisional point on the main line of the Canadian Northern Railway, which has a round house and repair shops here. Vermilion is the center of a rapidly growing grain and stock-raising district. Population, 1911, 625.

Vernon, a town in the Yale district, British Columbia, two miles from Long Lake and Swan Lake, and five miles from Okanagan Lake. It is on the Shuswap and Okanagan branch of the Canadian Pacific Railway. It is a noted health resort and is the shipping point for much fine fruit grown in the vicinity. It has flour mills, lumber and planing mills, a sash and door factory and a creamery. A provincial fruit demonstration farm is now located here. Population, 1911, 2,671.

Victoria, British Columbia. See Volume V.

Victoriaville, Quebec, in Arthabasca county, on the Grand Trunk Railway. Electric power is furnished by Shawinigan Falls. The principal manufactures are furniture, soda water, cheese, clothing, springs and mattresses and foundry products. Population, 1911, 3,028.

Virden, a town in Brandon county, Manitoba, on Ebor Creek and on the Canadian Pacific Railway, forty-eight miles west of Brandon. It is noted for its grain elevat— flour mills, engine works, cold storage . . . rk-packing plants. Wheat, oats, flax and barley are raised extensively in the vicinity. Population, 1911, 1,550.

Wainwright, Alberta, a divisional point on the Grand Trunk Pacific Railway, 130 miles southeast of Edmonton, is famous for its park, which contains a herd of 1,000 buffaloes. Population, 1911, 788.

Walkerville, Ontario, on the Grand Trunk, Pere Marquette and other railways, one and one-half mile from Windsor. Four steamship lines run to Fort William, Port Arthur and intermediate points and two lines to Montreal. The industries of the town are increasing in number and variety; there are distilleries, varnish and paint factories, wire fence works, brewery, bridge works, tobacco, clothing and carriage factories. Population, 1911, 3,302.

Wallaceburg, Ontario, situated in Kent county, on the Pere Marquette Railway, about eleven miles northwest of Chatham and twenty-three miles south of Sarnia. Several lines of boats run on Lake Saint Clair from Wallaceburg to Detroit and nearby ports. A large canning factory, glass works, foundry, beet sugar refinery and flour mill are located here. Population, 1911, 3,438.

Wapella, a town of Saskatchewan, is situated on the Canadian Pacific Railway, 110 miles east of Regina. It is in a good farming district. Population, 1911, 485.

Waterloo, Ontario, a town on the Grand Trunk Railway, three miles northwest of Berlin. Waterloo is an important center for manufacturing, furniture of all kinds, boots and shoes, malt products, trunks and bags, bricks and tiles being the most important products. There are good public and separate schools and six churches. Population, 1911, 4,359.

Watrous, a town of Saskatchewan, is a divisional point on the Grand Trunk Pacific Railway, midway between Edmonton and Winnipeg and about seventy-three miles southeast of Saskatoon. The nearness of Manitou Lake is making it a tourist and health resort. Population, 1911, 781.

Welland, a town in Welland county, Ontario, is situated on the Welland Canal and on the Grand Trunk, Michigan Central, Wabash and five other railways. Welland has become a great railroad and manufacturing center. Especially important are dredges, hoisting engines, steel products of various kinds, agricultural implements, automobiles, metal beds and stoves. There is an abundance of water power and natural gas in the vicinity. Welland has the county high school, three public schools and a business college. Population, 1911, 5,318.

Westmount, a city of Hochelaga county, Quebec, is a suburb of Montreal and forms an important part of the residential district of that city. It is pre-eminently a city of homes. It contains twelve churches, five public schools, a public library and a public hall. The electric lighting plant is owned by the city. Population, 1911, 14,579.

Westville, in Pictou county, Nova Scotia, on the Intercolonial Railway, five miles from New Glasgow. Coal mining is the leading industry, but lumbering and mixed farming in the vicinity and woodworking and the manufacture of bricks in the town are also important. Population, 1911, 4,417.

Wetaskiwin, a city in Strathcona district, Alberta, on the Calgary and Edmonton division of the Canadian Pacific Railway, forty miles south of Edmonton. The industries include brick works, cement and clay works, grist mills and factories for the manufacture of mattresses and excelsior. There are also a number of creameries. The town has good public schools, several churches, three hotels, three banks and good stores. It is located in a fine agricultural region and large deposits of coal, clay and marl are found in the neighborhood. Population, 1911, 2,411.

Weyburn, a town in the Qu'Appelle district, Saskatchewan, on the Souris River. The Winnipeg-Regina-Lethbridge line of the Canadian Pacific Railway, which will make Weyburn an important divisional point, when completed will be the shortest route to the Pacific coast. It is also connected with the United States by the Soo line from the south. Weyburn is an important grain market and distributing center for the surrounding country. It contains a custom house, has four banks, and owns its electric light plant, water works and sewage system. There are two public schools, embracing all grades from the kindergarten to the high school. Population, 1911, 2,210.

White Horse, a town in Yukon Territory, on Fifty-Mile River and the White Pass and Yukon Railway. During the summer, steamers run to Dawson in about forty hours. White Horse is the center of a copper mining district. Population, 1911, 727.

Whitewood, Saskatchewan, fifteen miles east of Broadview. It is a distributing point for a prosperous and growing grain district. Population, 1911, 447.

Wilkie, Saskatchewan, a divisional point on the Winnipeg-Edmonton line of the Canadian Pacific Railway. Railway repair shops, grain elevators and a machine shop are located here. There are also barracks of the Royal Northwest Mounted Police. Population, 1911, 537.

Windsor, the county town of Hants county, Nova Scotia, at the junction of the Avon and Saint Croix rivers, forty-six miles from Halifax. It is the seat of King's College, or the Church School for girls and the Boys' College School. About 200,000 pounds of gypsum are shipped from Windsor each year, and the deposits are said to be practically inexhaustible. The town has a large trade in lumber and also has several factories for the manufacture of sash doors and other lumber products. Population, 1911, 3,452.

Windsor, Ontario. See Volume V.

Winkler, a village in Lisgar county, Manitoba, on a branch of the Canadian Pacific. There are six large grain elevators and a fine public school. Population, 1911, 458.

Winnipeg, Manitoba. See Volume V.

Winnipegosis, Manitoba, a town at the southern end of Lake Winnipegosis and on the

WINNIPEG CITY HALL

Canadian Northern railroad system. Population, 1911, 518.

Wolfville, a town in Kings county, Nova Scotia, on the Basin of Minas and on the Dominion Atlantic Railway. It is the seat of Acadia University, Horton Academy and Acadia Seminary. A creamery and corn mill are located here, but the town is better known as a resort for tourists who wish to visit the historic spots of the vicinity. Population, 1911, 1,458.

Wolseley, Saskatchewan, on the Canadian Pacific's main line from Brandon to Regina and a terminus of the Wolseley-Reston branch. The town has six churches, public school, seven grain elevators, a brick yard, electric light and power and a telephone system. The Canadian Pacific Railway has a nursery of 750,000 trees here. Population, 1911, 961.

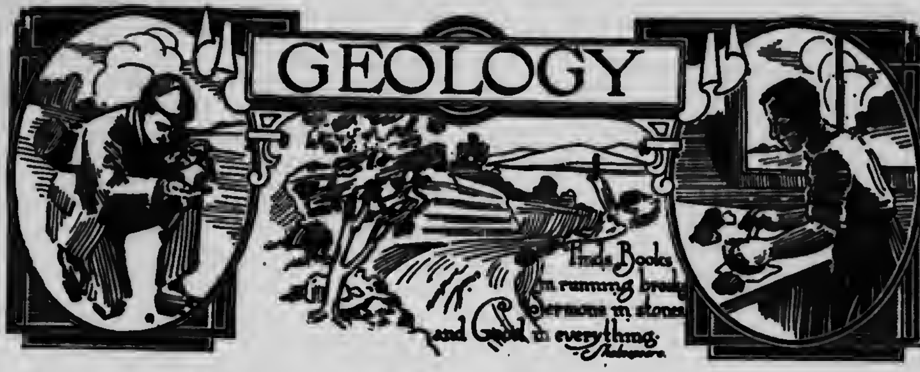
Woodstock, the county-seat of Carleton county, New Brunswick, is situated on a high bluff at the junction of the St. John and Meduxnekeag rivers and on the Canadian Pacific Railroad. It is the center of a thriving agricultural and lumbering district. A creamery, three foundries, tannery, grist mill, saw mills, pork, carriage, barrel and wood-working factories are among the important industries. Population, 1911, 3,856.

Woodstock, Ontario. See Volume V.

Yarmouth, Nova Scotia. See Volume V.

Yellow Grass, a town of Saskatchewan, is situated on the Canadian Pacific Railway about eighteen miles northwest of Weyburn. It is the center of a fine grain belt. Population, 1911, 459.

Yorkton, a town in the province of Saskatchewan, on the Canadian Pacific and Grand Trunk Pacific (Hudson's Bay branch) railways, 130 miles north of Regina. It has excellent churches, schools, stores and banks. It does an extensive business in flour and building materials and is a wholesale distributing point for northern and eastern Saskatchewan. The town owns and operates an electric light plant, waterworks and sewage system. A Dominion lands office and the district headquarters of the Northwest Mounted Police are located here. Population, 1911, 2,309.



Introduction. The subject of geology appeals to many of us as being altogether too technical and too difficult to enter upon by ourselves; and so, in fact, it might be if we were intending to go into it very deeply. For it is a study which needs laboratory work and field work; reading only, no matter how extensive, could never make a man a geologist. But reading can give more than a passing acquaintance with the subject; can create an interest which may lead to further work, and can open our eyes to many, many wonderful facts in the world about us.

The general article on *Geology* in The New Practical Reference Library treats of the origin of the earth, the formation of rocks, classes of rocks, the periods of geologic history, the so-called systems into which these periods are divided, and the present geological forces which are causing changes in the earth. From this article there are references to the various systems and periods mentioned in the article; also to articles on such subjects as *Dike, Dip, Fossil, Fault, Joint.* The Classified Index at the end of this volume gives under the heading Geology a list of topics related to the general subject which are treated in The New Practical Reference Library. There is, moreover, under the sub-heading Rocks, a list of the important rocks on which articles are given.

The following outline will give an idea of the various departments of the science, the geologic theories which are current today, and the divisions which scientists make of geologic time. In the elaboration which follows the outline it has, of course, been impossible to give anything more than a brief sketch of some phases of the subject; but the aim has been to present interesting points, so that the student may feel a desire to pursue the subject further.

Outline

I. History
II. Theories of Origin of Earth
III. Branches of Geology
- (a) Cosmical Geology (studies relations of earth to other members of solar system)
- (b) Geognosy (studies materials of which earth is composed)
- (c) Dynamic Geology (studies forces which modify the earth)
- (d) Structural Geology (studies arrangement of materials in earth's crust)
- (e) Physiographic Geology
- (f) Stratigraphic Geology (studies geological history)
- (g) Paleontologic Geology (investigates records of life in crust of earth)

IV. Geologic Divisions of Time
- (a) Azoic
  - (1) Oldest igneous rocks formed
  - (2) No forms of animal life
- (b) Protozoic
  - (1) Formation of granites, marbles and slates
  - (2) Appearance of lowest forms of life
- (c) Paleozoic
  - (1) Appearance of continents
  - (2) Formation of coal measures
  - (3) Age of fishes, insects, amphibians
- (d) Mesozoic
  - (1) Formation of sandstone, chalk beds, gold
  - (2) Great variety of vegetation
  - (3) Great variety of animals, birds, reptiles
- (e) Cenozoic
  - (1) Continents nearly as now
  - (2) Birds, mammals
  - (3) Snow, floods, ice
  - (4) Age of man

V. Geologic Processes
- (a) Making of rocks
  - (1) Part plants and animals have played in rock-making
  - (2) Work of air and moisture
  - (3) Work of winds
  - (4) Work of water
  - (5) Work of ice
  - (6) Work of heat
    - (a) Through expansion and contraction
    - (b) Through fusion
    - (c) Metamorphism, or changing
- (b) Making of valleys
- (c) Making of hills and mountains

Geology and Mythology. We say, sometimes, without realizing that we are using figures of speech, that a volcano breathes out smoke; that the waves are angry; that a mountain lifts its head among the clouds; that the wind whistles; that the clouds threaten. With us, they are only figures of speech, but in the early days such expressions were more than that. The ancient Greeks and Romans lived in a region whose geological features could not be overlooked. It was no flat prairie country, the same to the north as to the south. There were mountains and mountain streams; there were volcanoes and earthquakes; there were chasms and rivers and deep still lakes and the restless, wind-tossed sea. And for all of those things the active minds of the Greeks and Romans had to find explanations. To those ancient peoples everything was alive, not with merely human life, but with the life of gods. A man might blow a basin of water and make little waves upon it; what, then, more natural than that the wind, so like, on a large scale, the blowing-out of a man's breath, should be the breath of some great god? So they accounted for all the facts in nature which they saw about them. If they rose in the morning and found that the sea had become very stormy during the night and was hurling its great waves up on the shore, they felt that the sea god was angry, and they made offerings to him to buy back his favor. Anything so unusual as an earthquake or a volcanic eruption needed a very special explanation, so they invented histories that reached far back into the past, telling how the gods became angry with some huge giant and buried him under a mountain. His breath was the smoke of the volcano; his struggles to escape caused the earthquakes. A deep chasm or hole in the ground showed where some god had struck his spear, either in anger or because he wanted to get to the regions below the earth without taking a long way round.

Beginnings of a Science. Now, while such reasons satisfied for a time, it was natural that there should arise wise men who should ask some other explanation for the facts and changes they saw about them. How, for example, did sea-shells come to be imbedded in land scores of miles from the sea? What were the strange objects, some so like plants, some like animals, but all made of stone, which were found in the rocks? What, if you found you could not believe that earthquakes and volcanoes were due to the twisting and struggling of a giant under a mountain, did cause those disturbances? Aristotle, away back in the fourth century B. C., wrote a book called *Meteorics*, in which he tried to prove that earthquakes and volcanoes were due to wind inside of the earth. He also declared, with a modernness which rather surprises us, that the land and the water are not just as they have always been; that some of what is now land was once covered with water, and may be again; while land may emerge from what is now the sea. Thus little by little the very beginnings of the science of geology were built up in ancient times.

Geology in the Middle Ages. During the Middle Ages little attention was paid to geology, but after the beginning of modern times, when men began to have a new interest in all the sciences, it came in for its share of study. But just as geology and religion had been mixed up in the ancient days, religion again began to have a connection with the growing science. Geologists declared that it must have taken ages and ages for the rocks to be formed by water; the doctrines of the Church declared that the world had existed for only about six thousand years. And straightway began a struggle between the scientists and the churchmen, the latter insisting that the geologists were attempting to overthrow the Bible. The battle was a long and a fierce one; in fact, it is only in recent years that people have come to see that the geologists' statement that the earth has been in existence for a great, great length of time does not deny in any degree the truth of the Bible.

Age of the Earth. Have you any idea how long the geologists believe the earth has existed? Or of how they go about it to make up their minds on the subject? It all begins with the study of rocks and the fossil animals which they contain. In some places there are found great

Definition

The science which treats of the history of the earth.

Theories

1. Various theories of origin and formation of the earth.
2. The best known theory—the Nebular Hypothesis: The earth formed by the cooling and condensation of a large mass of gaseous matter thrown off from the sun.
3. The interior of the earth at present in a heated state, as seen by volcanoes, hot springs, etc.

GEOLOGY

Formation of Rocks

1. By the action of heat.
   - a. Known as igneous rocks.
   - b. The oldest and largest part of the earth's crust.
   - c. First in a molten state; solidified by cooling.
   - d. Examples: Granite, gneiss, basalt.
2. By the action of water.
   - a. Stratified rocks.
   - b. Found in lowlands, by bodies of water.
   - c. Particles of rock carried into streams formed mud. In the course of time the land raised, the mud hardened into rock.

Geologic Systems

1. The history of the rocks determined largely by fossils they contain, showing the life existing at the time of their formation.
2. Igneous rocks first formed contain no evidences of life.
3. Oldest rocks contain simplest fossils and traces of plant life, before that of animal life.

Azoic

1. System—Archaean.
2. Forming of igneous rocks.
3. No form of animal life.

3. Protozoic

1. System—Algonkian. The formations sedimentary, elastic and crystalline. The system well developed around Lake Superior.
2. Granite, marbles, slates.
3. Lowest forms of life appear as fossils.

4. Paleozoic

1. Systems: Carboniferous. Devonian. Silurian. Ordovician. Cambrian.
2. Appearing of continents.
3. Formation of coal measures.
4. Rich vegetation—age of coal plants.
5. Development of life from lowest forms to vertebrates.
6. Age of fishes, insects, scorpions, amphibians.

5. Mesozoic

1. Systems: Cretaceous. Jurassic. Triassic.
2. Formation of sandstone, chalk beds, gold, etc.
3. Vegetation—great varieties, trees resembling oak, birch, poplar, etc.
4. Animals—great variety, flying birds, reptiles, etc.

6. Cenozoic

1. Systems: Quaternary. Tertiary.
2. Continents nearly as they are now.
3. Birds, mammals (milk-givers), etc.
4. Snow, floods, ice, formation of caves.
5. The age of man.

GEOLOGISTS

Agassiz. Buckland. Buffon. Cuvier. Hayden. Hitchcock. Lamarck. LeConte. J. W. Dawson. Darwin. Dana. Geikie. Miller. Murchison. Owen. Powell. Lyell. Winchell. Thomson. Tyndall.

SUGGESTIVE OUTLINE FOR BLACKBOARD

beds of rock, spread out in layers, which look very much like petrified sand and clay and gravel; and so, in fact, they are. All of these great layers of rock, some of them thousands and thousands of feet thick, were made, geologists believe, just as land is being made now at the bottom of the sea. Sand, limey shells, gravel, sank down, down through the water and formed in layers on the bottom. Then there came, how or when nobody knows, great upheavals; the bottom of the sea was raised above the water, and water flowed in over what had been land.

This happened again and again, so that layer after layer was added. If we had in any one place all of these layers, we should have a complete rock history of the world; as it is, the history has to be pieced out. Now we know that the depositing of sediments as now going on, though constant, is slow; and geologists have figured out that if geologic processes in by-gone ages were like those today, it must be something like one hundred million years since the first stratified rocks were laid down. That is too great a length of time for us to have any real idea of—to us it seems almost like eternity; but the majority of geologists feel that no shorter time will account for all that must have happened to this planet of ours.

Origin of the Earth. As to the origin of the earth there can be, of course, nothing definite known. But from conditions that exist on the earth today, geologists believe that they have proof that the earth was originally in a molten condition. If a ball of molten material could be set to whirling about on its axis as the earth wheels, it would take just the shape of the earth—that of a sphere flattened at the poles. Gradually the earth solidified, an ever-thickening crust forming over the fluid interior. Until very recent years, scientists believed that the central part of the earth was still molten. If you dig down far enough into the earth, you find it very warm, and they figured that if this heat increased in proportion all the way in, the center must be so hot that it would be fluid. Now, however, they are inclined to believe that while the conditions as to heat are about as they have always believed, the pressure of the surface rocks of the earth is so universal that it would raise the melting point of the interior above even the great temperature that exists there; so that it is generally believed now that the center of the earth is solid.

Divisions of Time. Geologists divide the millions of years with which their science has to deal into various periods, each of which has certain definite characteristics. The first of these periods is the Archaean, or *beginning*, time, from the Greek word for "beginning;" the second is the Paleozoic time, the name being taken from two Greek words meaning "ancient" and "life;" the name of the third, Mesozoic, means "middle life," and that of the last, Cenozoic, means "recent life."

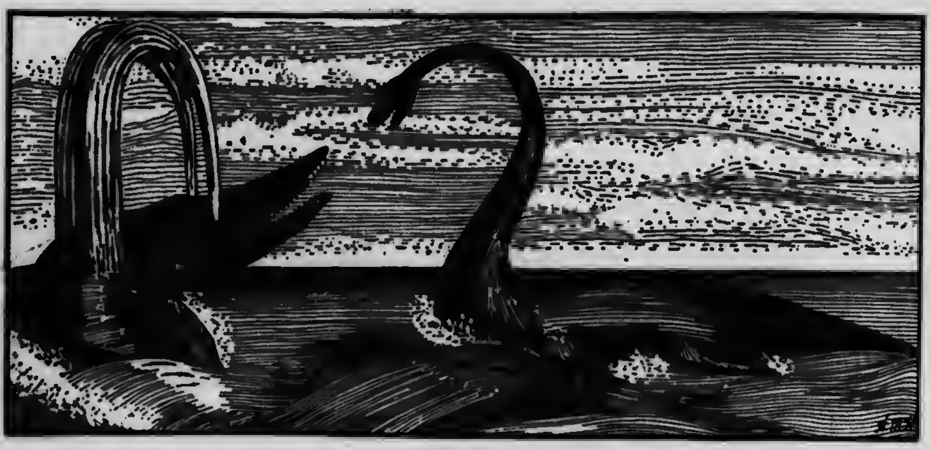
In what seems to us quite a wonderful manner, geologists have been able to distinguish between rocks of one age and those of another. One of the most interesting ways of telling rocks of the Archaean Time is by the occurrence in those rocks of great beds of iron ore. This was the world's iron age, and some of the beds of that ore which exist in Archaean rock are from one hundred to two hundred feet in thickness. Of course even a person who knows nothing much about geology could tell that there must have been a time, back in the beginning of things, when there was no life on the earth; for what could exist on a molten globe? Even after the earth began to cool off, it was long before it was of a temperature to support life. It is probable that the very first living things that existed on the globe were water plants of the lower orders, for plants can bear a higher temperature than even the lowest of the animals. However, no one can be sure that either plants or animals existed even in the sea during the Archaean Time.

During the Paleozoic Time life became, gradually, very abundant. At first there were only sea plants and sea animals, and only the simpler forms of those. No vertebrates of any sort, not even the simplest fishes existed; but there were sponges and starfish and mollusks, much like our clams or oysters, and worms. Then the fishes appeared, huge forms related to the sharks; but still there was no trace of animal life on land. Finally the land, too, began to have life on it; swarms of little insects appeared, as spiders which spun their webs to catch the tiny, dancing things. Before the close of the Paleozoic Time reptiles had appeared—sea reptiles and land reptiles; these, we must remember, were not just like any of the reptiles that exist today. But nowhere during Paleozoic Time was there any trace of birds or mammals.

But perhaps the most interesting feature of Paleozoic Time was not the animals, but the plants—the plants of one particular division of Paleozoic Time, which is called the Carboniferous Age. During this period the greatest coal beds of America and Europe were formed, and it is this fact which has given the period its name; for "Carboniferous" comes from "carbon," the Latin name for coal. The great forests of the earth kept on all through the period, building up layers on layers of black pulpy material which today we call peat, and which finally hardened into coal. (See article *Coal*, in Volume II.)

TYPE OF VEGETATION OF THE CARBONIFEROUS AGE

Mesozoic Time is called the Age of Reptiles, and when we read descriptions of the reptiles which lived in those times, we are glad that the period ended before the days of men. Of course reptiles were not the only forms of life; there were corals and mollusks, as there had been earlier, and modern fishes, such as the salmon and the perch and the herring; there were a few birds with feathers, some of them having teeth set in sockets; and there were a few species of mammals of the lowest orders, relatives of the kangaroo and opossum. But, first and last, there were reptiles, of all sizes and forms. There were reptiles ten or twelve feet in height, which stalked about on two feet; and there were reptiles that walked on all fours, and that had heads over two feet long. There were amphibious reptiles, living partly in water and partly on land, covered with scales like a fish; and there were flying reptiles, like gigantic bats, with a wing stretch of twenty-five feet. Some of the most terrible were the megalosaur, a lizard twenty-five or thirty feet long; the ichthyosaurus, which had a long head, a short neck, a thick body and a long tail, and which grew to be thirty feet long; and the plesiosaurus, which has a very long neck, a small head, and four limbs developed like paddles for swimming. Never since Mesozoic Times have there been reptiles in anything like the number in which they existed then.



Ichthyosaurus Plesiosaurus

TYPES OF ANIMALS OF THE REPTILIAN AGE

The last period of time, the Cenozoic, is divided into two periods, called the Age of Mammals and the Age of Man. In the Age of Mammals all forms of life existed. It is true that all the kinds of mammals and of birds that existed in the earliest part of the period no longer live; but many of the lower orders of animals still exist just as they did then. And gradually, with the progress of the years, appeared animals much like the modern hog and rhinoceros and hippopotamus. But it was not until during the Age of Man that all the forms of animal life as they exist today finally appeared. Nor are we to imagine that the process of change has stopped; species are still becoming extinct, through man, if not in other ways. The dodo, a strange bird somewhat like a chicken, but much larger, was living in the seventeenth century, but exists nowhere now. The aurochs of Europe is nearly extinct, and our own buffalo bids fair to disappear from the earth.

Present Geologic Changes. Nor are changes in animal life the only changes that are taking place in the earth today. All the processes which have gone on through geologic ages are going on now, but so slowly that we seldom notice them; and some of the processes are not on so grand a scale as they have been in times past, because the earth has become solidified, or more nearly so, and its surface is not constantly affected by the movements of a molten interior.

Let us see, for example, how rocks are made. There are various methods, some of which may never have occurred to us. In the first place, plants and animals have had a great deal to do with the making of rocks—with certain kinds of rocks. Many of the animals that live in the sea have internal skeletons or else have shells, and the chief material in these skeletons and shells is lime. When the animals die, the stony parts fall to the bottom of the sea, and these deposits, heaped up year after year and age after age, finally made up great beds of limestone. Some tiny marine plants and animals make stony secretions of other kinds, called siliceous, and of these secretions also rocks have been formed. We spoke earlier of the making of coal-beds, which are of vegetable origin.

Winds, by carrying sand and piling it up in drifts, and running water, by carrying sand and gravel and depositing them along its course, built up layers of these substances all through past ages, just as they are building them up today. And these layers, pressed down by accumulations on top of them, and sunk, perhaps, ages long beneath the water, became rock. All of these rocks which were laid down in layers are called stratified rocks—that is, rocks in layers. But there is another style of rock which is not arranged in layers, which is called igneous rock. This was made by the cooling of melted rock material forced up to the surface of the earth through fissures. Occasionally even now, when volcanoes pour out lava, we have a chance to see the making of igneous rocks.

The story of the making of mountains and valleys belongs rather to physical geography than to geology. The two subjects are, in fact, very closely related, and the person who is interested in geology will find much to help him in the study of physiography.

Questions

What is geology? What is now the accepted theory as to the origin of the earth?

Were the rocks of your neighborhood formed through the action of heat or water? Why your answer? What causes an earthquake? A volcanic eruption?

What makes a hillside uneven and rough? What causes canyons?

Where does the soil come from? What is it? How formed?

Since the earth is being constantly worn down, what prevents it from being entirely immersed in the sea?

What is the difference between geology and mineralogy?

What is the difference between marble and granite?

What are some of the causes of the changes in the earth's crust at present? Cite some instances of change.

What are the uses of marble? Granite?

How is quartz used in the manufacture of porcelain?

What is amalgam?

What are some of the theories regarding the nature of the earth's interior?

What is stratified rock?

By what means do we know the form of plant or animal life existing before man?

Which existed first, animals or plant? How do we know?

What is a quarry?

What is the difference between coal and diamonds?

What is the action of frost on rocks? What is the actior of rain? Why?

What is the origin of the hills and mountains?

Where are the stratified rocks generally found?

What effect does ice have on rocks?

Why do we sometimes find single rocks weighing many tons located on level farm lands?

How do waves change the seashore? What properties has water that it is able to decompose rocks?

What are glaciers? Where found? How formed? With what rapidity do they move? What effect would they have on surface?

What was the glacial period? What effects did it have on the earth?

Of what element is the diamond the purest form?

The Term Broadly Considered. History, in the broadest sense of the word, refers to everything that has happened, not merely the history of people or of nations, but of the changes and phenomena of nature as well. It includes everything that changes. As modern science has shown that everything changes, therefore the whole universe and every part of it have a history. There is a history of geography, of physics, of mathematics, just as there is a history of the nations of the world. And not only is there a history of geography, but geography is a part of the history of countries. Ancient Greece was divided into many small states; some of them, like Athens, were cities smaller than many of our cities today. Why was Greece divided into so many states? Because mountains, rivers and the sea formed natural divisions which the people could not easily overcome. It is then clear that we must know something of the geological and geographical divisions of Greece before we can understand the political divisions.

So, too, if we consider the history of North America, we shall see that the formation of the land held great significance. Why did the English settlements spread north and south along the Atlantic Coast? Why did the French settle in the interior and spread their settlements from north to south? The great Mississippi Valley lay open to the French because they controlled Canada, whereas the English were barred by the Appalachian Mountains. A moment's thought will show us how different the history of Canada might have been if these mountains had not hemmed in the English on the coast. It may seem strange to us that so many more elements are included in history than we had imagined. Many think of it as a list of kings and battles and a few important dates, but it is much more. History is a record of living forces and living people; history is being made every day just as history was made a hundred or a thousand years ago. Life was very much the same then as it is now. Probably there were other forces at work then; perhaps some of them were the same as those now in operation. To study these forces and their results, to show the development of nations as social, political and economic units, is the purpose of history in the common sense of the word.

The word "history" comes from a Greek word which was used centuries before Christ to denote the search for knowledge in the widest sense. History meant investigation and inquiry, not narration and description; it began as a branch of scientific research. It was not until many years later that the "historian" meant the man who told the story and not the seeker after knowledge. In the course of time a "history" became the story which the historian told.

Present-Day Application. The article on *History* in regular alphabetical order in Volume III explains the three present-day uses of the word. In the first place it means the individuals, events, forces and institutions which together show the progress and growth of a nation, in other words, the facts of history; in the second place it means the branch of science which studies these facts; and finally, it means the branch of literature in which they are presented. The first meaning, the facts and materials of history, has already been explained; let us simply bear in mind that the "history of a people includes every item which has interest or importance in connection with that people's life and growth."

There remains the explanation of the two other meanings, which refer rather to the arrangement and presentation of the facts than to the facts themselves. Viewed as research, it is a science; viewed as a branch of literature, it is an art. In a general way, we find two schools of historians, one school giving prominence to the subject-matter, the other to the form. History as a science flourishes in a scientific age; history as an art rises and falls with the arts. As an art it calls upon the imagination and the powers of expression. Those periods which have been influenced by masters of style have been less interested in the methods of investigation than in the beauty of their rhetoric. Macaulay often seems to sacrifice strict accuracy of detail in order to make a rhetorical point. The historian as an artist looks upon his subject as a great picture whose details must be subdued in order to make a harmonious whole, even though the outlines are dimmed and the colors blurred. The scientific historian, on the other hand, generally feels that the facts must be presented as they are. History, the art, is dependent on the individual artist, but history as a science has developed along scientific lines.

The historian of today has at his disposal a great amount of machinery and material accumulated by the past, splendid collections of documents and manuscripts, now opened to research, give him opportunities which were for many years denied to his predecessors. The scientific historian defends no theory or thesis, he seeks to lay bare the truth. To illustrate the relation of history to its sister arts and sciences, let us take two typical examples. The first years of the nineteenth century were, with a few exceptions, characterized by romanticism, with its exaggeration of the individual; Macaulay's History of England and Carlyle's works are typical of the age. Carlyle's "great man theory of history," his "hero-worship" is logically connected with the age of Scott, Byron and Keats; it was a philosophy of history which might furnish poets with inspiration. Later in the nineteenth century came a scientific age, the age of Darwin and Spencer, of Buckle and Guizot, of practical statesmen rather than poets. It is almost invariably true that histories deal with subjects which interested the age in which they were written. Modern historians began with politics and wars, but as the interest of the people was drawn toward the economic and social factors, these two were considered by historians. Histories of commerce, of industries, of cities are now as common as histories of wars and robber-barons. We know that no one of these is more than one of the many factors which make up the complex forces of civilization.

Material for Study. Abundant material is provided in these volumes for the student who wishes to know the history of his own or any other country. The history of each nation is given in a subhead of the article upon that nation. These subdivisions contain numerous references to the histories of other nations, as well as to other articles upon important wars, battles, political events of sufficient importance to be known by distinctive names, such as Congress of Vienna, Barebones Parliament, and others; treaties; famous documents; temporary systems of government, such as the commonwealth and the directory; great institutions, such as the feudal system and chivalry, and important special periods, such as the Dark Ages, the Middle Ages, etc. Frequent reference is also made to the biographies of famous individuals, and in a few cases general discussions of the periods in which they lived are given under their names; this is true of Napoleon and Cromwell. The history of the United States from the discovery of America is contained in an article which forms part of the article *United States*. This is subdivided by periods and contains frequent references to a great many other articles, such as those upon battles and wars, famous laws, treaties, congresses, documents and organizations. Canadian history is summarized in the article *Canada*, in Volume I. On pages 398 to 405 of this volume is a more detailed account of Canada since Confederation. This is followed by a complete outline of our history from the discovery of America and by a series of questions which are suggested as examples. The department of *Biography* (pages 135 to 191) contains sketches of many Canadians; these should be invaluable in the systematic study of history, as constant reference must be made to them. References and cross-references have been inserted wherever possible in order that related subjects may be studied in their proper connection.

If the pupil and teacher both realize that history is more than a set of dates and names to be memorized, that they are studying the deeds and thoughts of people who lived as we live, that they are considering forces many of which are at work today, then the study of history will be fascinating. It will open our eyes not only to the past but to the present and future, for it is by seeing how other people have lived that we ourselves learn to live. The article on *History—Methods of Teaching*, in alphabetical order in Volume III will be found of great value in enabling the pupil to understand the true purposes of instruction in history; its general suggestions and specific methods of teaching in the primary, intermediate and grammar grades, and the lists of books suited to the work of these grades will be of special assistance to the teacher or parent.

Outline of History—Methods of Teaching

I. Purposes
- (1) To present facts in such a manner that the principles of growth and government of nations will be established
- (2) To stimulate patriotism and all its attendant virtues
- (3) To develop the minds of pupils to imagine and grasp a situation.
- (4) To train the judgment and reasoning powers
- (5) To direct the reading of pupils along supplementary lines and create a permanent choice for historical reading
- (6) To strengthen and develop character

II. Preparation of the Teacher
- (1) A thorough knowledge of subject
- (2) A knowledge of methods of teaching
- (3) Ability to direct pupils in study
- (4) Ability to present subjects in an interesting manner

III. Primary Grades—First, Second and Third
- (1) History stories
- (2) Biographies of great men
- (3) Stories of exploration
- (4) Patriotic songs and gems of literature

IV. Intermediate Grades—Fourth, Fifth and Sixth
- (1) History stories
- (2) Biographies
- (3) Stories of travel
- (4) Memorizing patriotic songs and gems

V. Grammar Grades—Seventh and Eighth
- (1) Text-books
- (2) Cause and effects
- (3) Maps
- (4) Outlines
- (5) Dates
- (6) Government
- (7) Wars
- (8) Supplementary work

Ancient History

Covers Great Periods. The period of ancient history is by far the largest of the three great divisions of recorded history. In addition to more or less authentic records there is a body of legend and tradition, some of it perhaps based on facts; most of it, unfortunately, is so mixed with myths and religious superstitions that its value as history is doubtful. Vergil's record of the wanderings of Aeneas and Homer's account of the Trojan war may be accepted as histories only because we have little other evidence in regard to these events; they may or may not present an accurate picture but they are founded on actual events and persons. These legends are of value because they tell us something of the people and events.

There are other great fields of historical study, which enable us to reconstruct ancient civilizations, though they tell us little or nothing of single incidents. These fields of study are anthropology, which is the history of man as a unit in the animal kingdom; ethnology, the history of man as racial units, and ethnography, the history of the distribution of the races and nations, thus formed, over the earth. The study of these topics properly accompanies a thorough knowledge of ancient history, because it gives a background and perspective which can be acquired in no other way. For the same reason the study of mythology, of painting and sculpture, of architecture, even of domestic life, has its proper place alongside the study of great men and important events. In our study of recorded history we should combine these subjects so that history fulfills its true purpose of giving us a complete picture and an accurate understanding of past and present civilizations. Alexander's system of imperial government is as much a part of history as the Battle of Issus; the domestic life of the Romans is fully as important as the character of Caesar or Nero or Constantine the Great in explaining the course of Roman history.

Charts and Outlines. To help the student in grasping the main facts of ancient history a series of charts has been added to the outlines. Especially the younger students should find these of great value, for they present in a form that may be understood by all the important events of history and the characteristics of the nations

Outline of Ancient History; to 476 A. D.

I. Races of Man
- (1) Divisions
  - (a) Caucasian or white
  - (b) Mongolian or yellow
  - (c) Malay or brown
  - (d) Negro or black
  - (e) American or red
- (2) Development of civilization
  - (a) Stone Age
  - (b) Bronze Age
  - (c) Iron Age

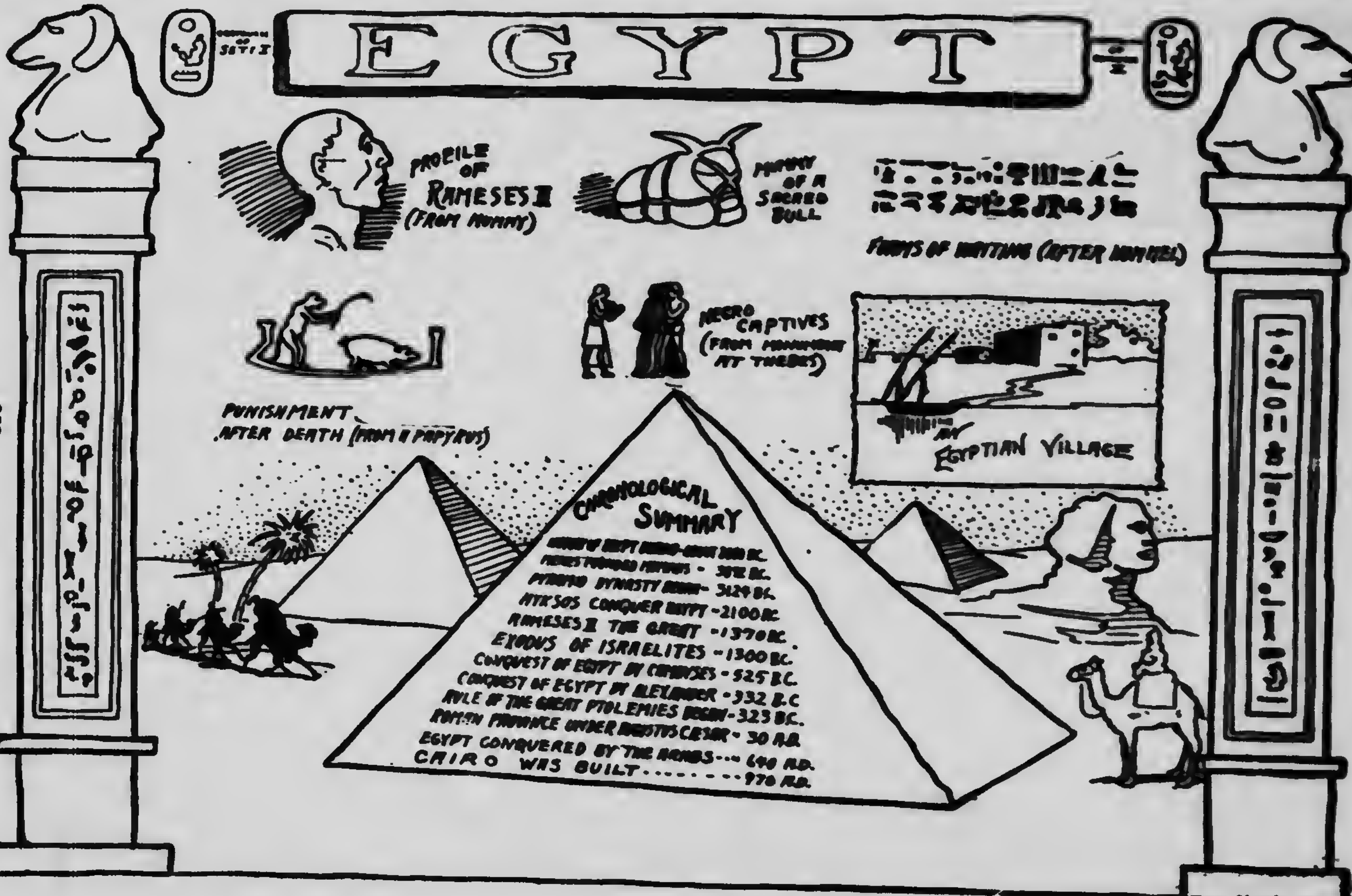
II. Civilizations of the East
- (1) Egypt
  - (a) Old Empire, first seventeen dynasties
    - (1) Menes, legendary founder
    - (2) Pyramid builders
      - (a) Cheops
      - (b) Shafra
      - (c) Menkara
  - (b) Hyksos or Shepherd kings
    - (a) Dark Ages of Egyptian history
    - (b) Exile of the Children of Israel
  - (c) New Empire
    - (a) Amosis establishes Theban dynasty
    - (b) Thothmes III
    - (c) Amunoph III
    - (d) Rameses I
    - (e) Rameses II
    - (f) Later rulers
- (2) China
  - (a) Legendary history
  - (b) Reign of Yao (about 2350 B. C.)
  - (c) Shun
  - (d) Yu
  - (e) Shang dynasty
  - (f) Chow dynasty
    - (1) Confucius
    - (2) People change from nomadic to agriculture state
  - (g) Tsin or Chin dynasty
    - (1) Great Wall of China built
    - (2) Buddhism introduced
  - (h) Tang dynasty
- (3) Chaldea, Assyria and Babylonia
  - (a) Chaldean supremacy, 2300-1400 B.C.
    - (1) Nimrod, founder of the Empire
    - (2) Kudur-Nakhunta
    - (3) Kudur-Lagamer, also known as Chedorlaomer
  - (b) Assyrian supremacy, 1400-625 B. C.
    - (1) Tiglath-Pileser I
    - (2) Vul-lush III and his queen, Semiramis
    - (3) Sargon
    - (4) Sennacherib
    - (5) Saracus
  - (c) Babylonian supremacy.
    - (1) Becomes independent under Nabonassar
    - (2) Nabopolassar
    - (3) Nebuchadnezzar, 604-561
      - (a) Captures and subdues Jerusalem
      - (b) Siege of Tyre
      - (c) Babylonia's Golden Age
    - (4) Fall of Babylonia
- (4) The Hebrew Nation
  - (a) Under the patriarchs
  - (b) In Egypt
    - (1) Joseph
    - (2) Moses
    - (3) Aaron
  - (c) The Exodus
  - (d) The Judges
  - (e) The Kingdom
    - (1) Saul
    - (2) David
    - (3) Solomon
  - (f) Kingdom of Israel
  - (g) Kingdom of Judah
- (5) The Phoenicians
  - (a) Sidon
  - (b) Tyre
- (6) Persia
  - (a) Cyrus the Great
  - (b) Darius I
  - (c) Xerxes I
  - (d) Artaxerxes I
  - (e) Decline of the Persian Empire

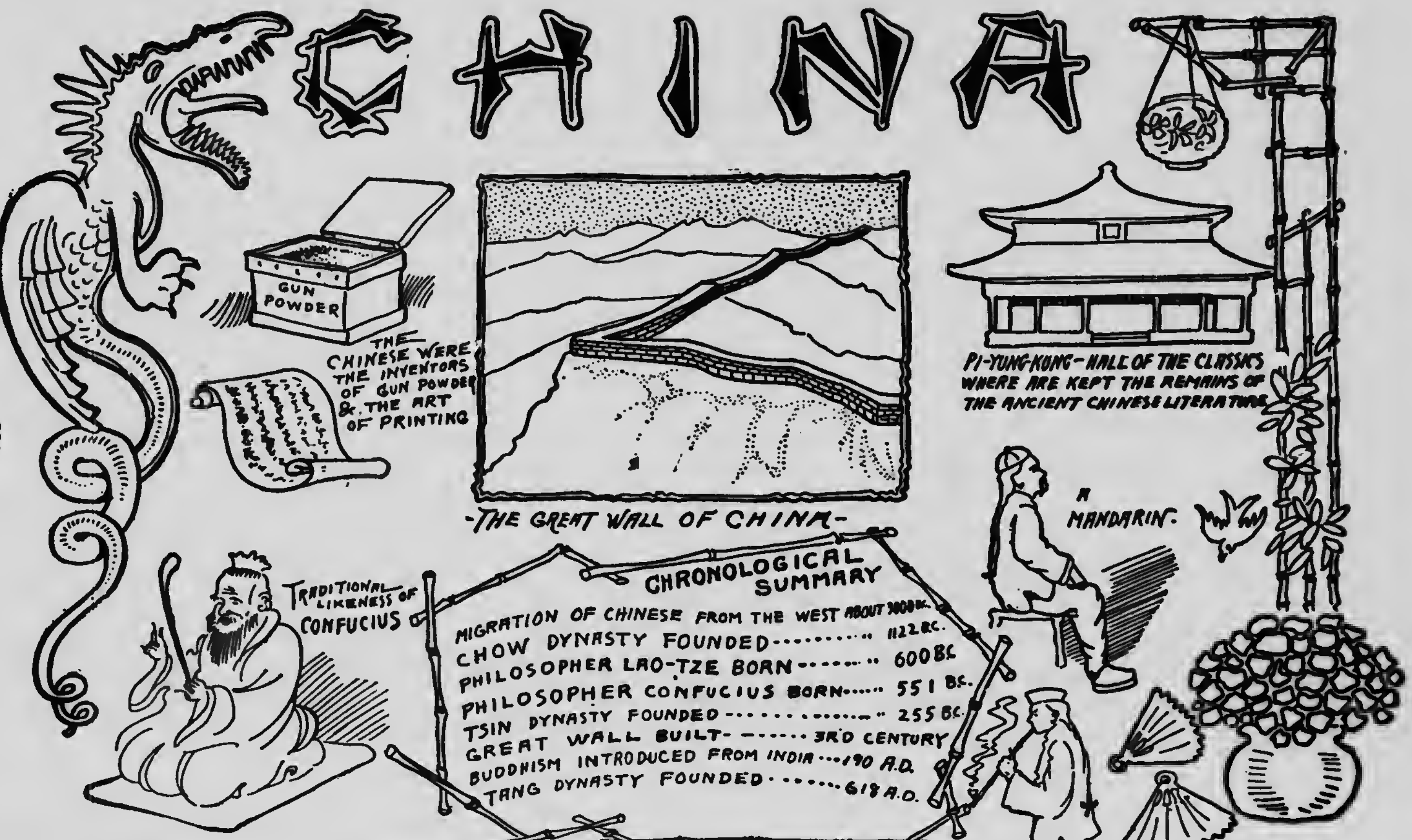
III. Civilizations of the West
- (1) Greece
  - (a) Legendary Age
    - (1) Argonauts
    - (2) Trojan War
  - (b) Early history of Sparta
    - (1) Lycurgus
    - (2) Messenian Wars
  - (c) Early history of Athens
    - (1) Cecrops founds Athens
    - (2) Rule of the Archons
    - (3) Solon
    - (4) Pisistratus
  - (d) Graeco-Persian Wars
    - (1) First expedition of Xerxes
    - (2) Battle of Marathon
    - (3) Thermopylae

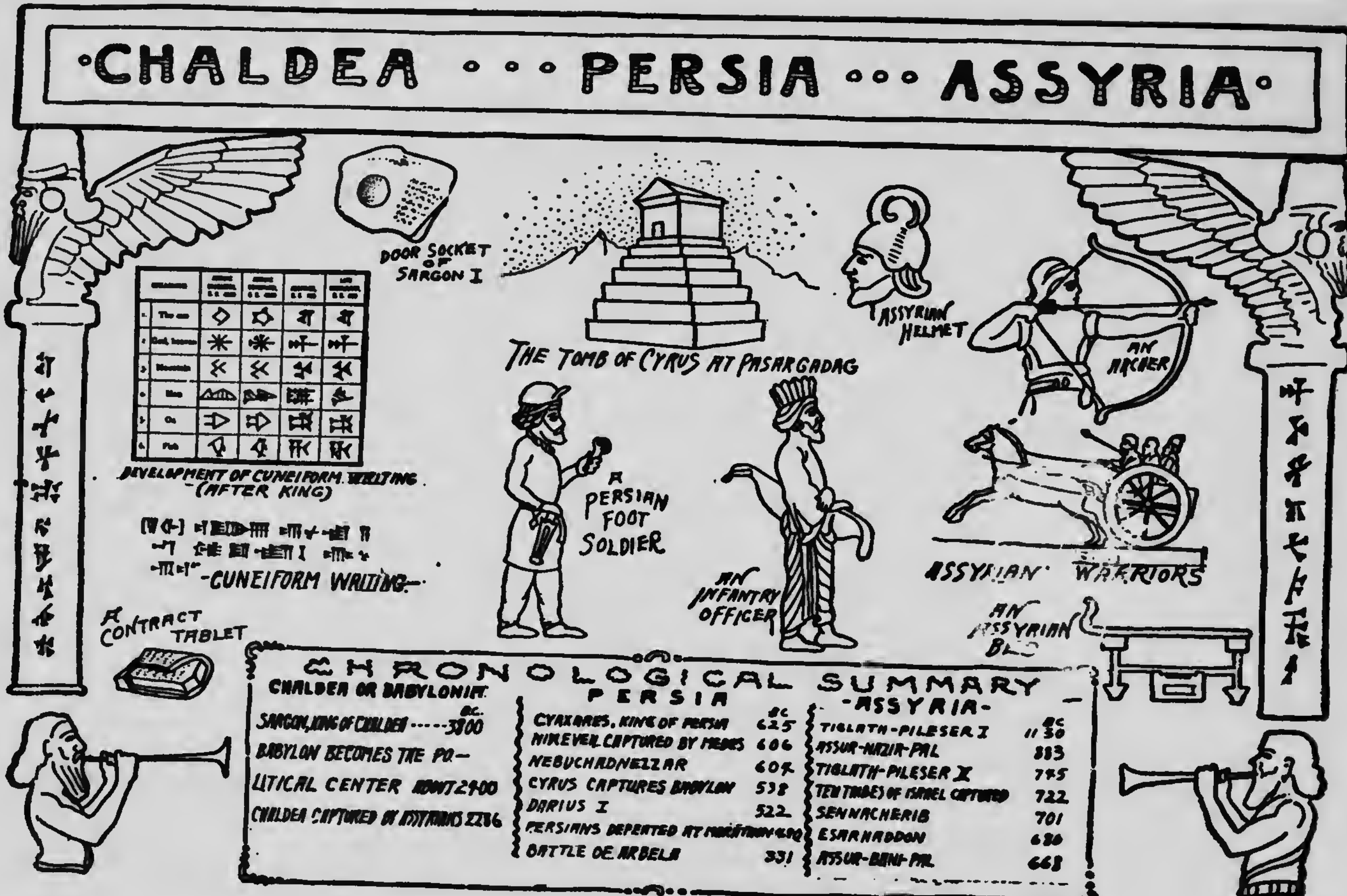
(4) Salamis
(5) Plataea and Mycale
(e) Athenian supremacy
(1) Themistocles
(2) Aristides the Just
(3) Confederacy of Delos
(4) Ages of Pericles
(a) Athens in her glory
(f) Spartan and Theban supremacy
(1) Peloponnesian Wars
(2) Sparta the leading state in Greece
(a) Xenophon and the Ten Thousand
(b) Oppression of the oligarchies
(3) Thebes
(a) Victory of Epaminondas at Leuctra
(b) Death of Epaminondas and decline of Thebes
(g) Macedonian supremacy
(1) Philip of Macedon
(a) Battle of Chaeronea
(b) Conquest of Greece
(2) Alexander
(a) Battle of Issus
(b) Siege of Tyre
(c) Conquest of Egypt
(d) Arbela
(e) In India
(f) Character of Alexander
(h) Division of the Empire
(1) Syria
(2) Thrace
(3) Macedonia
(4) Egypt under the Ptolemies
(2) Rome
(a) Legendary
(1) Romulus
(2) Numa
(3) Servius Tullius
(4) Tarquin the Proud
(b) The Republic
(1) Samnite Wars and conquest of Italy
(2) Struggle between Rome and Carthage
(a) First Punic War
(b) Second Punic War
(1) Hamilcar
(2) Hannibal
(a) Crosses the Alps
(b) Cannae
(c) Battle of Zama
(c) Third Punic War
(1) Roman treachery
(2) Fall of Carthage
(3) Civil Wars and class strife
(a) The Gracchi
(b) The Social Wars
(c) Marius and Sulla
(d) The First Triumvirate
(1) Caesar
(2) Pompey
(3) Crassus
(e) Civil War between Caesar and Pompey
(1) Caesar in Gaul
(2) Caesar's triumph
(a) Crossing the Rubicon
(b) Battle of Pharsalia
(3) Death of Caesar
(f) Second Triumvirate
(c) The Empire
(1) Its glory
(a) Augustus
(b) Tiberius
(c) Nero
(d) Trajan
(e) Hadrian
(f) Marcus Aurelius
(2) Decline and fall
(a) Commodus
(b) Diocletian
(c) Constantine the Great
(d) Julian the Apostate
(e) Theodosius the Great
(1) Alaric and the Goths
(2) Attila and the Huns
(3) Odoacer and the fall of Rome

The Ancient History Charts

Egypt.
China.
Chaldea—Persia—Assyria.
The Hebrews.
Greece—Heroic Period.
Greece—Period of Glory.
Greece—Period of Decline.
Greece—Civilization.
Rome—Legendary Period.
Rome—The Republic.
Rome—The Empire.
Roman Civilization.
Rome—Social Customs.
The Eternal City.
Mythology.
Mohammedanism.


EGYPT
SETI I
PROFILE OF RAMESES II (FROM MUMMY)
MUMMY OF A SACRED BULL
FORMS OF WRITING
PUNISHMENT AFTER DEATH
NEGRO CAPTIVES
EGYPTIAN VILLAGE
CHRONOLOGICAL SUMMARY
HYKSOS CONQUER EGYPT - 2100 B.C.
RAMESES II THE GREAT - 1370 B.C.
EXODUS OF ISRAELITES - 1300 B.C.
CONQUEST OF EGYPT BY CAMBYSES - 525 B.C.
CONQUEST OF EGYPT BY ALEXANDER - 332 B.C
RULE OF THE GREAT PTOLEMIES BEGIN - 323 B.C.
EGYPT CONQUERED BY THE ARABS - 640 A.D.
CAIRO WAS BUILT - 970 A.D.


CHINA
GUN POWDER
THE CHINESE WERE THE INVENTORS OF GUN POWDER & THE ART OF PRINTING
-THE GREAT WALL OF CHINA-
PI-YUNG-KUNG - HALL OF THE CLASSICS WHERE ARE KEPT THE REMAINS OF THE ANCIENT CHINESE LITERATURE
A MANDARIN.
TRADITIONAL LIKENESS OF CONFUCIUS
CHRONOLOGICAL SUMMARY
MIGRATION OF CHINESE FROM THE WEST ABOUT 3000 B.C.
CHOW DYNASTY FOUNDED .... 1122 B.C.
PHILOSOPHER LAO-TZE BORN .... 600 B.C.
PHILOSOPHER CONFUCIUS BORN ...... 551 B.C.
TSIN DYNASTY FOUNDED .... 255 B.C.
GREAT WALL BUILT .... 3RD CENTURY
BUDDHISM INTRODUCED FROM INDIA ... 190 A.D.
TANG DYNASTY FOUNDED .... 618 A.D.


·CHALDEA ··· PERSIA ··· ASSYRIA·
DOOR SOCKET OF SARGON I
THE TOMB OF CYRUS AT PASARGADAG
ASSYRIAN HELMET
AN ARCHER
DEVELOPMENT OF CUNEIFORM WRITING (AFTER KING)
-CUNEIFORM WRITING-
A PERSIAN FOOT SOLDIER
AN INFANTRY OFFICER
ASSYRIAN WARRIORS
A CONTRACT TABLET
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CYRUS CAPTURES BABYLON 538
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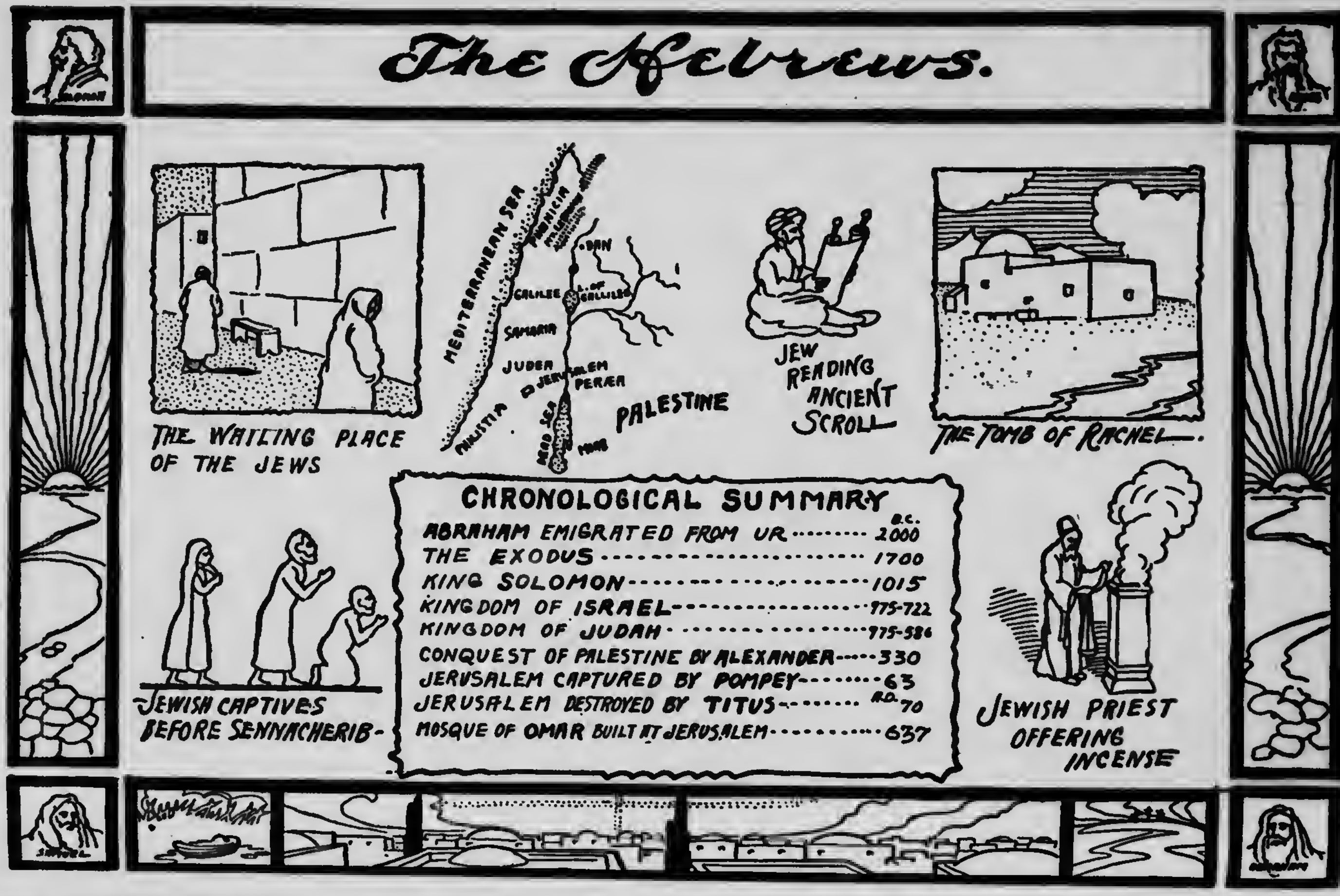
The Hebrews.
THE WAILING PLACE OF THE JEWS
MEDITERRANEAN SEA
PHENICIA
DAN
GALILEE
SEA OF GALILEE
SAMARIA
JUDEA
JERUSALEM
PERÆA
PHILISTIA
DEAD SEA
MOAB
PALESTINE
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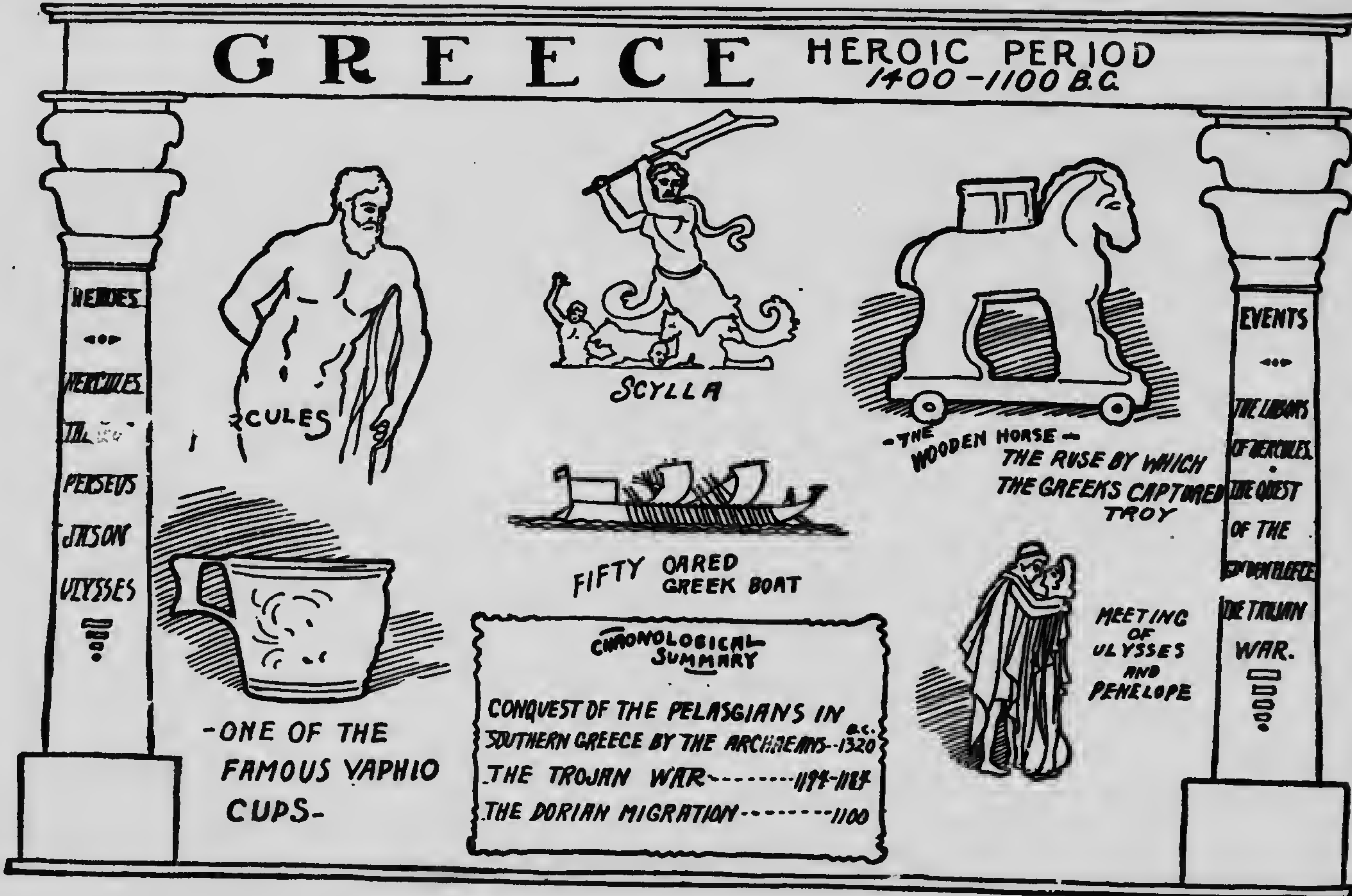
GREECE HEROIC PERIOD
1400-1100 B.C.
HEROES
HERCULES
PERSEUS
JASON
ULYSSES
CULES
-ONE OF THE FAMOUS VAPHIO CUPS-
SCYLLA
FIFTY OARED GREEK BOAT
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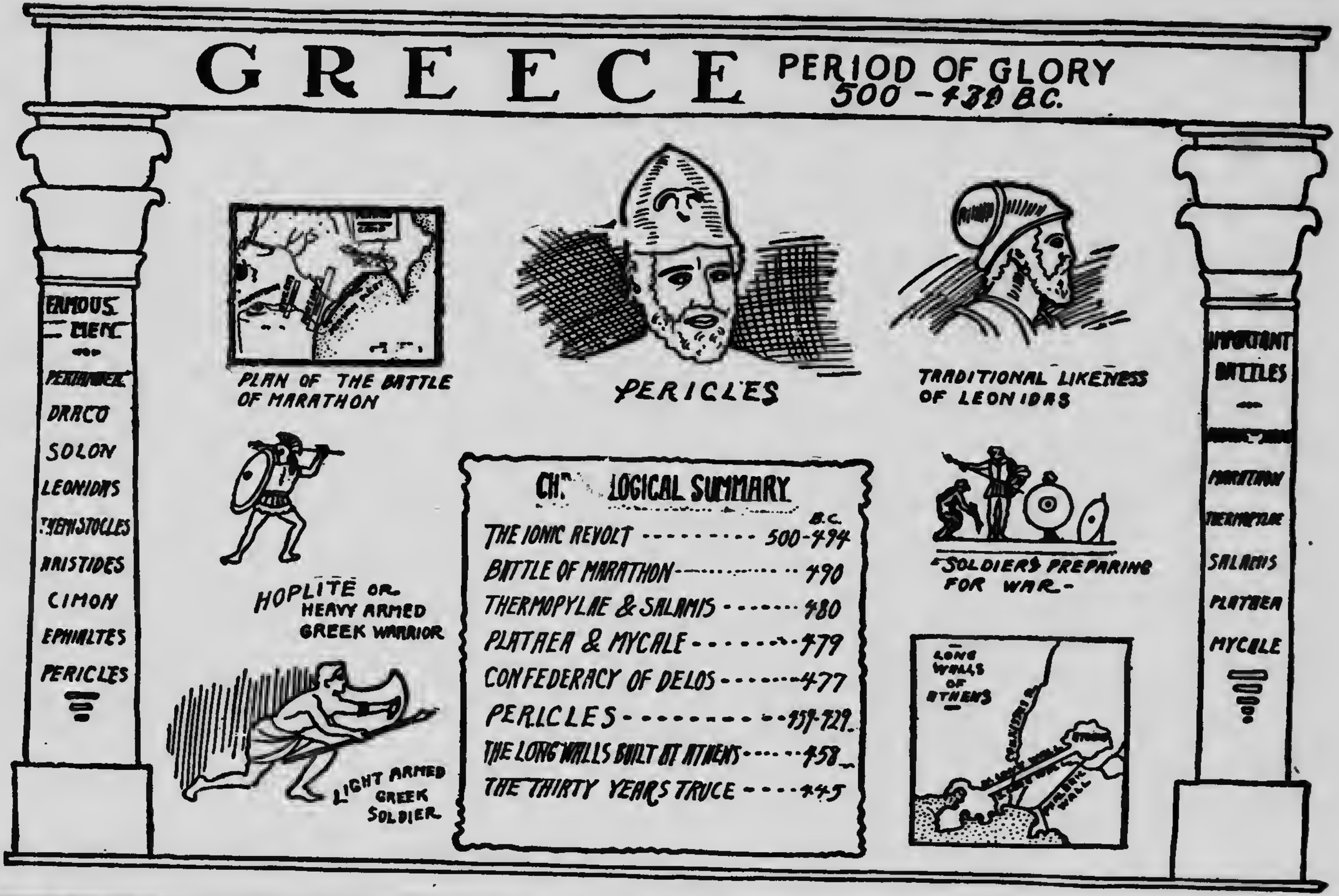
MEETING OF ULYSSES AND PENELOPE
EVENTS
THE LABORS OF HERCULES
THE QUEST OF THE GOLDEN FLEECE
THE TROJAN WAR.



GREECE
PERIOD OF GLORY
FAMOUS MEN
DRACO
SOLON
LEONIDAS
THEMISTOCLES
ARISTIDES
CIMON
EPHIALTES
PERICLES
PLAN OF THE BATTLE OF MARATHON
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TRADITIONAL LIKENESS OF LEONIDAS
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431-146 B.C.
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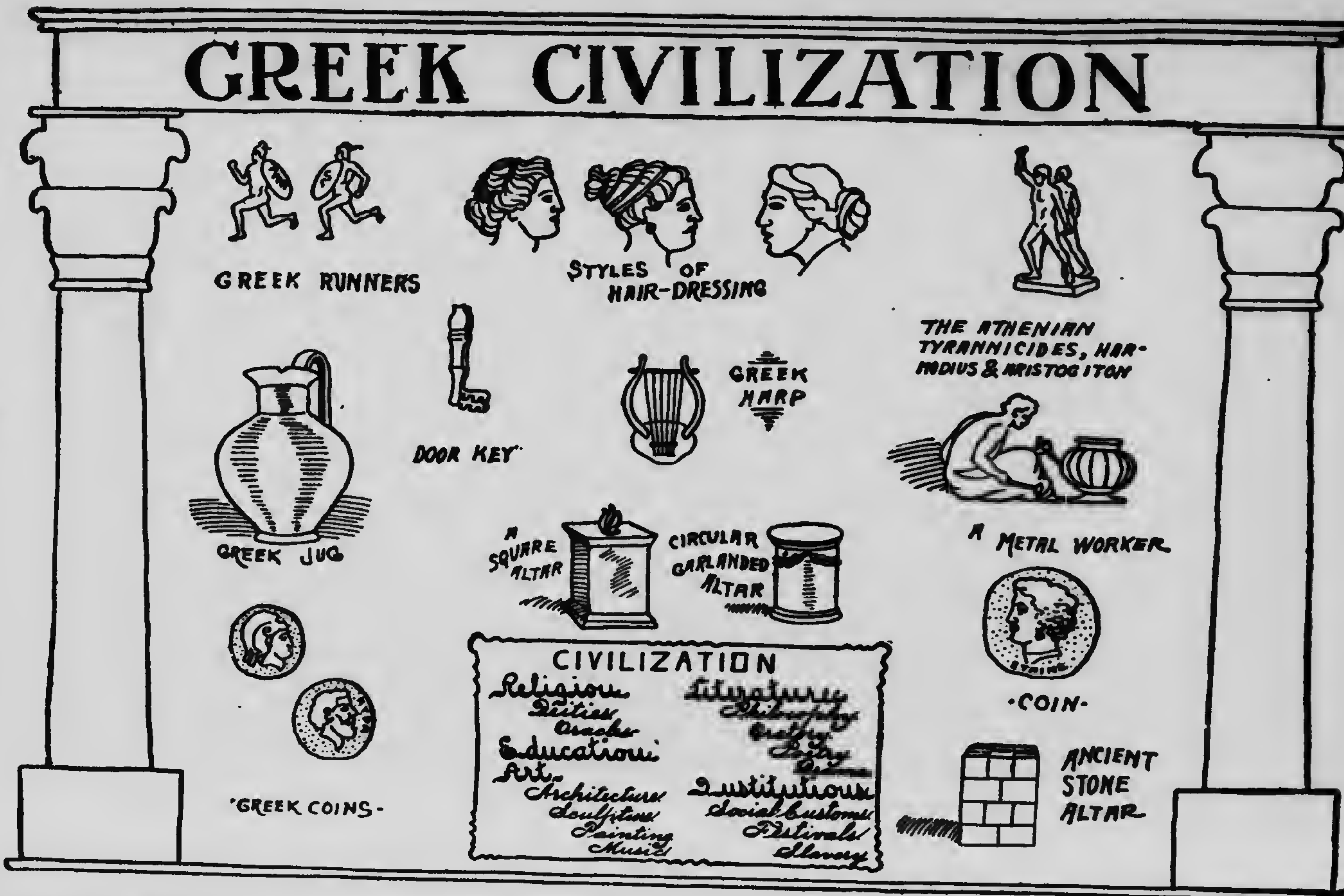
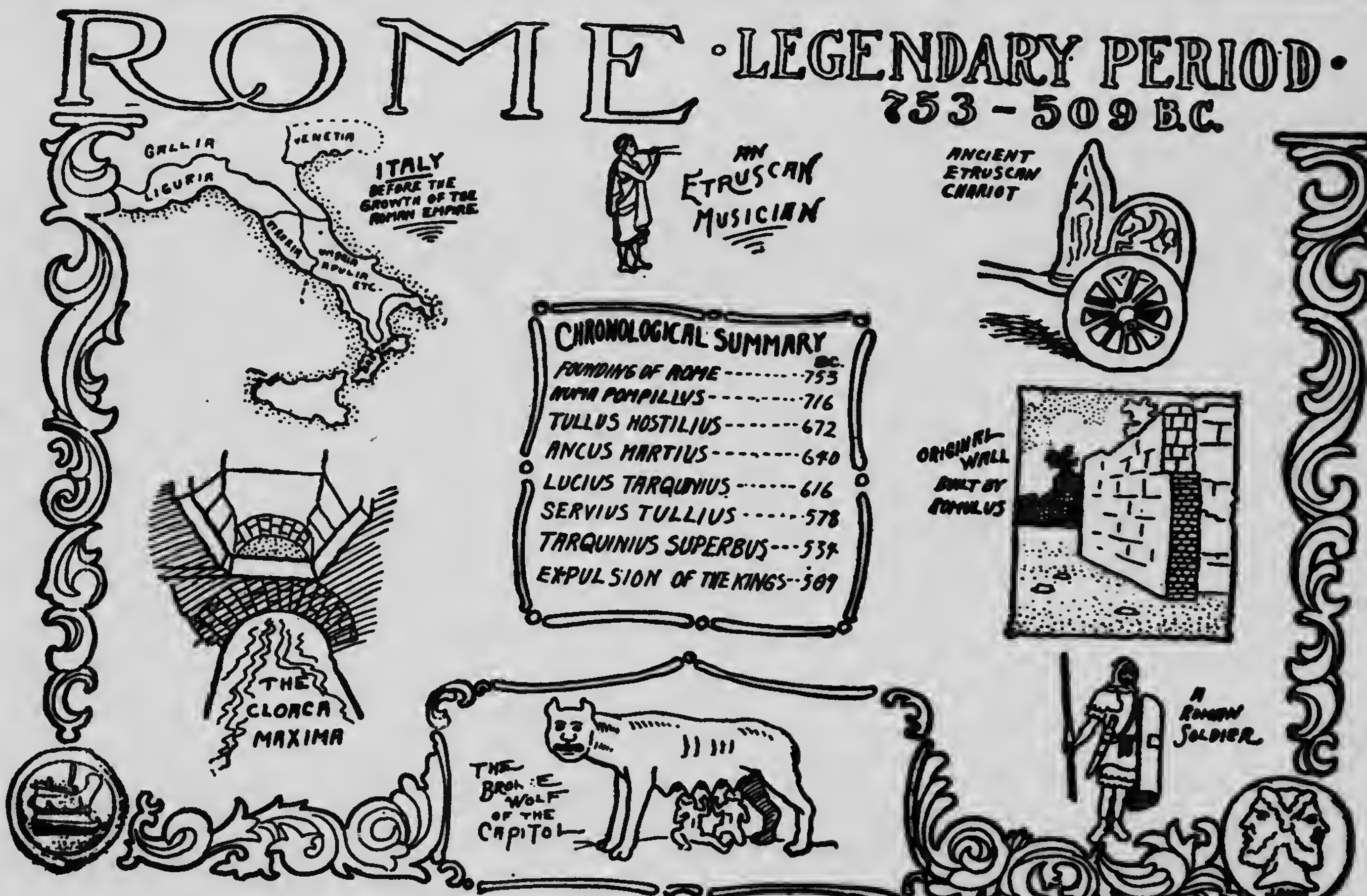
LEUCTRA
CHAERONEA
GRANICUS
ARBELA


GREEK CIVILIZATION
GREEK RUNNERS
STYLES OF HAIR-DRESSING
THE ATHENIAN TYRANNICIDES, HARMODIUS & ARISTOGITON
GREEK JUG
DOOR KEY
GREEK HARP
A METAL WORKER
A SQUARE ALTAR
CIRCULAR GARLANDED ALTAR
·COIN·
GREEK COINS
ANCIENT STONE ALTAR
CIVILIZATION
Religion
Deities
Oracles
Education
Art
Architecture
Sculpture
Painting
Music
Literature
Philosophy
Oratory
Poetry
Institutions
Social Customs
Festivals
Slavery


ROME ·LEGENDARY PERIOD·
753 - 509 B.C.
GALLIA
LIGURIA
VENETIA
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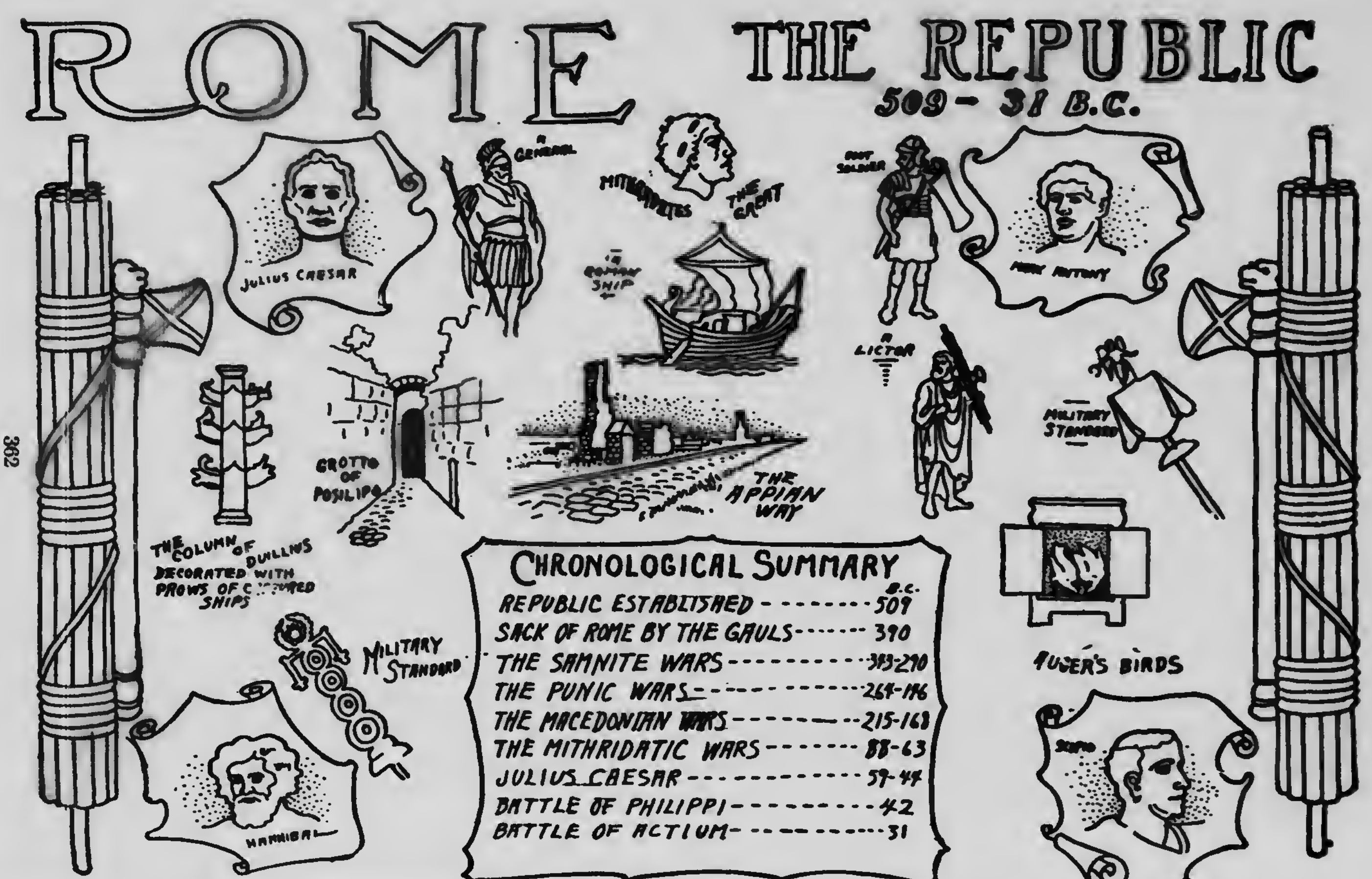
ROME THE REPUBLIC
509 - 31 B.C.
JULIUS CAESAR
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MITHRIDATES THE GREAT
A ROMAN SHIP
MARK ANTONY
A LICTOR
MILITARY STANDARD
GROTTO OF POSILIPO
THE APPIAN WAY
THE COLUMN OF DUILLUS DECORATED WITH PROWS OF CAPTURED SHIPS
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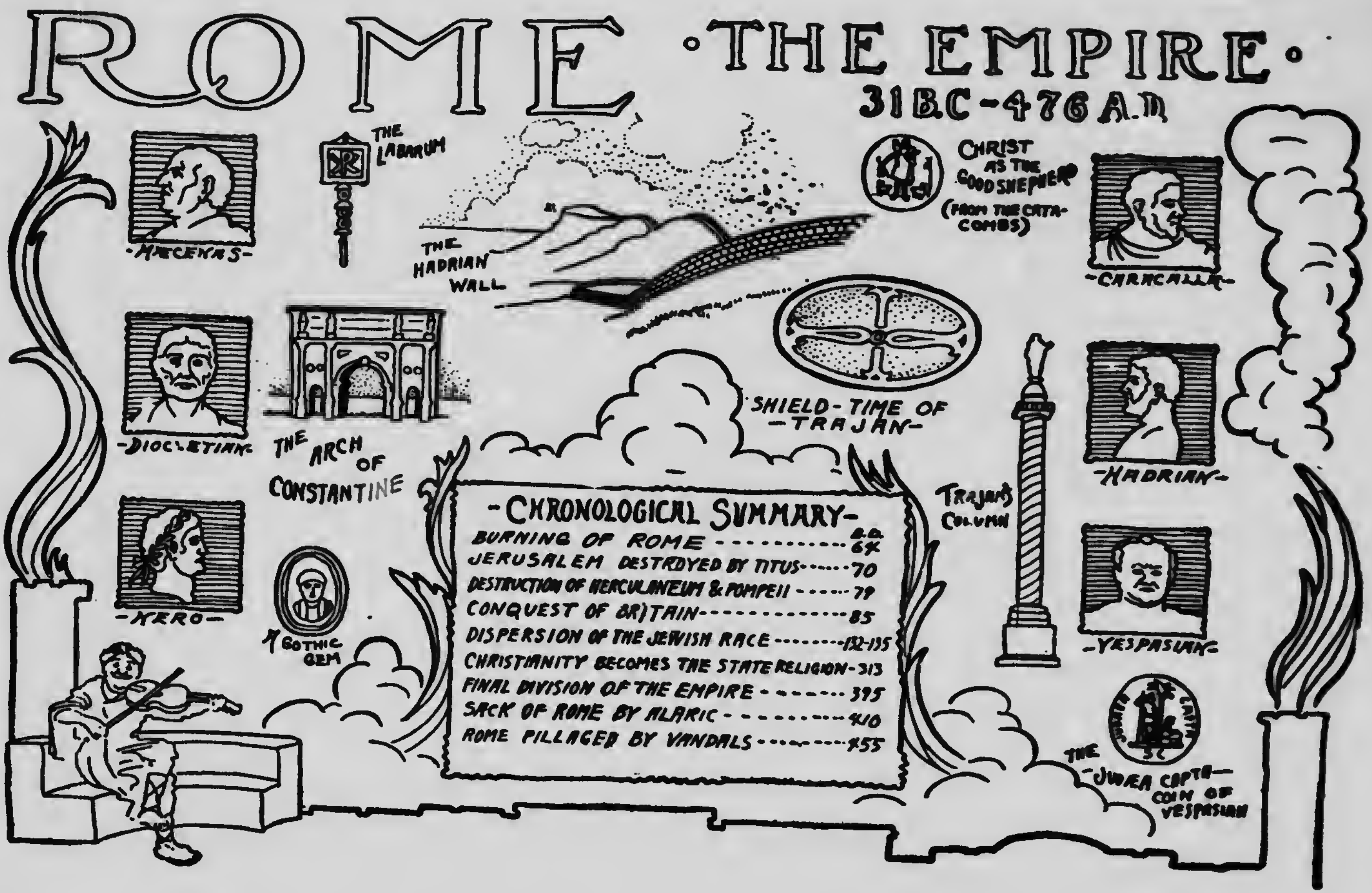
ROME ·THE EMPIRE·
31 B.C.-476 A.D.
-MÆCENAS-
THE LABARUM
THE HADRIAN WALL
CHRIST AS THE GOOD SHEPHERD (FROM THE CATACOMBS)
-CARACALLA-
-DIOCLETIAN-
THE ARCH OF CONSTANTINE
SHIELD-TIME OF -TRAJAN-
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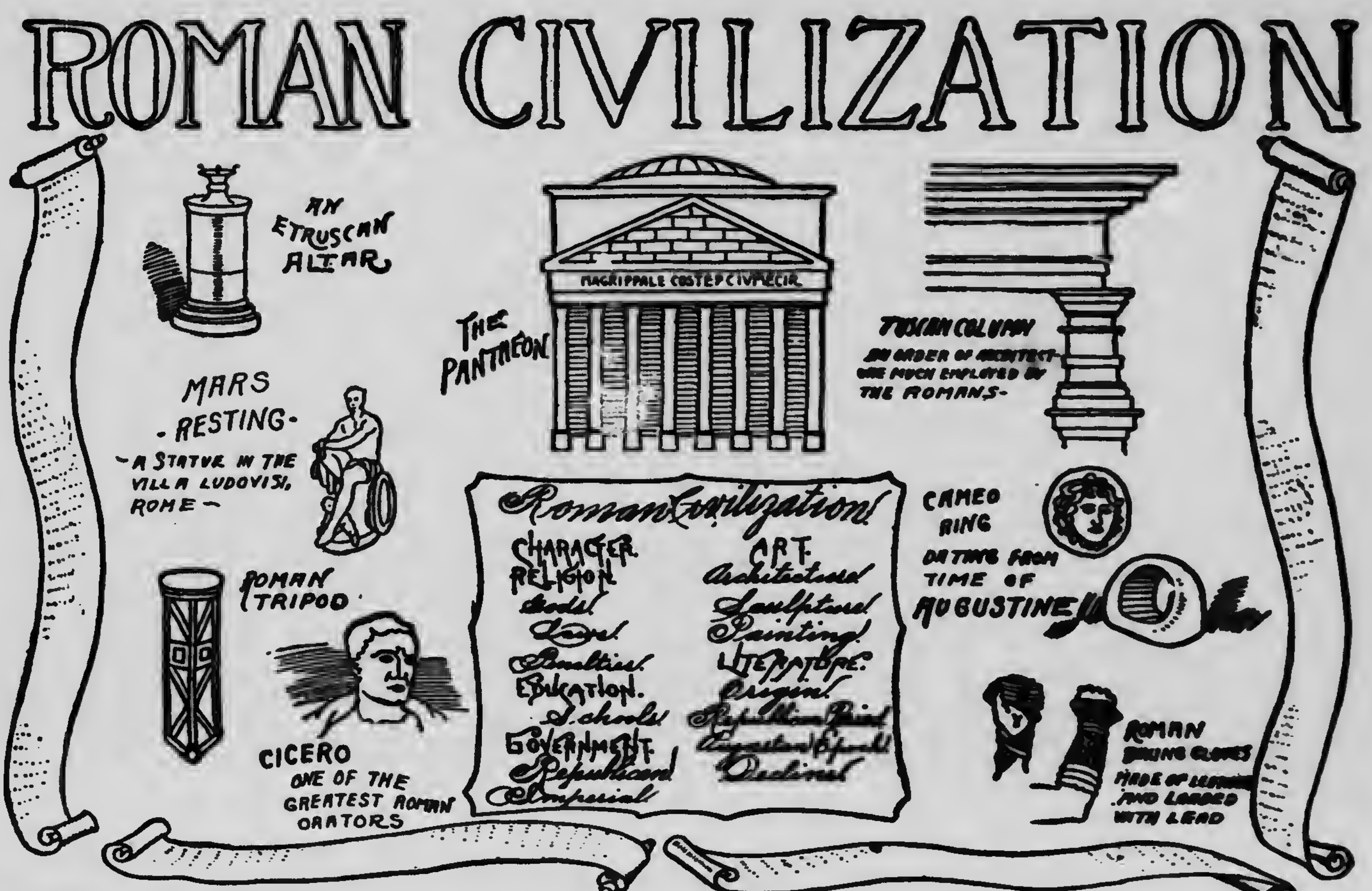
ROMAN CIVILIZATION
AN ETRUSCAN ALTAR
MARS
- RESTING -
- A STATUE IN THE VILLA LUDOVISI, ROME -
ROMAN TRIPOD
CICERO
ONE OF THE GREATEST ROMAN ORATORS
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RELIGION
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Laws
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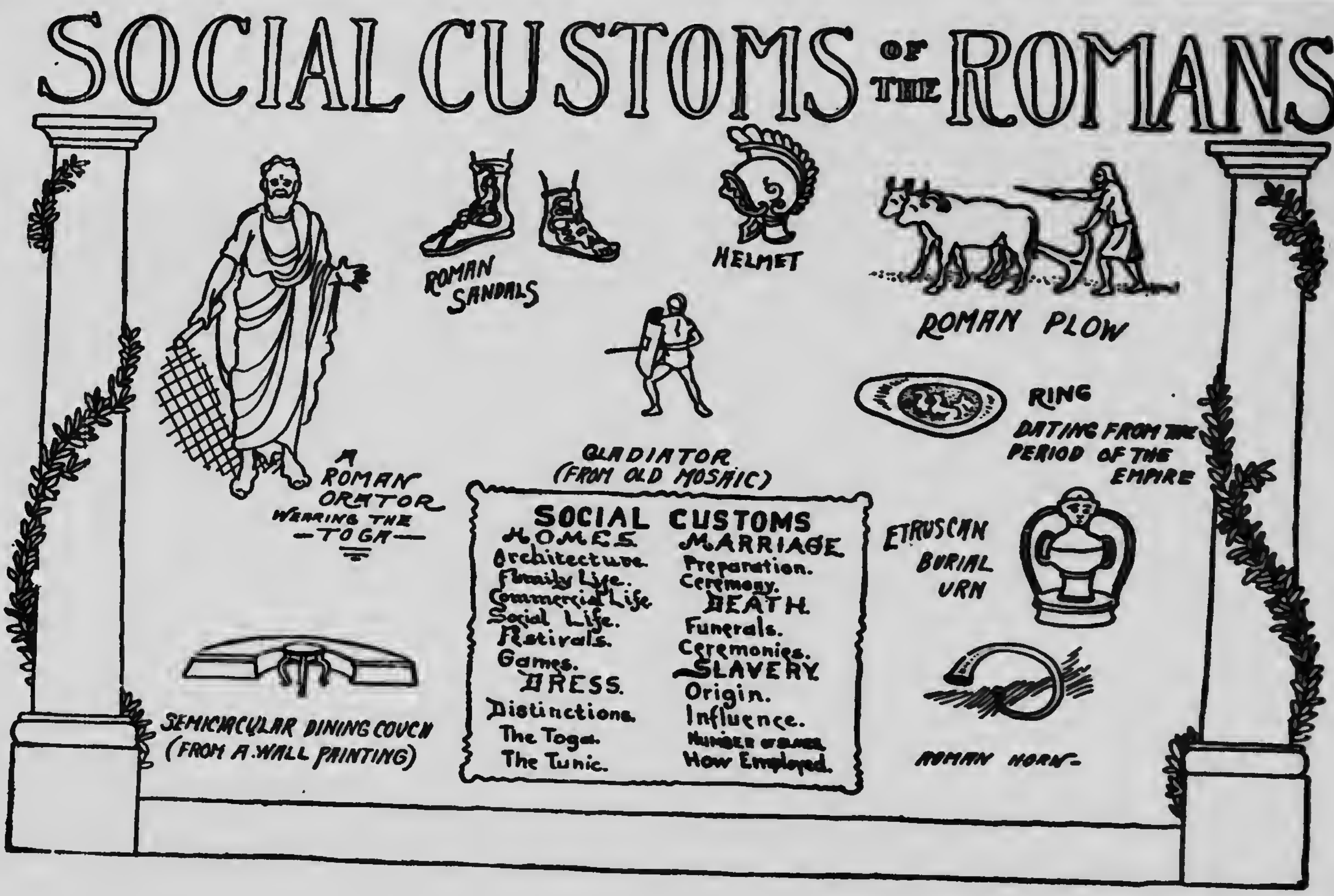
Schools
GOVERNMENT
Republican
Imperial
ART
Architecture
Sculpture
Painting
LITERATURE
Origin
Decline
CAMEO RING
DATING FROM TIME OF AUGUSTINE
ROMAN
AND LOADED WITH LEAD


SOCIAL CUSTOMS OF THE ROMANS
A ROMAN ORATOR WEARING THE —TOGA—
ROMAN SANDALS
HELMET
ROMAN PLOW
GLADIATOR (FROM OLD MOSAIC)
RING DATING FROM THE PERIOD OF THE EMPIRE
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Family Life.
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Social Life.
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DRESS.
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The Toga.
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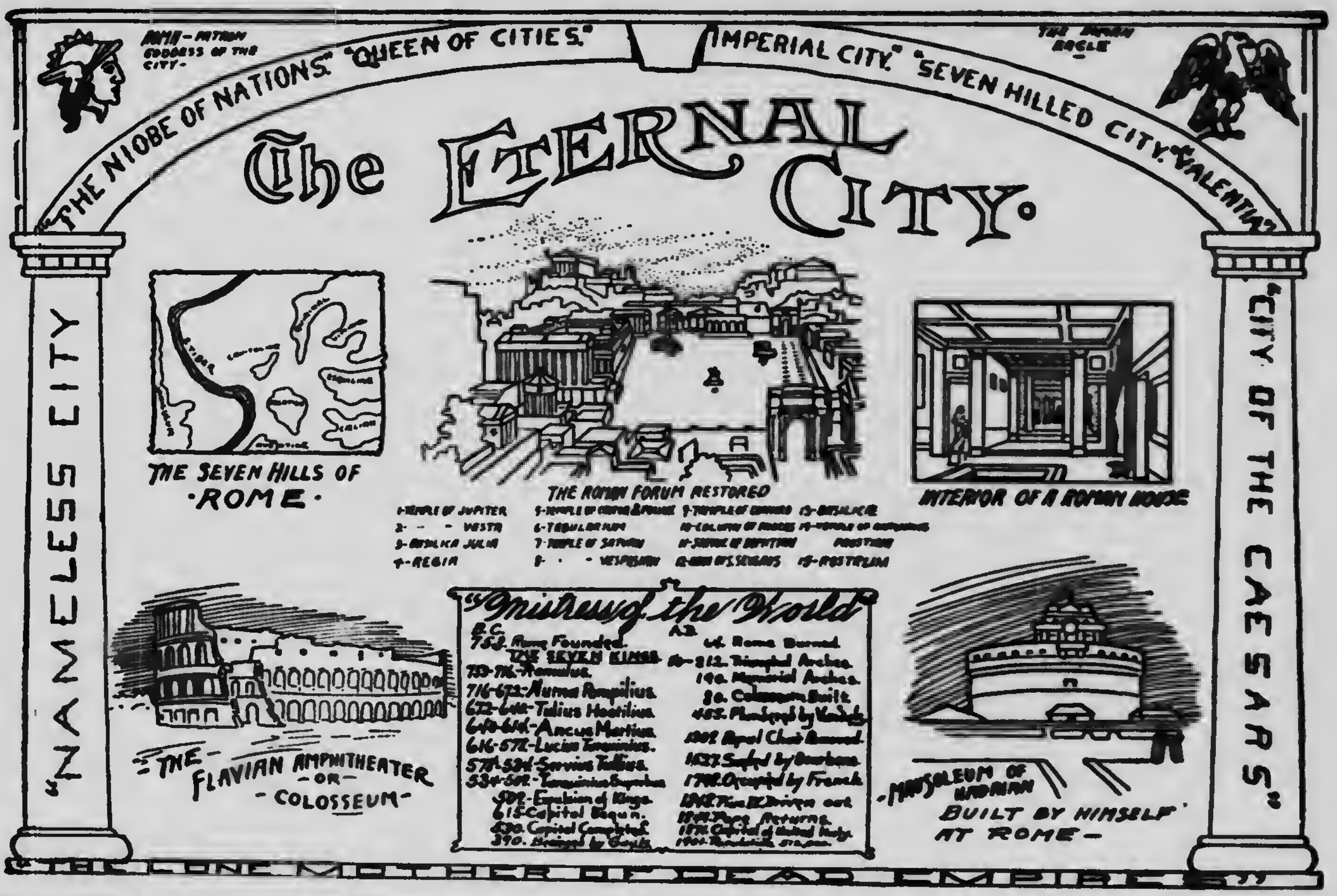
Ceremony.
DEATH.
Funerals.
Ceremonies.
SLAVERY.
Origin.
Influence.
How Employed.
ETRUSCAN BURIAL URN
ROMAN HORN


"THE NIOBE OF NATIONS" "QUEEN OF CITIES" "IMPERIAL CITY" "SEVEN HILLED CITY" "VALENTIA"
ROMA-PATRON GODDESS OF THE CITY
THE ROMAN EAGLE
The ETERNAL CITY.
"NAMELESS CITY"
"CITY OF THE CAESARS"
THE SEVEN HILLS OF ROME
THE ROMAN FORUM RESTORED
INTERIOR OF A ROMAN HOUSE
"Mistress of the World"
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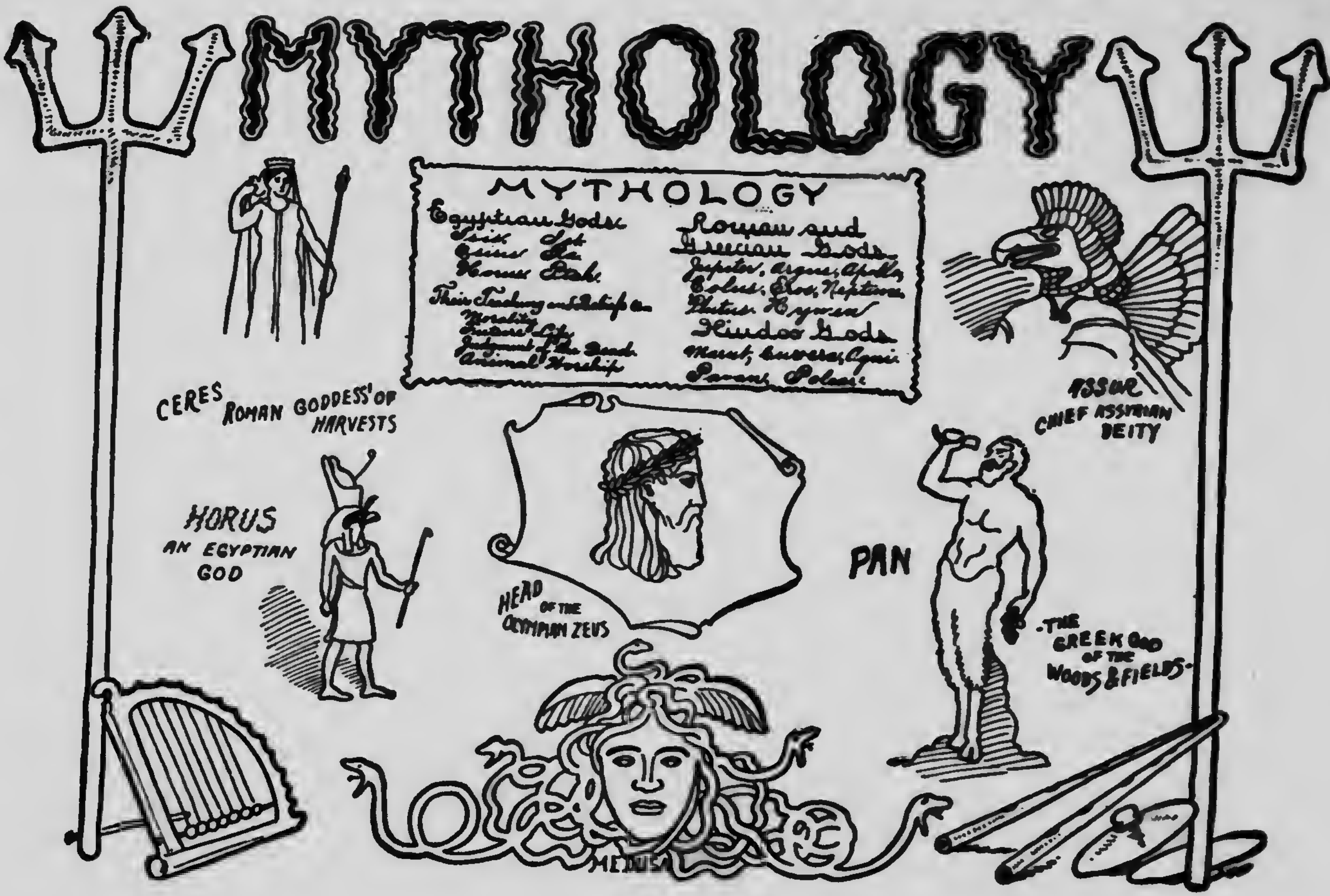
716-672-Numa Pompilius
A.D.
1798-Occupied by French
THE FLAVIAN AMPHITHEATER -OR- COLOSSEUM
MAUSOLEUM OF HADRIAN BUILT BY HIMSELF AT ROME


MYTHOLOGY
MYTHOLOGY
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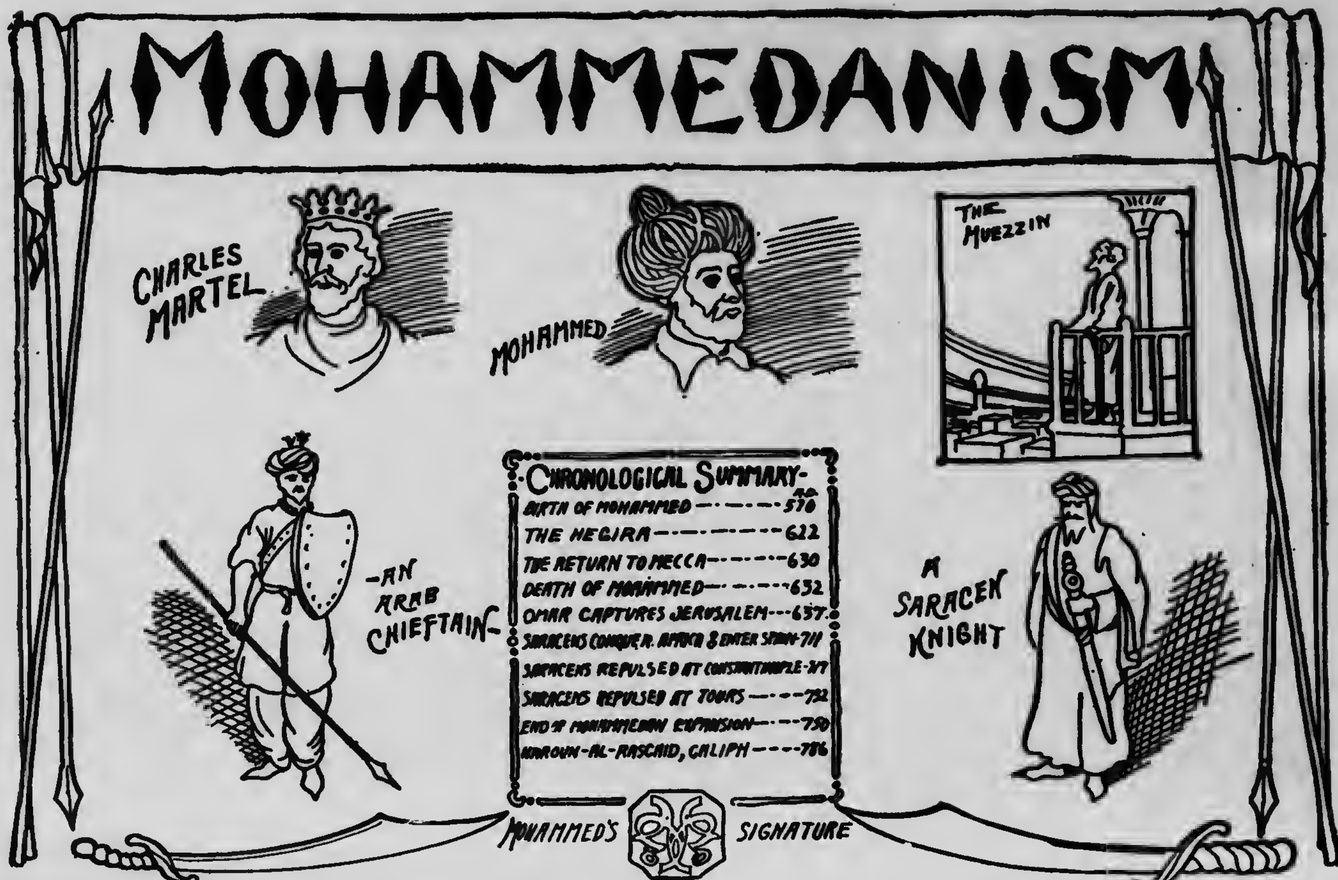
Roman and Grecian Gods
Hindoo Gods
CERES ROMAN GODDESS OF HARVESTS
HORUS AN EGYPTIAN GOD
HEAD OF THE OLYMPIAN ZEUS
ASSUR CHIEF ASSYRIAN DEITY
PAN
-THE GREEK GOD OF THE WOODS & FIELDS-
MEDUSA


MOHAMMEDANISM
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MOHAMMED'S SIGNATURE

Medieval and Modern History

Beginning of Medieval Period. The more we study history the more fully we realize that all divisions into ancient, medieval and modern are purely arbitrary. It is convenient to be able to pick out a definite date and say "modern history begins here." As a matter of fact, we find that there is no real break in the continuity of events. We say the fall of Rome in 476 A. D. ends the period of ancient history, but Roman influence has continued even to our own time.

Some historians say that the discovery of the New World marks the beginning of modern history. The establishment of a new dynasty in one country may have an effect similar to a successful war in another country. The truth is that we must look beyond the mere date to a connected account of causes. The beginnings of the Reformation can be traced for a hundred years before Luther nailed the ninety-five theses to the doors of the church at Wittenberg. The beginnings of the French Revolution were apparent for many years before Louis XVI was executed. Especially in modern history it becomes almost impossible to pick out a date as the starting-point of a great movement or to isolate events in one country from those in another. Improved means of transportation and communication, the resulting intermingling of opinions and of peoples, and the inevitable effect on other nations make it impossible for us to say, "Let us study only England or Germany in the nineteenth century."

Not even among ancient barbarians can we pick out a nation which had no relations with other nations. If we try to study the many wars between England and France as independent units we shall soon be in hopeless confusion. If we relate them to the general history of Europe, we shall find that each falls into its proper place. If we consider only Napoleon during the Revolutionary and Napoleonic era we shall not be able to understand why it was that France, though a defeated nation, still held the balance of power after 1815. Of course we cannot at one sitting understand all European history since 1500, but we can grasp some of the main currents of events and subordinate the minor facts to their proper place.

Outlines. In the following outlines no attempt has been made to present all possible fields of study. The recorded history of the world, however, may be divided into a number of periods whose general movements are easily traced; these periods are so grouped that a glance at the outline will show the principal events and tendencies of the time:

Medieval History, 476 to 1492

I. The Dark Ages, 476-1050
- (1) Germanic migrations
  - (a) Ostrogoths in Italy
  - (b) Visigoths in Spain and Gaul
  - (c) Burgundians in Gaul, 443-534
  - (d) Vandals, 439-533
  - (e) Franks, 486-752
  - (f) Lombards in Italy, 568-774
  - (g) Angles and Saxons in England, 449
- (2) Fusion of the Romans and Teutons
  - (a) Conversion of barbarians
- (3) Eastern Empire
  - (a) Under Justinian
  - (b) Under Heraclius
- (4) Mohammed and the Saracens
  - (a) Religion
  - (b) Conquests
  - (c) Driven out of Europe
- (5) Empire of the West
  - (a) Pepin
  - (b) Charles Martel
  - (c) Charlemagne
  - (d) Division of the Empire
- (6) The Northmen
  - (a) Causes of migrations
  - (b) Settlements and conquests
    - (1) Scotland and Ireland
    - (2) Iceland, Greenland, America
    - (3) Russia
    - (4) Constantinople
    - (5) England
      - (a) Repulsed by Alfred
      - (b) Conquest under Swend, 1004
      - (c) Reign of Canute, 1016-1035
      - (d) Edward the Confessor. 1042-1066
    - (6) Gaul
      - (a) Rollo receives grant from Charles the Simple
      - (b) Normans
- (7) Rise of the Papacy
  - (a) Reasons
  - (b) Its relation to Europe

II. The Age of Revival, 1050-1492
- (1) Characteristic institutions
  - (a) Feudalism
    - (1) Origin and causes

(2) Form of the system
(3) Chivalry
(4) Effects
(b) Monasticism
(1) Origin
(2) Hermits and anchorites
(3) Monks and monasteries
(4) Effects
(2) The Crusades, 1096-1272
(a) Causes
(b) The expeditions
(c) Effects
(3) Struggle between the Empire and the Papacy
(a) Gregory VII against Henry IV of Germany
(b) The Hohenstaufens
(c) Innocent III, 1198-1216
(1) His character
(2) Quarrel with King John of England
(3) Lateran Council
(d) Great Schism, 1378-1414
(1) Rival popes
(2) Council of Constance
(e) Papacy loses its temporal power
(4) The development of nations
(a) England
(1) Under the Normans, 1066-1154
(2) Under the Plantagenets
(a) Constitutions of Clarendon
(b) Magna Charta, 1215
(c) Simon de Montfort's Parliament, 1265
(d) Conquest of Wales
(e) Wars with Scotland
(f) The Hundred Years' War
(g) Wars of the Roses
(b) France
(1) House of Capet, 987-1328
(a) English possessions in France
(b) Crusades and persecution of the Albigenses
(c) The States-General
(2) House of Valois, 1328-1498
(a) Hundred Years' War
(b) Invasion of Italy by Charles VIII
(c) Germany
(1) The successors of Charlemagne
(2) Conrad of Franconia and the Saxons, 911-1125
(a) Development of central government
(3) Lothar of Saxony, and the Hohenstaufens, 1125-1254
(4) The Great Interregnum, 1254-1273
(a) Causes
(b) Rise of the cities
(5) Rise of the House of Hapsburg, 1273-1519
(d) Spain
(1) Union of Castile and Aragon, 1479
(2) Conquest of Granada, 1492
(3) Growth of royal power
(4) Inquisition
(5) Discoveries in the New World
(e) Italy
(1) Different racial elements
(2) The cities powerful
(f) Russia
(1) Beginnings
(2) Tartar conquest
(3) Rise of Moscovy
(a) Ivan the Great
(b) Ivan the Terrible

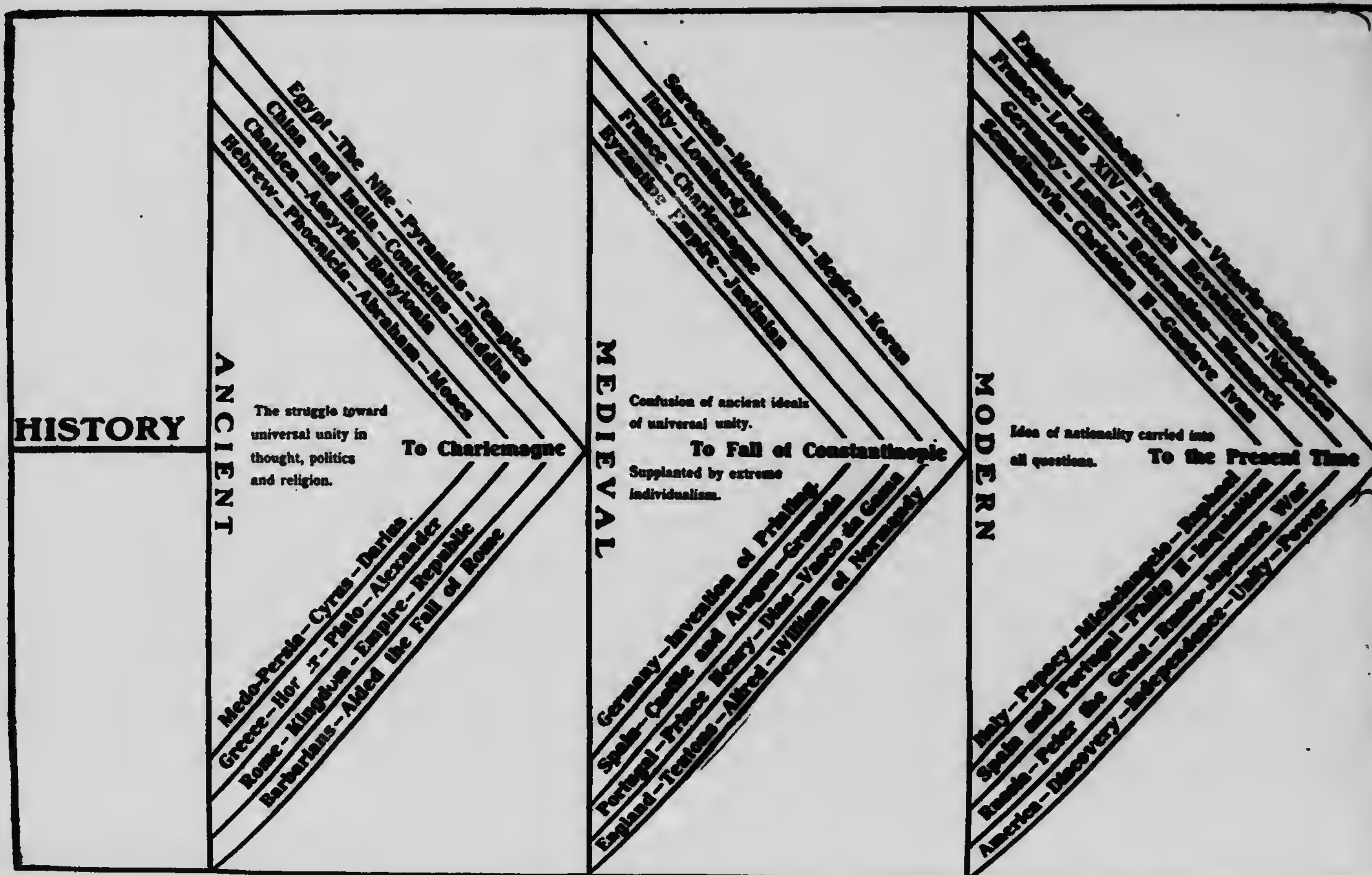
Modern History, from 1492

I. The Reformation and the Religious Wars, 1500-1648
(1) Germany and Switzerland
(a) The humanists
(b) Luther and the Edict of Worms, 1521
(c) Council of Trent, 1545
(d) John Calvin
(e) Peace of Augsburg, 1555
(2) Denmark, Norway and Sweden
(3) Rise and fall of Spain
(a) Emperor Charles V, 1515-1556
(b) Philip II, 1556-1598
(c) Revolt of the Netherlands
(4) England under the Tudors, 1485-1603
(a) Henry VIII, 1509-1547
(1) Act of Supremacy, 1534
(2) Articles of Faith, 1539
(3) Foreign Policy
(b) Edward VI, 1547-1553
(1) Book of Common Prayer
(c) Mary, 1553-1558
(d) Elizabeth, 1558-1603
(e) France
(1) Beginnings of Reformation
(2) Civil Wars
(a) Catharine de Medici
(b) The Bourbons
(c) Peace of St. Germain

(d) Massacre of St. Bartholomew, 1572
(e) War of the three Henries
(f) Edict of Nantes
(g) Richelieu
(f) Thirty Years' War, 1618-1648
(1) Bohemia and the Palatinate
(2) Danish War, 1625-29
(3) Swedish intervention
(a) Gustavus Adolphus
(b) French Alliance
(c) Battle of Lutzen
(d) Peace of Westphalia
(4) Disruption of Germany

II. Era of Absolutism and Dynastic Wars, 1648-1789
(1) England
(a) James I, 1603-1625
(1) Gunpowder Plot
(2) Colonization in America
(b) Charles I, 1625-1649
(1) Struggle between King and Parliament
(2) Civil War and execution of Charles
(c) The Commonwealth and Protectorate, 1649-1660
(1) Oliver Cromwell
(2) Ireland and Scotland subdued
(3) War with Spain
(4) Death of Cromwell
(d) The Restoration
(1) Charles II, 1660-1685
(2) James II, 1685-1688
(a) Revolution of 1688
(e) William and Mary, 1688-1702
(1) Bill of Rights, 1689
(2) Act of Settlement, 1701
(f) Anne, 1702-1714
(1) War of the Spanish Succession
(2) Union with Scotland, 1707
(g) Supremacy of England under the House of Hanover
(1) Development of cabinet government
(2) Foreign affairs
(a) War with Spain
(b) War of the Polish Succession
(c) War of the Austrian Succession
(d) French and Indian or Seven Years' War
(e) American Revolution
(2) France
(a) Ascendency under Louis XIV, 1643-1715
(b) The regency, 1715-1723
(c) The struggle with England for supremacy
(1) Loss of colonial possessions
(3) Russia
(a) Early history
(b) Peter the Great, 1682-1725
(1) League of Denmark, Poland and Russia
(2) Fall of Sweden
(c) Catharine II, 1762-1796
(4) Rise of Prussia
(a) The Great Elector. 1640-1688
(b) Frederick William I
(c) Frederick the Great, 1740-1786

III. Revolution and Reconstruction
(1) The French Revolution and the Era of Napoleon
(a) The National Assembly
(b) War against Austria
(c) The Reign of Terror
(d) The Directory
(e) The Consulate, 1799-1804
(f) The Empire, 1804-1815
(2) Great Britain
(a) The Reform Bill
(b) Repeal of the Corn Laws
(c) Free Trade
(d) A world-empire
(3) The revolutions of 1830
(a) July Revolution in Paris
(b) Belgium independent
(c) Insurrection in Poland
(4) The revolutions of 1848
(a) In France
(b) In Germany
(c) Italy
(d) Hungarians
(5) Unification of Italy, 1861
(6) Unification of Germany
(a) War with Austria
(b) North German Confederation
(c) The German Empire, 1871
(7) Russia
(a) Crimean War
(b) Revolt of Bosnia
(c) Congress of Berlin
(8) The United States
(a) Early history
(b) The Civil War
(c) The United States a world-power
(9) Canada. See special outline, pages 407-409.



SUGGESTION FOR BLACKBOARD OUTLINE

UNITED STATES HISTORY

ANCIENT AMERICA

1. The Mound Builders.
2. The American Indian.
3. Pre-Columbian discovery.

DISCOVERY AND COLONIZATION

I. Exploration and Discovery.
- c. Columbus, 1436-1506.
- b. Later discovery: The Cabots, Vespucius, Balboa, Ponce de Leon, Magellan.
- c. Spanish exploration in America.
- d. French colonization: Verrazano, Cartier.
- e. Elizabethan seamen: Hawkins, Drake, Raleigh.

II. Colonization.
- a. English colonization in the South, 1600-1700.
- b. New England, 1608-1700.
- c. The Middle Colonies, 1609-1718.
- d. Struggle for a continent, 1609-1763.

REVOLUTIONARY

I. Causes and Beginning of the Revolutionary War, 1763-1775.
- a. The Stamp Act and theories of representation.
- b. Boston Massacre, Tea Party and Continental Congress.

II. Period of Suspense. 1775-1778.
- a. George Washington in command.
- b. Declaration of Independence.

III. Victory and Independence, 1778-1783.
- a. Surrender of Cornwallis, Oct. 19, 1781.
- b. Peace negotiations and Treaty of Paris, 1783.

IV. The Critical Period, 1777-1787. Problems.

V. The Constitution, 1786-1790. Adopted, 1787. Ratified, 1787-1790.

NATIONAL PERIODS

I. Organization of the Government, 1788-1800.
- a. The Constitution, organization and trouble: Indian war, trouble with France and England.
- b. Political parties and decade of prosperity.

II. Era of National Development, 1800-1829.
- a. Expansion, and attempt to divide the Union.
- b. War of 1812.
- c. Reorganization and national growth.

III. Growth of Sectionalism, 1829-1860.
- c. Political revolution, social changes, progress.
- b. The Mexican War.
- c. Slavery in the United States
- d. Widening the breach.

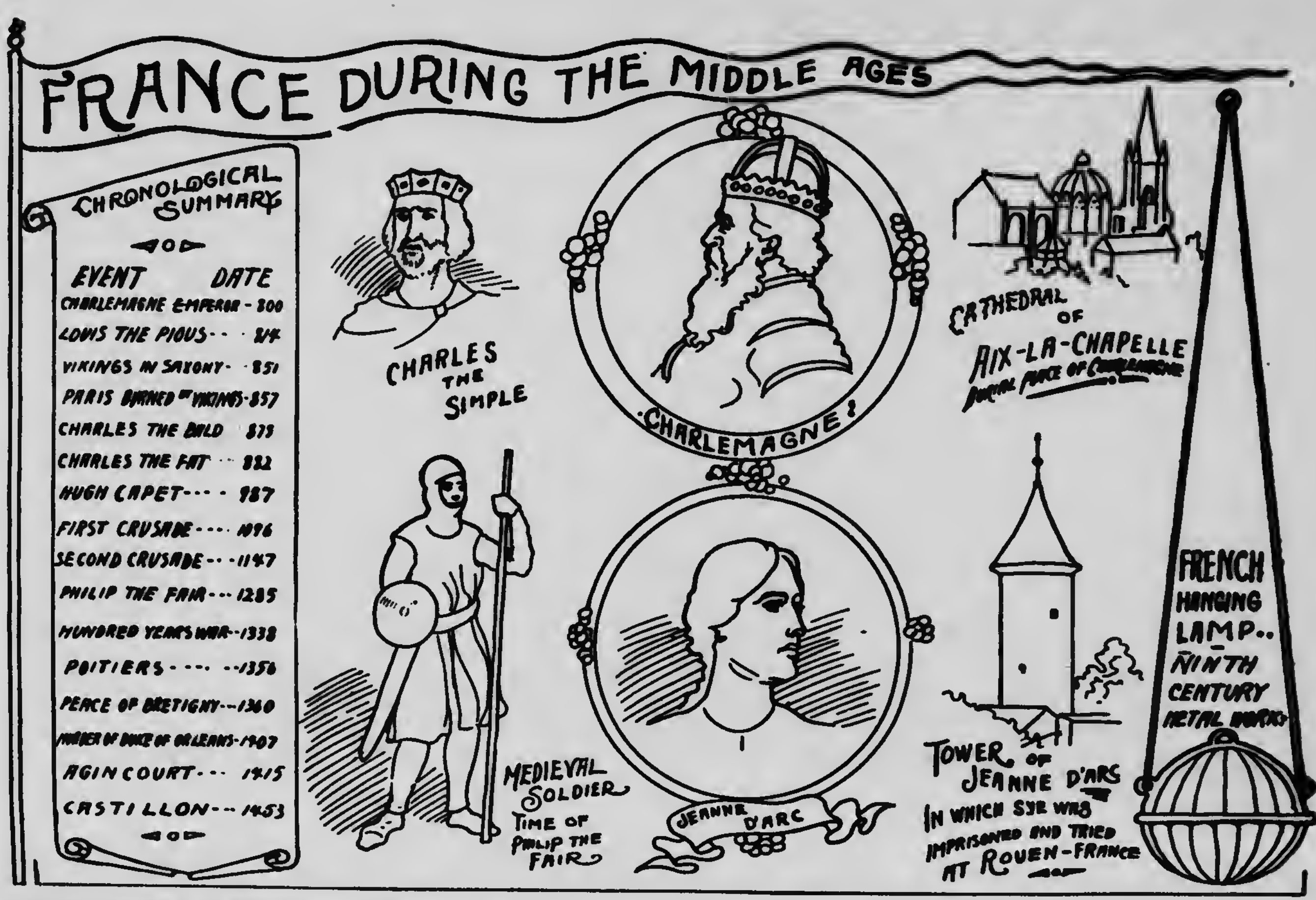
PERIOD

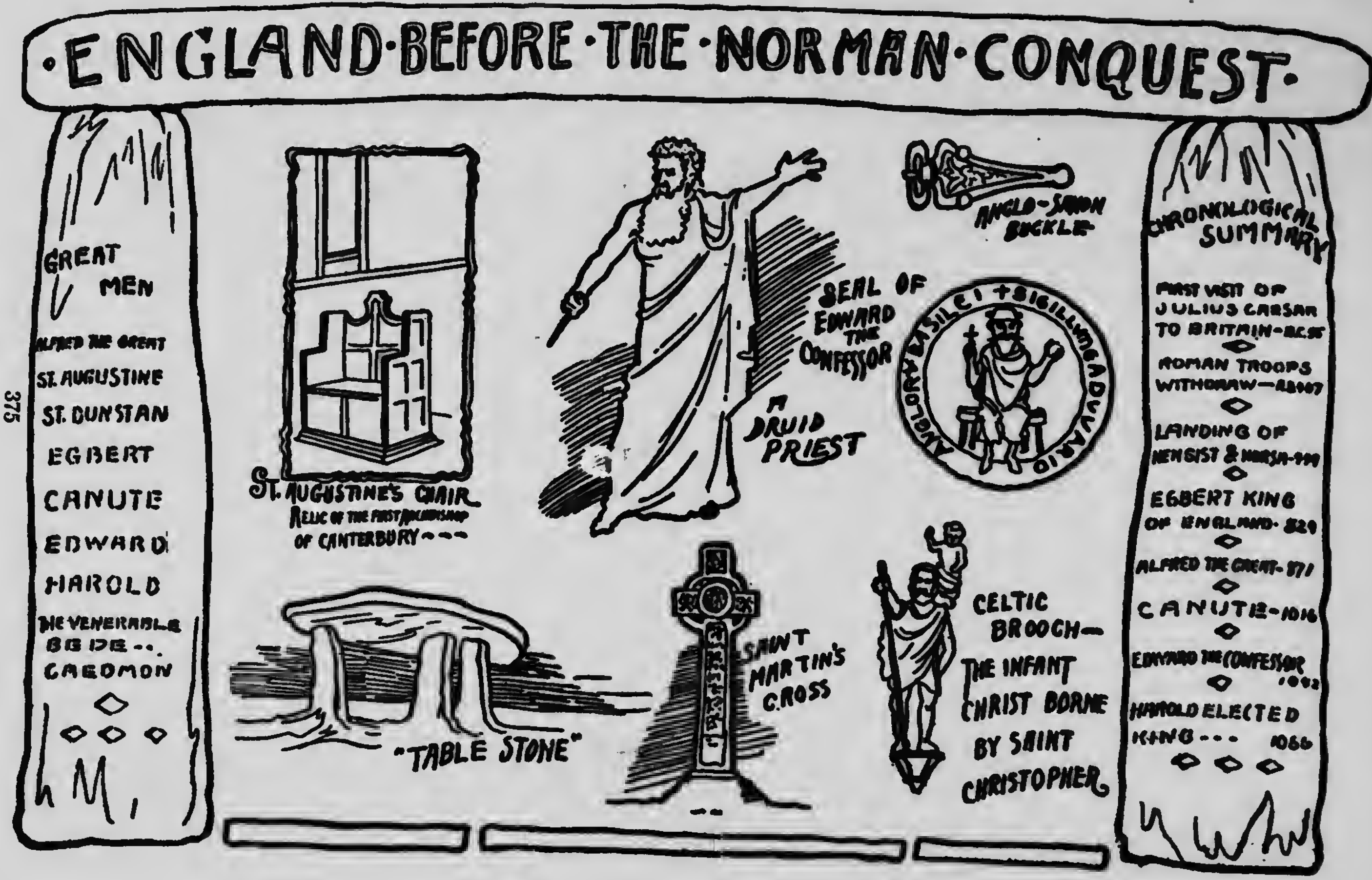
IV. Secession and Civil War, 1860-1865.
- a. The Union divided, Lincoln's inauguration.
- b. The war, from the fall of Fort Sumter to Chattanooga.
- c. From Chattanooga to Appomattox and Lincoln's assassination.

V. The Era of Reconstruction, 1866-1876.
- a. First steps toward reconstruction.
- b. Reconstruction completed.
- c. The nation's first centennial.

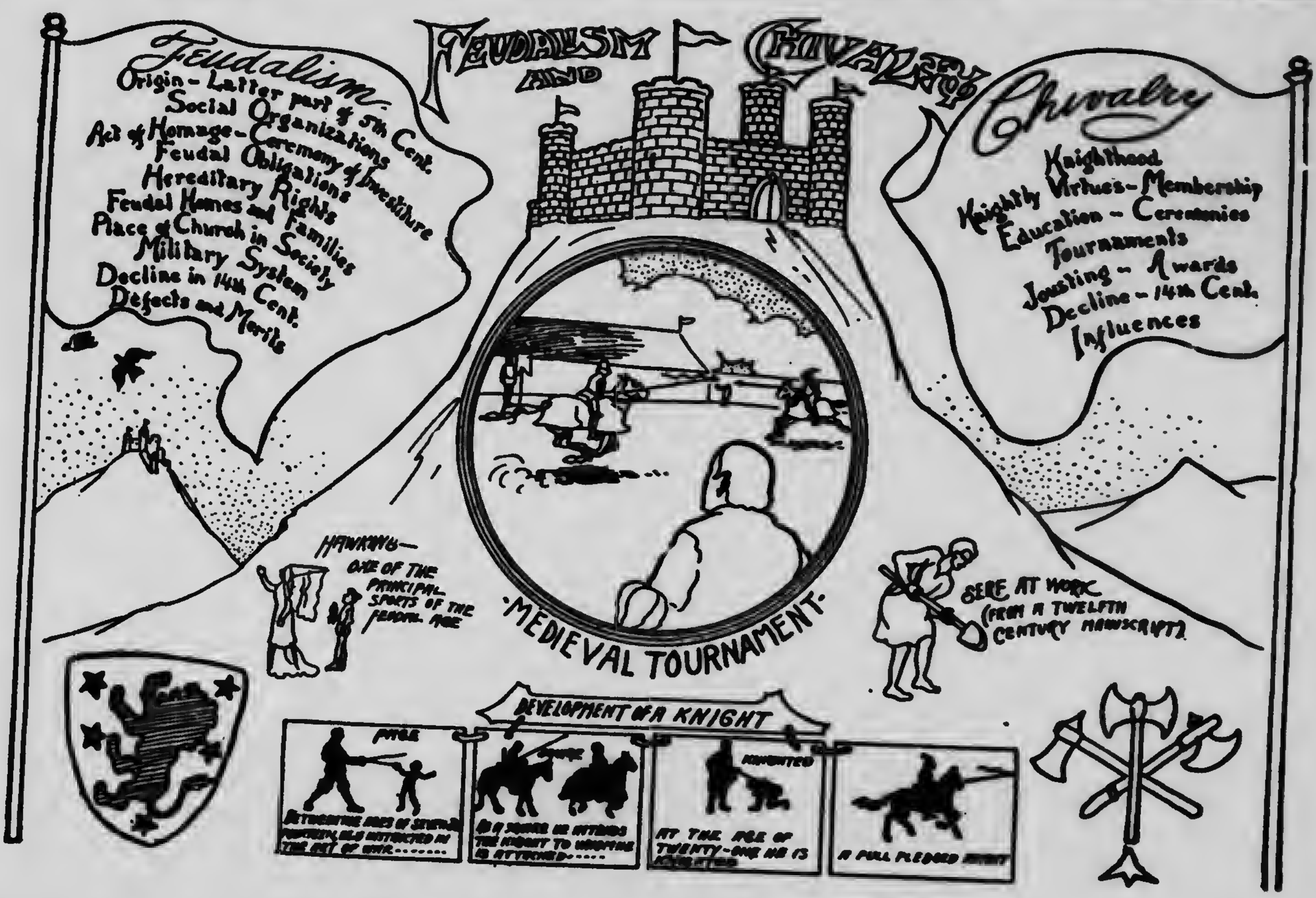
VI. Era of National Expansion, 1876-1911.
- a. Political and economic disturbances, from Garfield to war with Spain.
- b. Spanish-American War.
- c. United States as a world power.
- d. Administrations of Roosevelt and Taft.

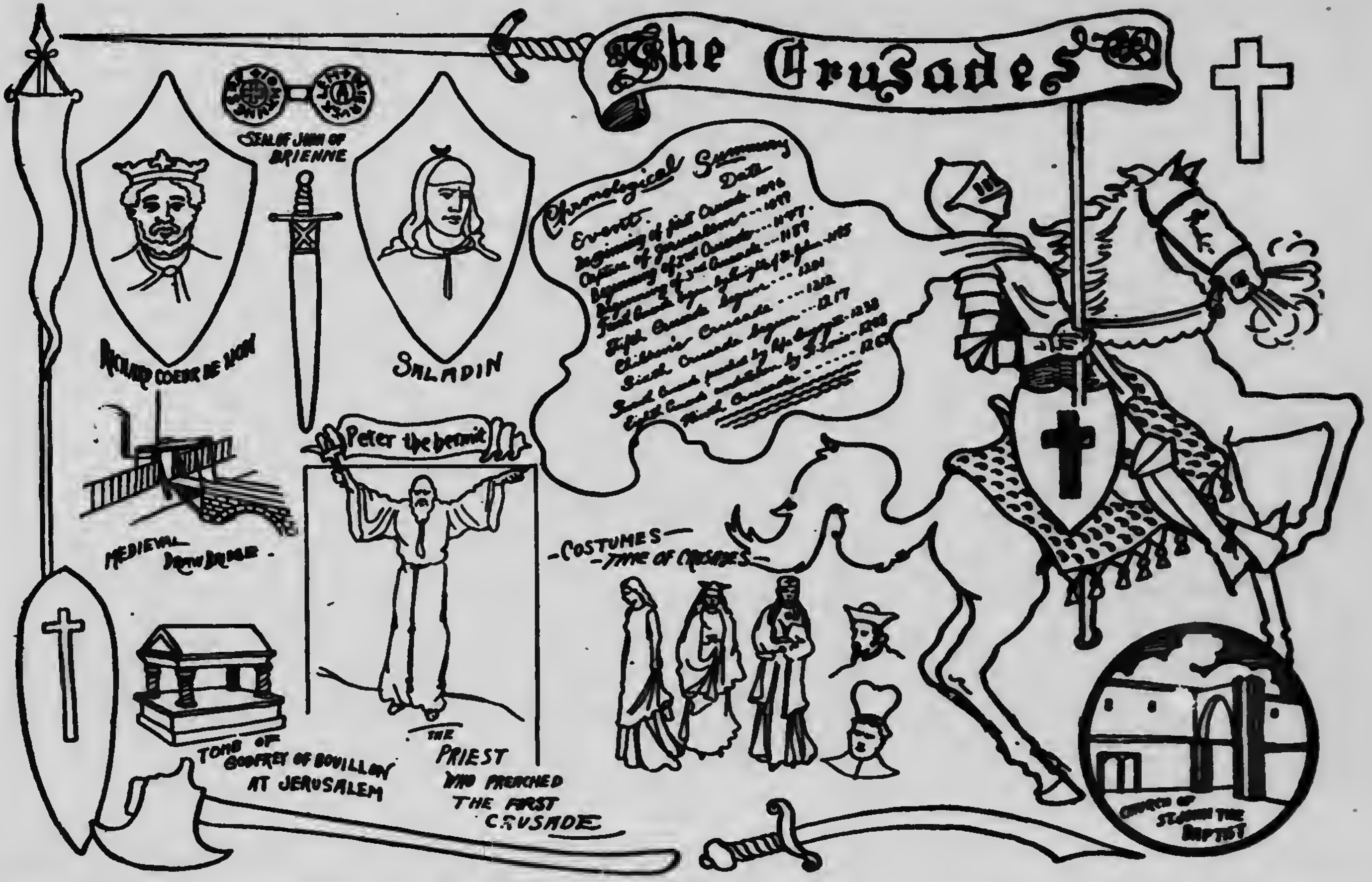
SUGGESTION FOR BLACKBOARD OUTLINE

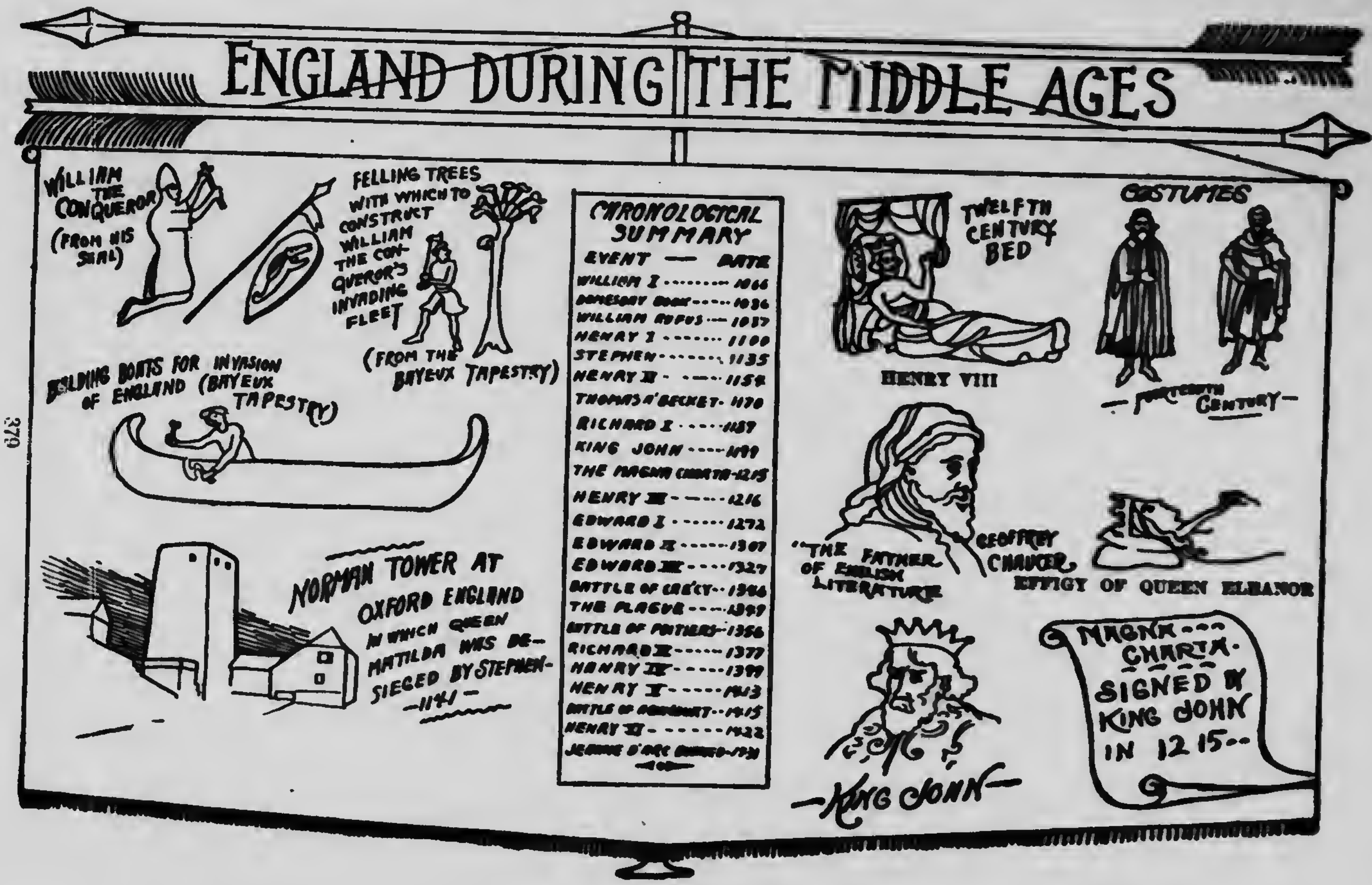

FRANCE DURING THE MIDDLE AGES
CHRONOLOGICAL SUMMARY
EVENT DATE
CHARLEMAGNE EMPEROR - 800
LOUIS THE PIOUS - - - 814
VIKINGS IN SAXONY - - 851
PARIS BURNED BY VIKINGS - 857
CHARLES THE BALD 875
CHARLES THE FAT - - 882
HUGH CAPET - - - - 987
FIRST CRUSADE - - - - 1096
SECOND CRUSADE - - - 1147
PHILIP THE FAIR - - - 1285
HUNDRED YEARS WAR - - 1338
POITIERS - - - - - - 1356
PEACE OF BRETIGNY - - 1360
MURDER OF DUKE OF ORLEANS - 1407
AGINCOURT - - - 1415
CASTILLON - - - 1453
CHARLES THE SIMPLE
CHARLEMAGNE
CATHEDRAL OF AIX-LA-CHAPELLE
BURIAL PLACE OF CHARLEMAGNE
MEDIEVAL SOLDIER
TIME OF PHILIP THE FAIR
JEANNE D'ARC
TOWER OF JEANNE D'ARC
IN WHICH SHE WAS IMPRISONED AND TRIED
AT ROUEN - FRANCE
FRENCH HANGING LAMP.. NINTH CENTURY METAL WORK

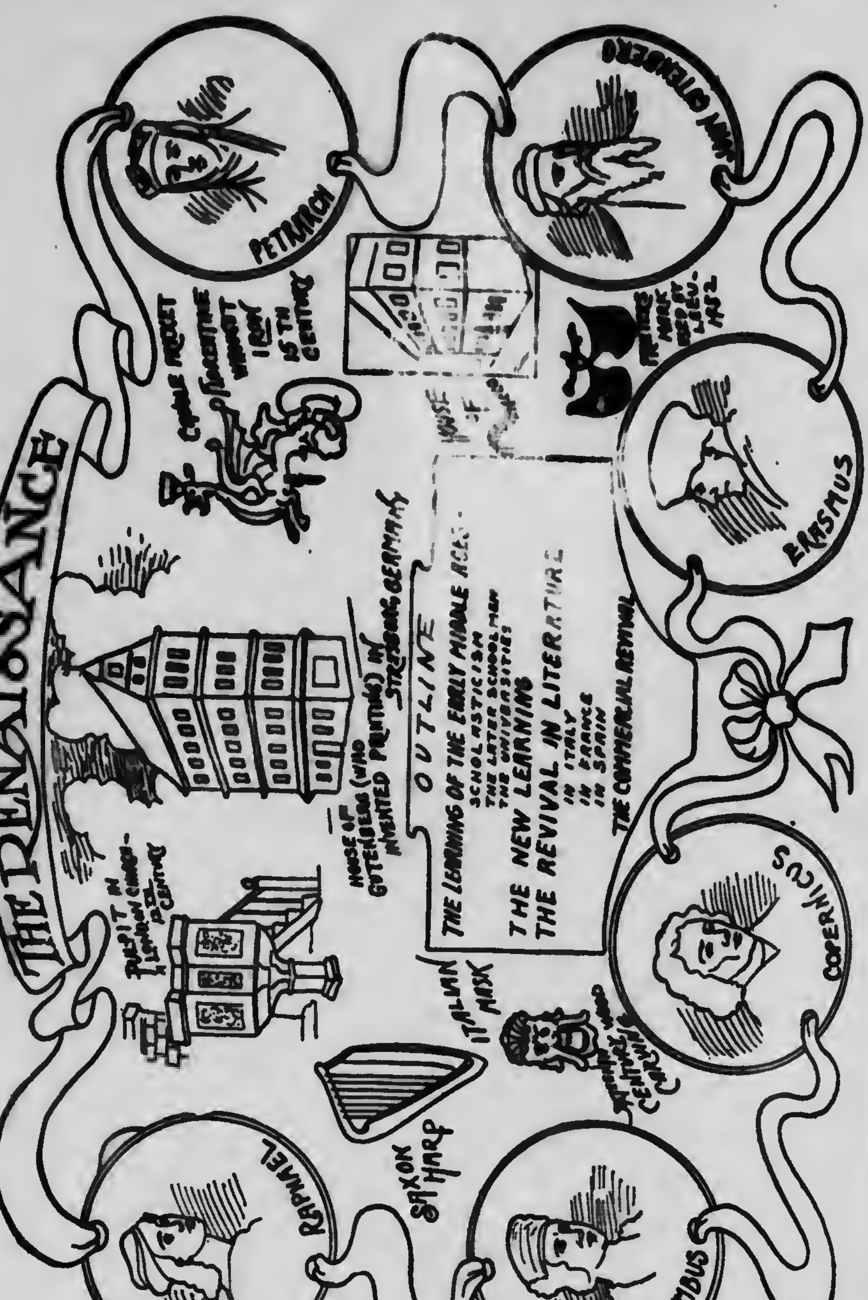

·ENGLAND·BEFORE·THE·NORMAN·CONQUEST·
GREAT MEN
ALFRED THE GREAT
ST. AUGUSTINE
ST. DUNSTAN
EGBERT
CANUTE
EDWARD
HAROLD
THE VENERABLE BEDE...
CAEDMON
ST. AUGUSTINE'S CHAIR
RELIC OF THE FIRST ARCHBISHOP OF CANTERBURY
A DRUID PRIEST
SEAL OF EDWARD THE CONFESSOR
+SIGILLUM EADUUARDI ANGLORUM BASILEI
ANGLO-SAXON BUCKLE
"TABLE STONE"
SAINT MARTIN'S CROSS
CELTIC BROOCH—THE INFANT CHRIST BORNE BY SAINT CHRISTOPHER
CHRONOLOGICAL SUMMARY
FIRST VISIT OF JULIUS CAESAR TO BRITAIN—B.C. 55
ROMAN TROOPS WITHDRAW—A.D. 407
LANDING OF HENGIST & HORSA—449
EGBERT KING OF ENGLAND—829
ALFRED THE GREAT—871
CANUTE—1016
EDWARD THE CONFESSOR 1042
HAROLD ELECTED KING ... 1066

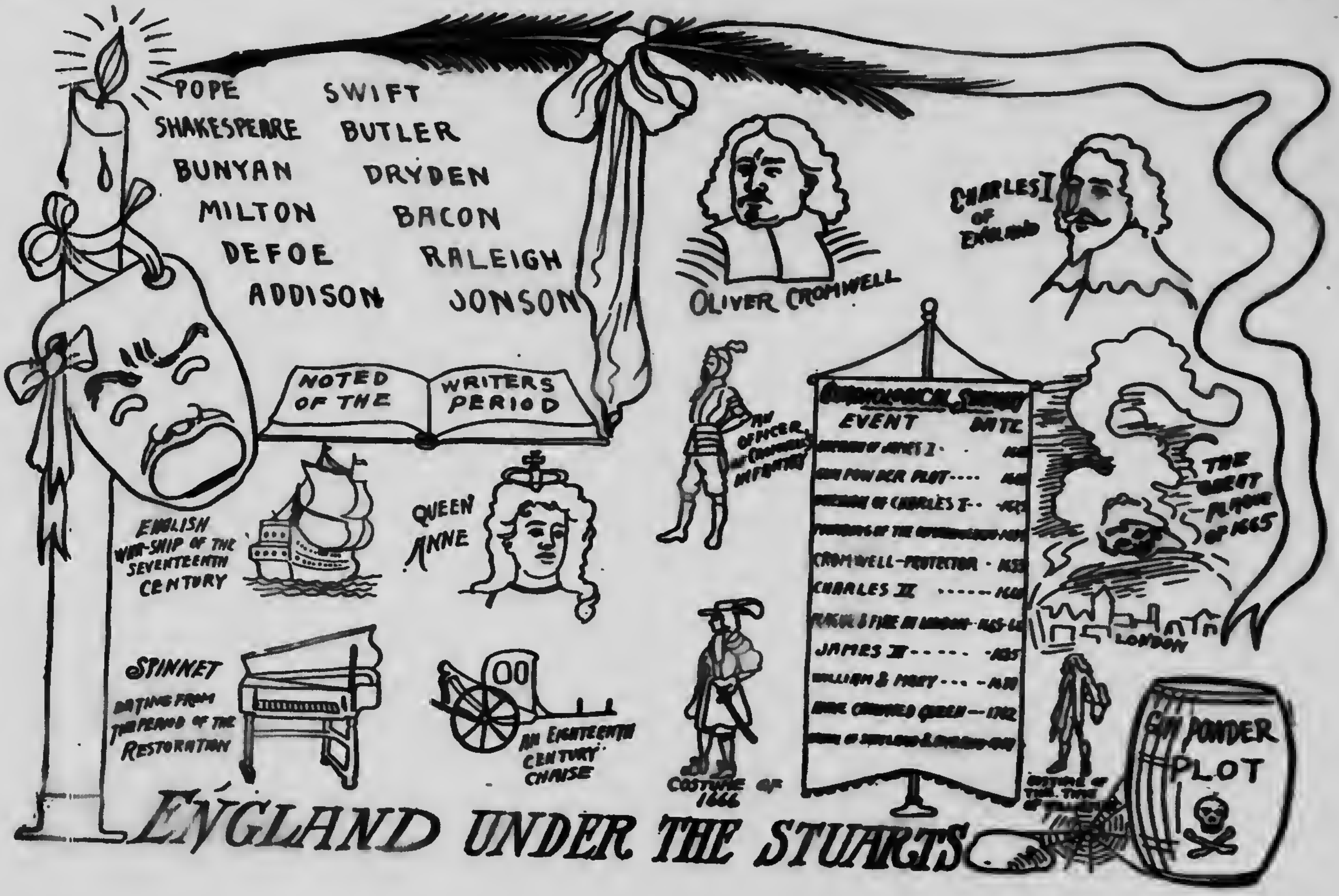

THE TOWER OF GOLD
STEEPLE HEAD DRESS
MEDIEVAL GERMAN CRAFTSMAN (FROM AN OLD MANUSCRIPT)
COSTUME OF AN EARLY GERMAN EMPEROR
CHRONOLOGICAL SUMMARY
OTTO THE GREAT
DEATH OF DANTE-1321
HUSSITE WAR
LOMBARD LEAGUE
FREDERICK III
TEUTONIC ORDER FOUNDED
THE HOLY ROMAN EMPIRE OF THE GERMAN NATION
RUINS OF DRACHENFELS CASTLE
MEDIEVAL LANCER (FROM THE BAYEUX TAPESTRY)
ELEVENTH CENTURY ORGAN (FROM AN OLD MANUSCRIPT)

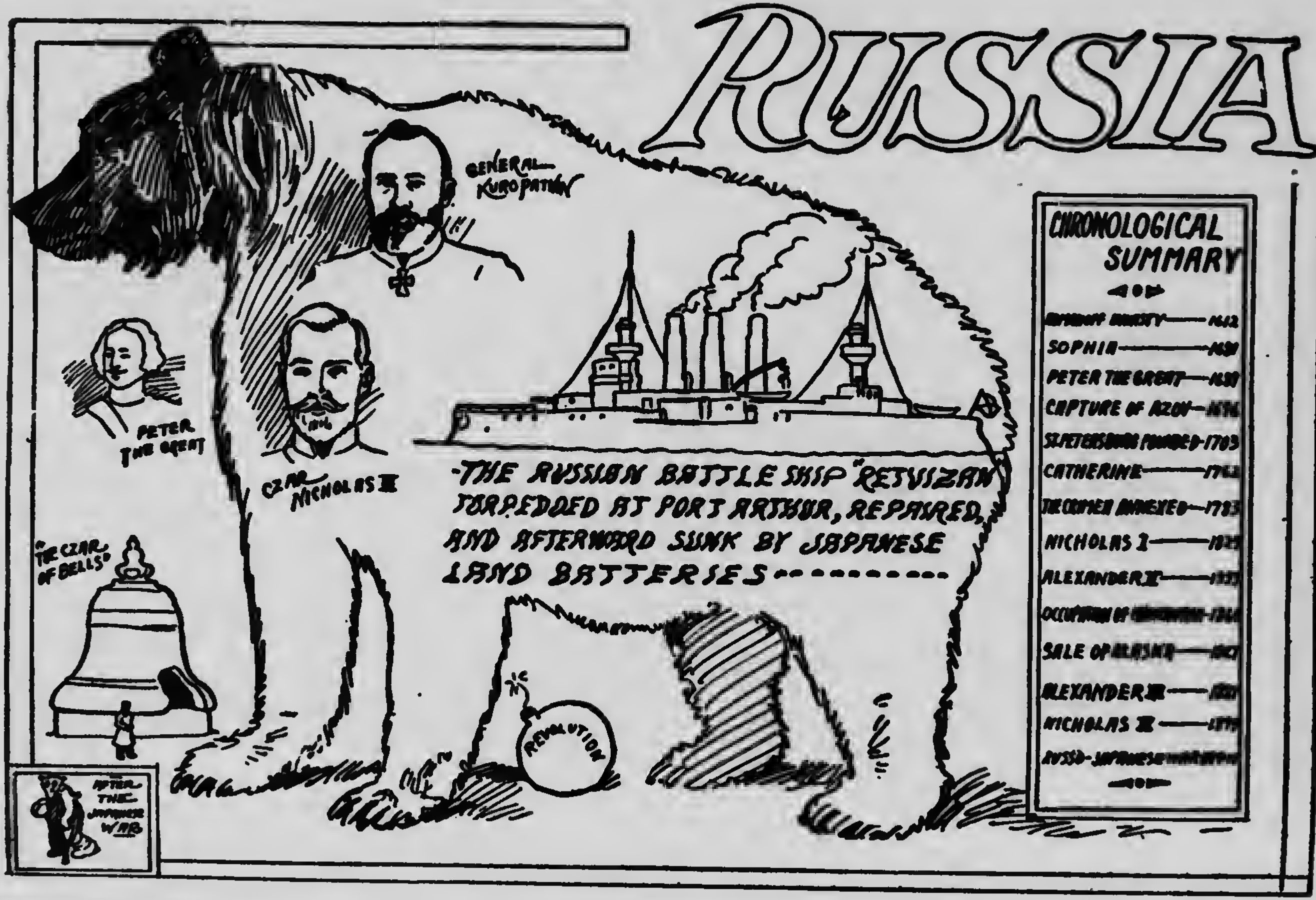

FEUDALISM AND CHIVALRY
Feudalism
Origin - Latter part of 5th Cent.
Social Organizations
Act of Homage - Ceremony of Investiture
Feudal Obligations
Hereditary Rights
Feudal Homes and Families
Place of Church in Society
Military System
Decline in 14th Cent.
Defects and Merits
Chivalry
Knighthood
Knightly Virtues - Membership
Education - Ceremonies
Tournaments
Jousting - Awards
Decline - 14th Cent.
Influences
HAWKING—
ONE OF THE PRINCIPAL SPORTS OF THE FEUDAL AGE
·MEDIEVAL TOURNAMENT·
SERF AT WORK
(FROM A TWELFTH CENTURY MANUSCRIPT)
DEVELOPMENT OF A KNIGHT
PAGE
SQUIRE
KNIGHTED
AT THE AGE OF TWENTY-ONE HE IS

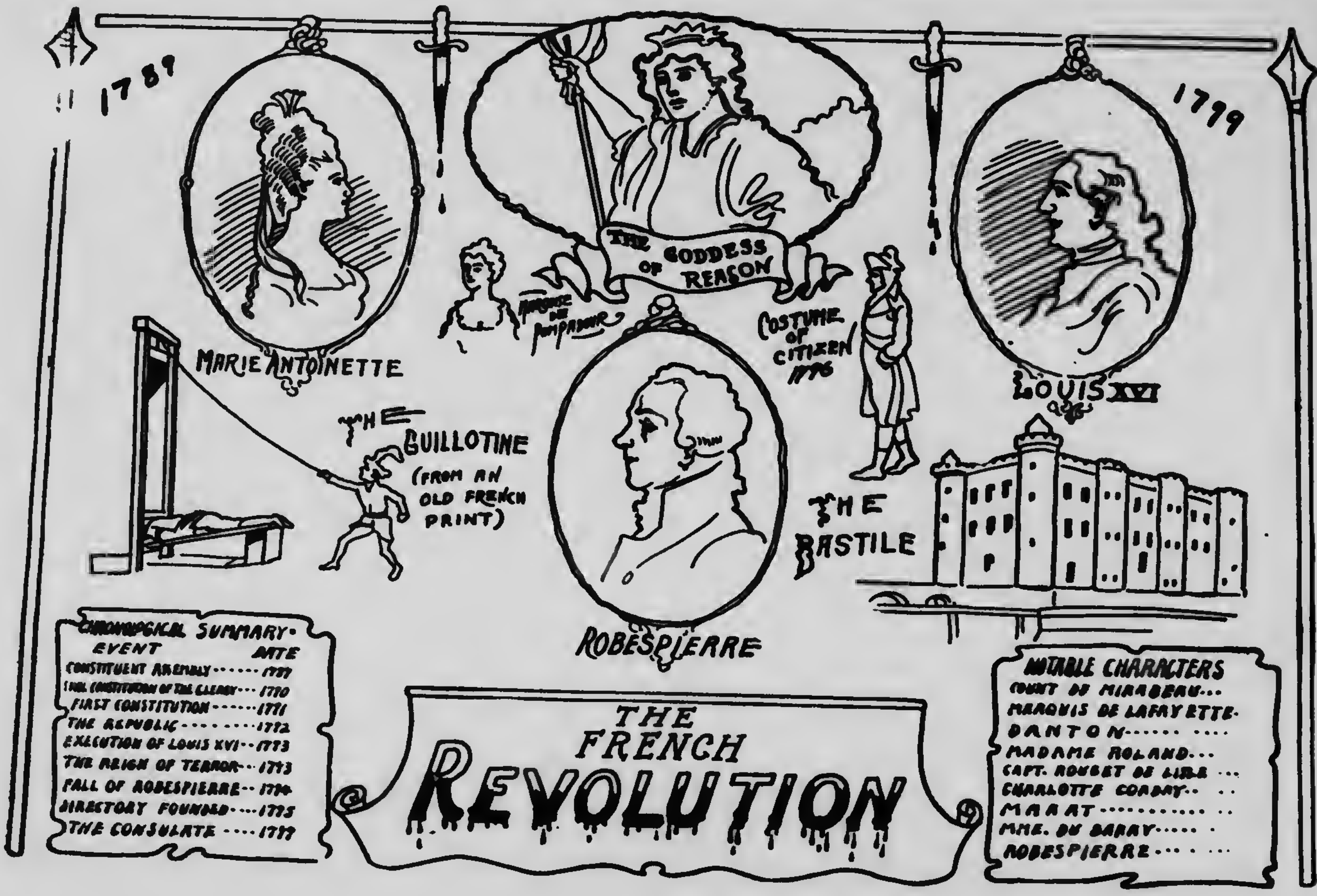

The Crusades
Chronological Summary
Events
Date
Seal of John of Brienne
Richard Coeur de Lion
Saladin
Medieval Drawbridge
Peter the hermit
Tomb of Godfrey of Bouillon at Jerusalem
The Priest who preached the first Crusade
-Costumes-
-Time of Crusades-
Church of St. John the Baptist


ENGLAND DURING THE MIDDLE AGES
WILLIAM THE CONQUEROR (FROM HIS SEAL)
FELLING TREES WITH WHICH TO CONSTRUCT WILLIAM THE CONQUEROR'S INVADING FLEET (FROM THE BAYEUX TAPESTRY)
BUILDING BOATS FOR INVASION OF ENGLAND (BAYEUX TAPESTRY)
NORMAN TOWER AT OXFORD ENGLAND IN WHICH QUEEN MATILDA WAS BESIEGED BY STEPHEN -1141-
CHRONOLOGICAL SUMMARY
EVENT — DATE
WILLIAM I ---------- 1066
DOMESDAY BOOK ----- 1086
WILLIAM RUFUS --- 1087
HENRY I ------- 1100
STEPHEN ------- 1135
HENRY II ------ 1154
THOMAS A'BECKET - 1170
RICHARD I ----- 1189
KING JOHN ---- 1199
THE MAGNA CHARTA - 1215
HENRY III ------ 1216
EDWARD I ------ 1272
EDWARD II ------ 1307
EDWARD III ---- 1327
BATTLE OF CRÉCY -- 1346
THE PLAGUE ---- 1349
BATTLE OF POITIERS - 1356
RICHARD II ------ 1377
HENRY IV ------ 1399
HENRY V ------ 1413
BATTLE OF AGINCOURT -- 1415
HENRY VI ------- 1422
JEANNE D'ARC BURNED - 1431
TWELFTH CENTURY BED
HENRY VIII
COSTUMES
— FOURTEENTH CENTURY —
"THE FATHER OF ENGLISH LITERATURE" GEOFFREY CHAUCER
EFFIGY OF QUEEN ELEANOR
— KING JOHN —
MAGNA — CHARTA. SIGNED BY KING JOHN IN 1215 —


THE RENAISSANCE
PETRARCH
ERASMUS
COPERNICUS
COLUMBUS
RAPHAEL
SAXON HARP
ITALIAN MASK
HOUSE OF GUTENBERG (WHO INVENTED PRINTING) IN STRASBURG GERMANY
OUTLINE
THE LEARNING OF THE EARLY MIDDLE AGES
SCHOLASTICISM
THE LATER SCHOOLMEN
THE UNIVERSITIES
THE NEW LEARNING
THE REVIVAL IN LITERATURE
IN ITALY
IN FRANCE
IN SPAIN
THE COMMERCIAL REVIVAL


POPE
SHAKESPEARE
BUNYAN
MILTON
DEFOE
ADDISON
SWIFT
BUTLER
DRYDEN
BACON
RALEIGH
JONSON
NOTED OF THE WRITERS PERIOD
OLIVER CROMWELL
CHARLES I OF ENGLAND
EVENT
DATE
GUN POWDER PLOT
CROMWELL—PROTECTOR
CHARLES II
JAMES II
WILLIAM & MARY
ANNE CROWNED QUEEN — 1702
THE GREAT PLAGUE OF 1665
LONDON
ENGLISH WAR-SHIP OF THE SEVENTEENTH CENTURY
QUEEN ANNE
SPINNET
DATING FROM THE PERIOD OF THE RESTORATION
AN EIGHTEENTH CENTURY CHAISE
COSTUME OF 1666
GUN POWDER PLOT
ENGLAND UNDER THE STUARTS

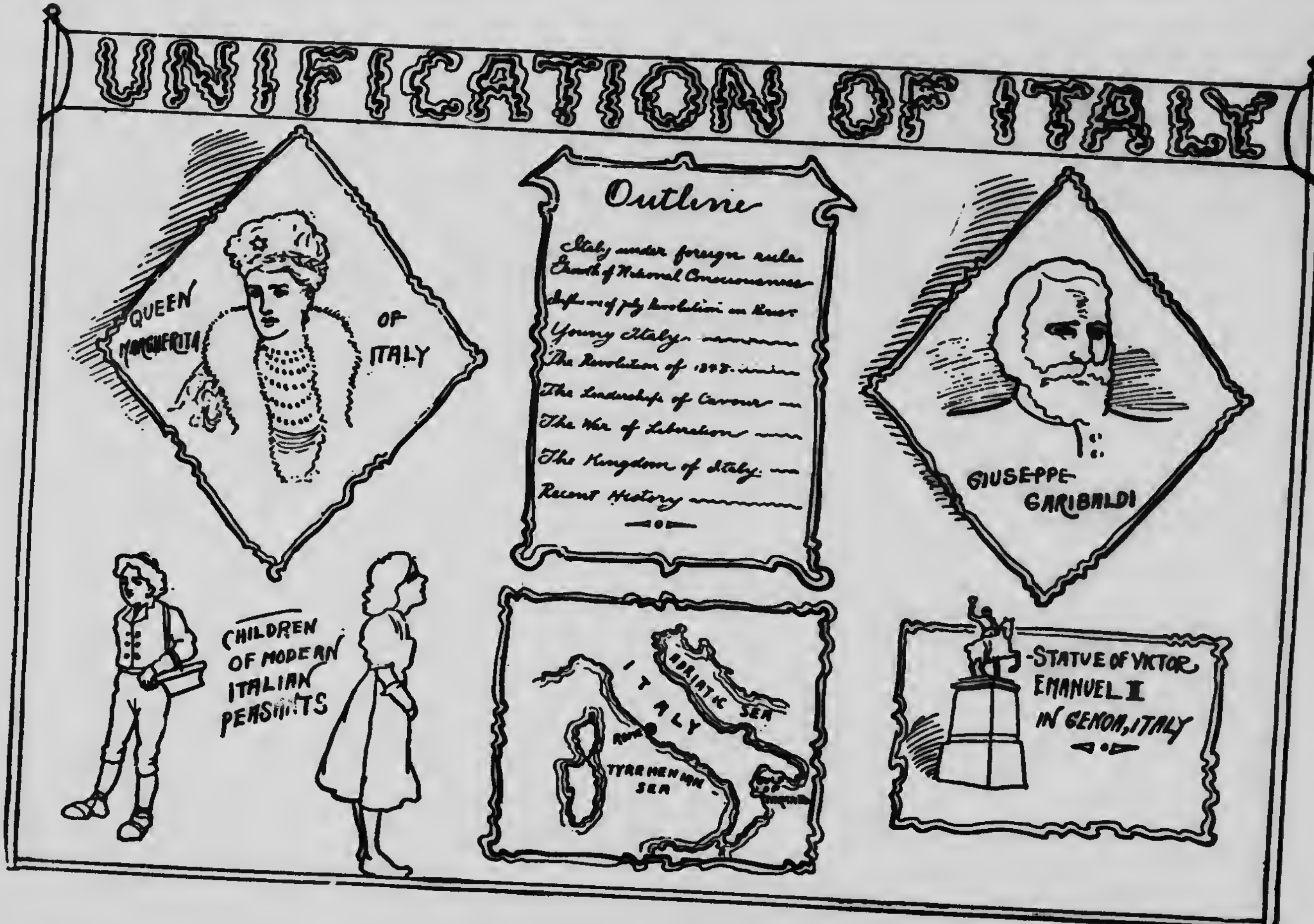

RUSSIA
GENERAL KUROPATKIN
PETER THE GREAT
CZAR NICHOLAS II
"THE CZAR OF BELLS"
AFTER THE JAPANESE WAR
THE RUSSIAN BATTLE SHIP "RETVIZAN" TORPEDOED AT PORT ARTHUR, REPAIRED, AND AFTERWARD SUNK BY JAPANESE LAND BATTERIES
REVOLUTION
CHRONOLOGICAL SUMMARY
SOPHIA
PETER THE GREAT
CAPTURE OF AZOV
ST. PETERSBURG FOUNDED—1703
CATHERINE
THE CRIMEA ANNEXED—1783
NICHOLAS I
ALEXANDER II
SALE OF ALASKA—1867
ALEXANDER III
NICHOLAS II
RUSSO-JAPANESE

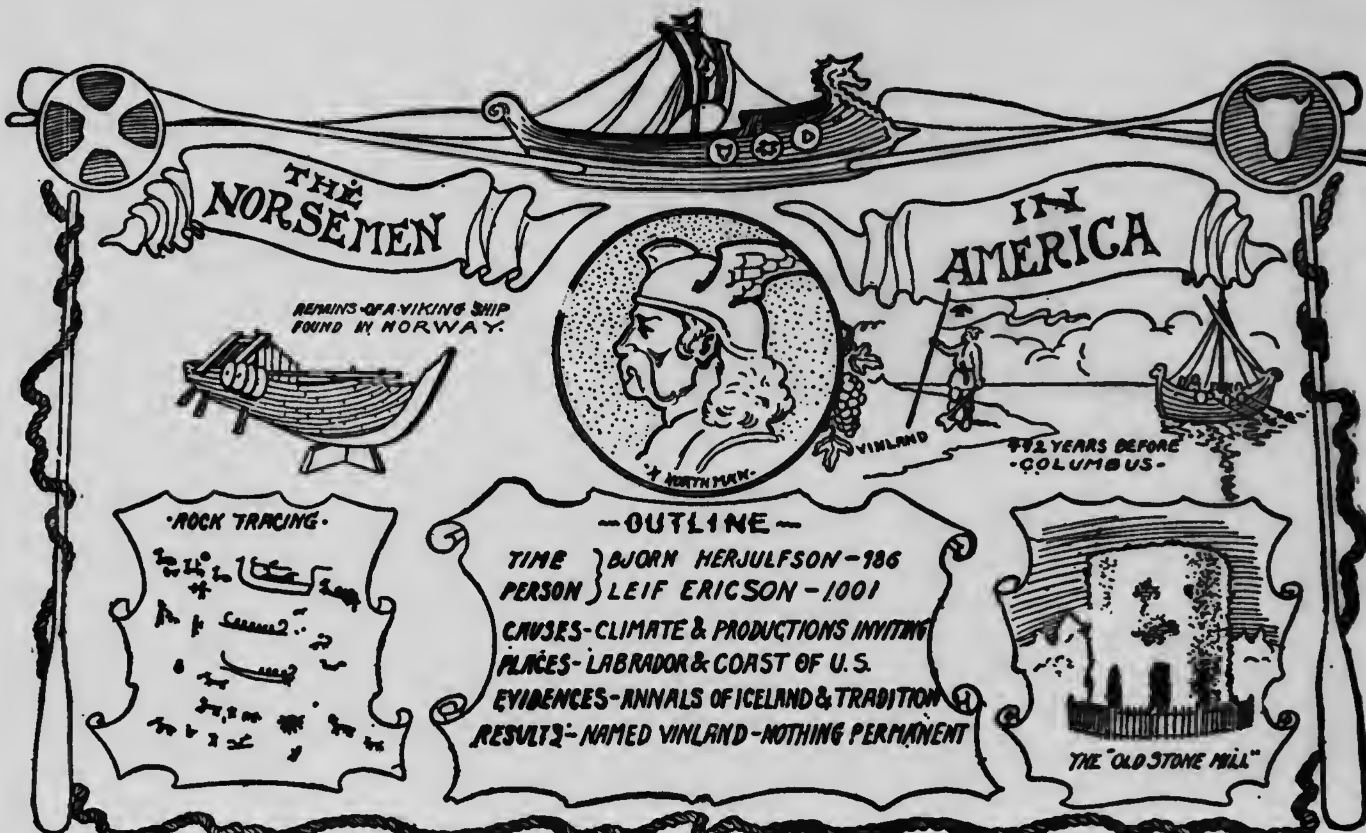

1789
1799
MARIE ANTOINETTE
THE GODDESS OF REASON
LOUIS XVI
COSTUME OF CITIZEN 1796
THE GUILLOTINE
(FROM AN OLD FRENCH PRINT)
ROBESPIERRE
THE BASTILE
CHRONOLOGICAL SUMMARY·
EVENT DATE
CONSTITUENT ASSEMBLY ······ 1789
CIVIL CONSTITUTION OF THE CLERGY ··· 1790
FIRST CONSTITUTION ······ 1791
THE REPUBLIC ······ 1792
EXECUTION OF LOUIS XVI ··· 1793
THE REIGN OF TERROR ··· 1793
FALL OF ROBESPIERRE ·· 1794
DIRECTORY FOUNDED ···· 1795
THE CONSULATE ···· 1799
THE FRENCH REVOLUTION
NOTABLE CHARACTERS
COUNT DE MIRABEAU···
MARQUIS DE LAFAYETTE·
DANTON······ ····
MADAME ROLAND···
CAPT. ROUGET DE LISLE ···
CHARLOTTE CORDAY·· ··
MARAT········· ··
MME. DU BARRY····· ·
ROBESPIERRE··· · ···

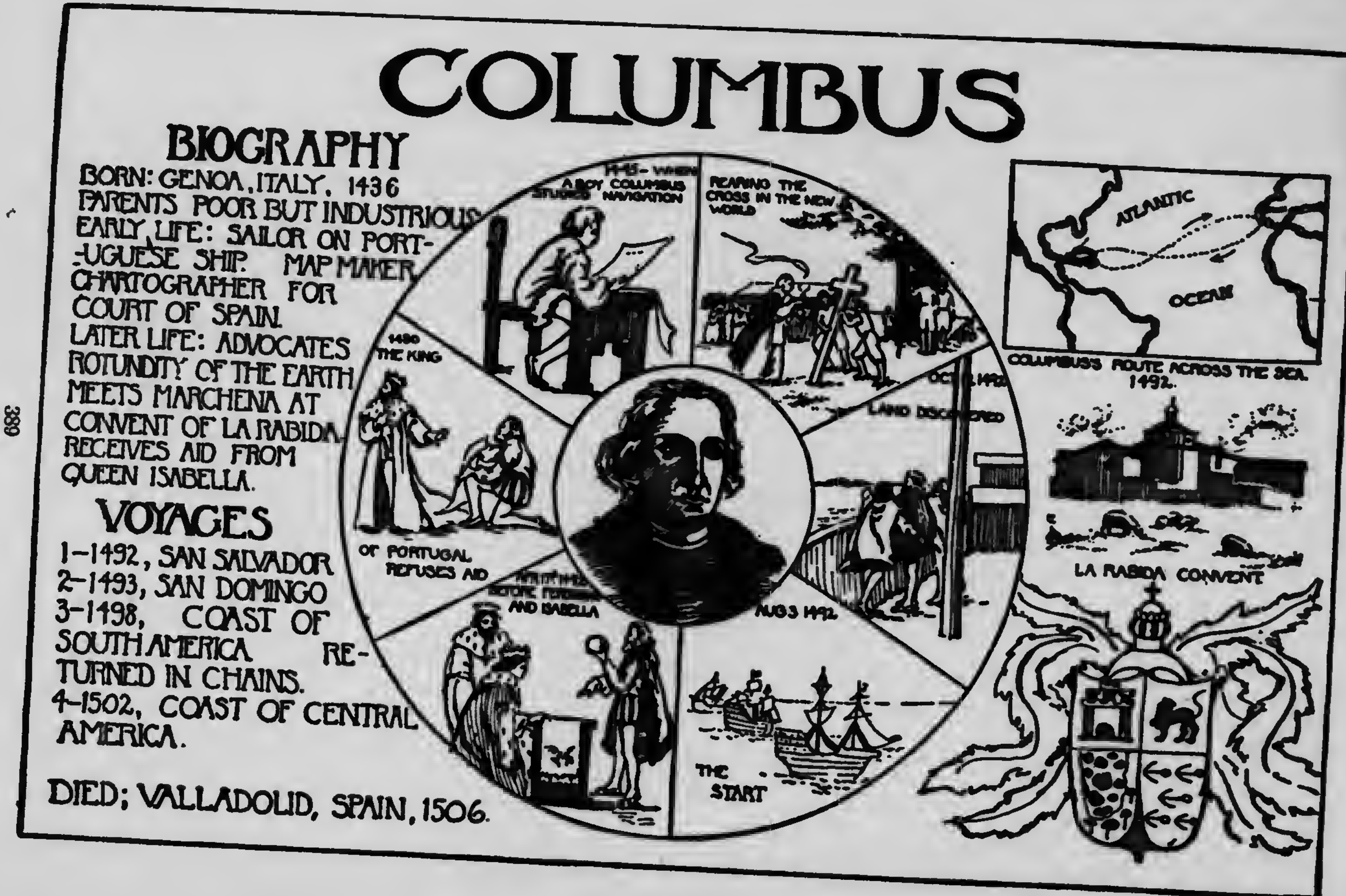

NAPOLEON'S RUSSIAN BEAR HUNT WAS NOT AS SUCCESSFUL AS HE THOUGHT IT WOULD BE!
RUSSIA
MOSCOW
NAPOLEON BONAPARTE
FRENCH GENERAL
WELLINGTON
-THIERS-
FIRST PRES. OF THE THIRD REPUBLIC
·CHRONOLOGICAL SUMMARY·
EVENT DATE
CONSULATE ---------- 1799
WATERLOO ---------- 1815
RESTORATION OF LOUIS XVIII ---- 1815
DEATH OF NAPOLEON I ------ 1821
THE SECOND REPUBLIC ----- 1848
CRIMEAN WAR -------- 1854
FRANCO-GERMAN WAR ------ 1870
THIRD REPUBLIC ------- 1870
COLONIZATION OF WEST AFRICA 1881
FASHODA AFFAIR -------- 1898
SEPARATION OF CHURCH & STATE -- 1905
-EMILE LOUBET-
SEVENTH PRESIDENT OF THE THIRD REPUBLIC —
EIFFEL TOWER PARIS 984 FEET HIGH
DUMAS
JEAN BAPTISTE COROT- A CELEBRATED FRENCH LANDSCAPE PAINTER
·FRANCE·
FROM THE CONSULATE TO THE PRESENT TIME.


ENGLAND SINCE THE ACCESSION OF VICTORIA
WILLIAM EWART GLADSTONE
QUEEN VICTORIA
EDWARD VII OF ENGLAND
PENNY POSTAGE ESTABLISHED IN 1841
TOWER BRIDGE LONDON
RHODESIA
CAPE COLONY
CAPE TOWN
SOUTH AFRICA- SCENE OF BOER WAR.
-CHRONOLOGICAL SUMMARY-
Accession of Queen Victoria — 1837
Crimean War — 1854
India Transferred to Crown - 1858
Canadian Federation - 1867
Gladstone's First Ministry - 1868
Queen's Jubilee — 1897
Boer War — 1899
Death of Queen Victoria 1901
Edward VII King of England - 1901
CARLYLE
WILLIAM MAKEPEACE THACKERAY


GERMANY
·AFTER 1814·
EMPEROR WILLIAM I
PRINCE VON BISMARCK
EMPEROR WILLIAM II
THE COLUMN OF VICTORY, —BERLIN—
COMMEMORATING THE SUCCESS OF THE GERMAN ARMS —1866-1870
·CHRONOLOGICAL SUMMARY·
GERMANIC CONFEDERATION 1815
CARLSBAD DECREES 1819
FIRST GERMAN PARLIAMENT 1848
SOCIALISM FOUNDED 1860
FRANCO-GERMAN WAR 1870
GERMAN EMPIRE 1870
BISMARCK, CHANCELLOR 1871
GERMAN COLONIZATION 1884
ACCESSION OF WILLIAM II 1888
TROUBLE IN VENEZUELA 1903
TRIUMPH OF SOCIALISTS 1903
REVOLT IN S. AFRICAN COLONIES 1904
—THE CALL TO ARMS
DETAIL FROM A PEDESTAL PIECE OF THE GERMAN NATIONAL MONUMENT
GREAT GERMAN MUSICIANS
HAYDN
SCHUMAN
MOZART
JOHN STRAUS
BEETHOVEN
R. STRUS
SCHUBERT
WAGNER
FAMOUS GERMAN WRITERS-
LESSING
GOETHE
SCHILLER
KÖRNER
UHLAND
GRIMM
KANT
HUMBOLDT
HEINE
FREYTAG
SCHEFFEL
VON RANKE
MOMMSEN
SUDERMAN
HAUPTMANN
RICHTER


UNIFICATION OF ITALY
QUEEN MARGHERITA OF ITALY
Outline
Italy under foreign rule
Growth of National Consciousness
Young Italy
The Revolution of 1848
The Leadership of Cavour
The War of Liberation
The Kingdom of Italy
Recent History
GIUSEPPE GARIBALDI
CHILDREN OF MODERN ITALIAN PEASANTS
ITALY
ADRIATIC SEA
TYRRHENIAN SEA
STATUE OF VICTOR EMANUEL II IN GENOA, ITALY


THE NORSEMEN
IN AMERICA
REMAINS OF A VIKING SHIP FOUND IN NORWAY.
A NORTHMAN
VINLAND
492 YEARS BEFORE COLUMBUS
ROCK TRACING
—OUTLINE—
TIME } BJORN HERJULFSON—986
PERSON } LEIF ERICSON—1001
CAUSES—CLIMATE & PRODUCTIONS INVITING
PLACES—LABRADOR & COAST OF U.S.
EVIDENCES—ANNALS OF ICELAND & TRADITION
RESULTS—NAMED VINLAND—NOTHING PERMANENT
THE "OLD STONE MILL"


COLUMBUS
BIOGRAPHY
BORN: GENOA, ITALY, 1436
PARENTS POOR BUT INDUSTRIOUS
EARLY LIFE: SAILOR ON PORT-
-UGUESE SHIP. MAP MAKER
CHARTOGRAPHER FOR
COURT OF SPAIN.
LATER LIFE: ADVOCATES
ROTUNDITY OF THE EARTH
MEETS MARCHENA AT
CONVENT OF LA RABIDA.
RECEIVES AID FROM
QUEEN ISABELLA.
VOYAGES
1–1492, SAN SALVADOR
2–1493, SAN DOMINGO
3–1498, COAST OF
SOUTH AMERICA RE-
TURNED IN CHAINS.
4–1502, COAST OF CENTRAL
AMERICA.
DIED; VALLADOLID, SPAIN, 1506.
A BOY COLUMBUS STUDIES NAVIGATION
REARING THE CROSS IN THE NEW WORLD
LAND DISCOVERED
AUG 3 1492
THE START
AND ISABELLA
1480 THE KING OF PORTUGAL REFUSES AID
ATLANTIC
OCEAN
COLUMBUS'S ROUTE ACROSS THE SEA. 1492.
LA RABIDA CONVENT

The American Indians

One of the great tragedies of modern history is the overthrow of the native Indians of America and the gradual assimilation of their race and civilization with that of the white man. Especially in North America their numbers and influence have declined greatly; in South and Central America frequent intermarriage with the conquering race has not prevented a decline in their number but it has resulted in greater influence on the race type and civilization.

The amount of material available for study of the Indian is enormous. Language, customs, dress, games and sports, all conceivable subjects have been investigated by experts. Our knowledge, especially of the Indians before the coming of the white man, is far greater than it was twenty-five years ago; the tribal classifications of the early enthnologists and anthropologists have long since been superseded; the character of the customs and habits, especially of the southwestern tribes, has been studied to great advantage with the aid of newly discovered ruins and relics.

Aside from this anthropological study there is the great field of the study of the Indians as a race and its divisions. Few of us realize that the Indians formed a great race, just like the Caucasian or Mongolian. In the outline below are given the principal groups or stocks and subordinate units called tribes. In addition to the outline it has seemed wise to give a few questions, all of which are answered in these volumes, and which may stimulate the reader to independent investigation.

Outline

I. The Indian Race
- (1) North America
  - (a) Arctic regions
  - (b) Temperate regions
- (2) Central America and Mexico
  - (a) Chapanecan
  - (b) Mayan
  - (c) Otomitlan
  - (d) Terascan
  - (e) Tehuantapecan
  - (f) Zapotecan
- (3) South America
  - (a) Arawakian
  - (b) Azmaran
  - (c) Caribian
  - (d) Tupian
  - (e) Tzonecan
  - (f) Zaparoan

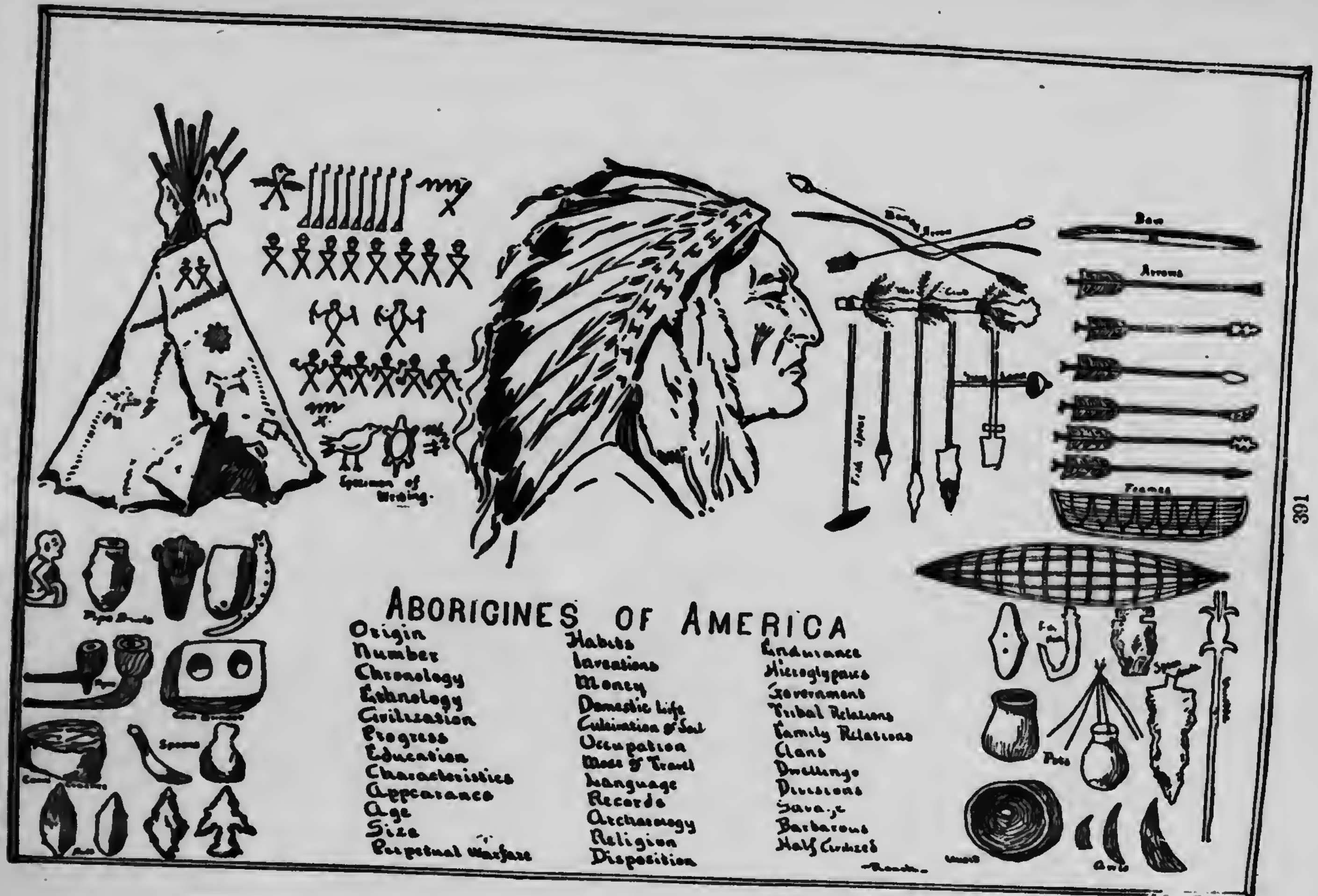
II. Dress
- (1) Skins
- (2) Woolens
- (3) Feathers
- (4) Shells
- (5) Bark

III. Sports and Games
- (1) Ball
- (2) Racing
- (3) Canoeing
- (4) Fishing
- (5) Hunting
- (6) Singing
- (7) Dancing
- (8) Wrestling

IV. Religion
- (1) Culture-hero or demi-god
  - (a) Part man
  - (b) To redeem the world
- (2) Tribal and local deities
- (3) Ceremonies
  - (a) Medicine-man as priest
  - (b) Dances
    - (1) Sun-dance
    - (2) Snake-dance
    - (3) Miscellaneous
  - (c) Songs
  - (d) Prayers
- (4) Philosophy
  - (a) Creation
  - (b) Future life

V. Government and Social Organization
- (1) Tribal or clan system
  - (a) Chieftain hereditary in clan
  - (b) Other civil and religious functions hereditary
- (2) Smaller units
  - (a) "Band" of the plains tribes
  - (b) Family
    - (1) Descent through the female line
- (3) Confederacies
  - (a) The Five Nations
  - (b) Creek
- (4) Slavery
  - (a) Captives and their descendants
  - (b) Negroes
- (5) Property rights
- (6) Marriage

VI. Arts and Industries
- (1) Abode
  - (a) Tents
  - (b) Mounds


ABORIGINES OF AMERICA
Origin
Number
Chronology
Ethnology
Civilization
Progress
Education
Characteristics
Appearance
Age
Size
Perpetual Warfare
Habits
Inventions
Money
Domestic Life
Cultivation of Soil
Occupation
Mode of Travel
Language
Records
Archaeology
Religion
Disposition
Endurance
Hieroglyphics
Government
Tribal Relations
Family Relations
Clans
Dwellings
Divisions
Savage
Barbarous
Half Civilized
Specimen of Writing.
Bow
Arrows
Fish Spear
Pots

ABORIGINES

Origin	Hab
Number	Inve
Chronology	Mo
Ethnology	Dom
Civilization	Culi
Progress	Occ
Education	Mo
Characteristics	La
Appearance	Re
Age	Ar
Size	Re
Perpetual warfare	Di

(c) Pueblos
(2) Agriculture
(3) Mining and working of metals
(4) Sculpture
(a) Stone
(b) Wood
(c) Bone and ivory
(5) Pottery
(a) Pipes
(b) Bowls
(c) Miscellaneous forms
(6) Basketry
(7) Blankets
(8) Miscellaneous

VII. Curious Customs
(1) Tattooing
(2) War-dance
(3) Scalping
(4) Forms of burial

VIII. History
(1) Contest with the white race for supremacy
(2) As a dependent race
(a) Homes
(h) Government
(c) Education
(d) Character

Indians in North America

The North American Indians are divided into a number of stocks or groups, based chiefly on language; each of these groups is divided into tribes. The lines of division are not always clear, but the principal groups, at least, are well-known and can be accurately classified. In the following classification only those tribes have been included which are still of some importance today; the smaller and the extinct tribes are not mentioned.

I. Algonquian

Arapahoe	Menominee
Blackfeet	Miami
Bloods	Nipissing
Cheyenne	Ottawa
Chippewa	Penobscot
Cree	Pottawatomi
Delaware	Sacs and Foxes
Kickapoo	Shawnee

II. Athapaskan

Apache	Jicarilla
Beaver	Navaho

III. Caddoan

Caddo	Wichita
Pawnee	

IV. Eskimo

Aleuts	Labrador
Greenland	Western

V. Iroquois

Cayuga	Oneida
Cherokee	Onondaga
Hurons	Seneca
Iroquois	Tuscarora
Mohawk	Wyandot

VI. Muskhogean

Chickasaw	Creek
Choctaw	Seminole

VII. Salishan

Flatheads	Spokan
Pend d'Oreille	Thompson
Lummi	

VIII. Shoshonean

Bannock	Pima
Comanche	Piute
Mission Indians	Shoshoni
Moki	Ute

IX. Sioux

Assiniboin	Kaw
Catawba	Omaha
Crow	Osage
Dakota	Ponca
Iowa	Winnebago

X. Minor Groups

Kiowa	Tanoa
Sahaptian	Yuma
Shasta	Zuni

Questions on the Indian

Who gave Indians their name? Why?

What are the Indian tepees or wigwam How were they made by the plains Indians! By those in the lake region? Why the difference!

How many Indians are found at present in North and South America? How many of this number resided in Canada in 1911?

How and of what material were the houses of the Pueblos constructed, and how arranged! What was peculiar about the houses in the lower tiers?

Without doors and windows, how did the Pueblos gain entrance to their homes?

By close observation of the Pueblo types as shown in colored illustration, what arts would you say were highly developed by this tribe?

In time of ceremony how did the Indians dress and decorate themselves? When and why did they paint their faces and bodies?

Have the Indians always used horses?

How and from what did the Indians make knives? Fish hooks? Needles? Axes? Pipes?

What did they make from rushes and grass? What was remarkable about some of their baskets? Did they know the art of making leather?

What games did the Indian boy play that were like those of his white brother?

What was the highest ambition of the Indian boy?

Where were the dead generally buried? What was generally buried with the deceased?

What were the duties of the medicine man? What were the great spirits of the Indians? How did they consider the wind? The rain? How did they regard every living thing?

What are Indian reservations?

Name five of the principal groups of tribes.

To which group do the following tribes belong: Arapahoe, Apache, Comanche, Crow, Seminole, Tuscarora, Omaha, Huron, Shawnee, Navaho?

What Indian maiden saved the life of Captain John Smith? Whom did she afterward marry?

What Indian name has been made world famous in one of Longfellow's poems.

What is meant by Indian summer?

By a study of the various types of the human race as shown in colored illustrations, how do the Indians compare in dress and intelligence with the Mongolian? With the negro?

What did the Indians of Mexico and Central America know of books, astronomy, arithmetic, etc., at the time the Spaniards invaded their country? How did their civilization compare with the Spaniards'?

What Indian nations inhabited Mexico and Central America when these countries were discovered by the Spaniards?

What did these Indians know about astronomy, arithmetic and other sciences?

How did their civilization compare with that of the Spaniards?

In what manufactures did they show great skill?

What Indians of South America possessed civilization equal or superior to that of the Indians of Mexico?

Flags

It seems probable that almost as soon as men began to meet for common purposes some conspicuous object was used either as a symbol of the common sentiment or as a rallying point. In military expeditions, where organization was necessary, such objects were used to mark out the lines and stations of encampment, and to keep in order the different bands on the march or in battle. In the course of time certain standards became known as belonging to certain regiments or tribes or even nations, as the case might be. The standards of individual lords and rulers were used by their retainers; as these rulers increased their dominion their flags gradually assumed the character of national flags.

Among the remains of the earliest civilizations are records of ensigns or standards. From ancient carvings and paintings it appears that different companies of the Egyptian army had their own standards, which were generally objects of awe and reverence; sacred animals, boats, a tablet bearing a king's name, and other devices were raised on the end of a staff, and the office of carrying them was considered a great privilege and honor. Among the ancient Assyrians two distinct designs are known to have existed: one, a man drawing a bow and standing on a bull; the other, two bulls running in opposite directions. Both Assyrian and Egyptian standards were frequently ornamented with flag-like streamers. The banners and standards of the Hebrews and other nations are frequently mentioned in the Bible. The Persians used the figure of an eagle fixed to the end of a lance, and sometimes the sun, as their divinity, was also represented. Some of the North American Indians carried eagle's feathers fastened to the tips of poles.

The standards of the Greeks and Romans show greater variety. The early Greeks bore a piece of armor fastened to a spear; in later times the cities chose emblems or letters sacred to their associations; the Athenians used the olive and the owl, the Thebans a sphinx, and the Messenians their initial M. Among the Romans a cross piece of wood was sometimes placed on the end of a spear and surmounted by a silver hand, figures of Mars or Minerva, or portraits of generals and emperors. Figures of animals, especially the wolf, horse, bear and eagle, were carried; it was not till the days of Marius that the eagle became the only standard of the legions. The emblems were guarded in the temples and the Roman soldier swore by his emblem as by his deities. Roman generals are known to have ordered a standard cast into the ranks of the enemy, in order to rouse their soldiers to a fiercer attack for the recovery of what to them was perhaps the most sacred thing on earth.

The earliest flags were almost purely of a religious character. In fact, the aid of religion seems to have been sought to give sanctity to national flags, many of which can be traced to a sacred banner, as the oriflamme of France and the Dannebrog of Denmark. The story goes that King Waldemar of Denmark, while leading his troops to battle in 1219, at a critical moment saw a cross in the sky. It was forthwith adopted as the emblem of Denmark and called the "Dannebrog," that is, the strength of Denmark. The standards of the early kings of France bore the blue hood of St. Martin; later the oriflamme, the emblem of St. Denis, was substituted. Similarly the cross of St. George was used in England, the cross of St. Andrew in Scotland, and the cross of St Patrick in Ireland.

Flags of the British Empire. The national flag of the British Empire is the Union Jack, in which the crosses of St. George, St. Andrew and

FLAG OF THE DOMINION

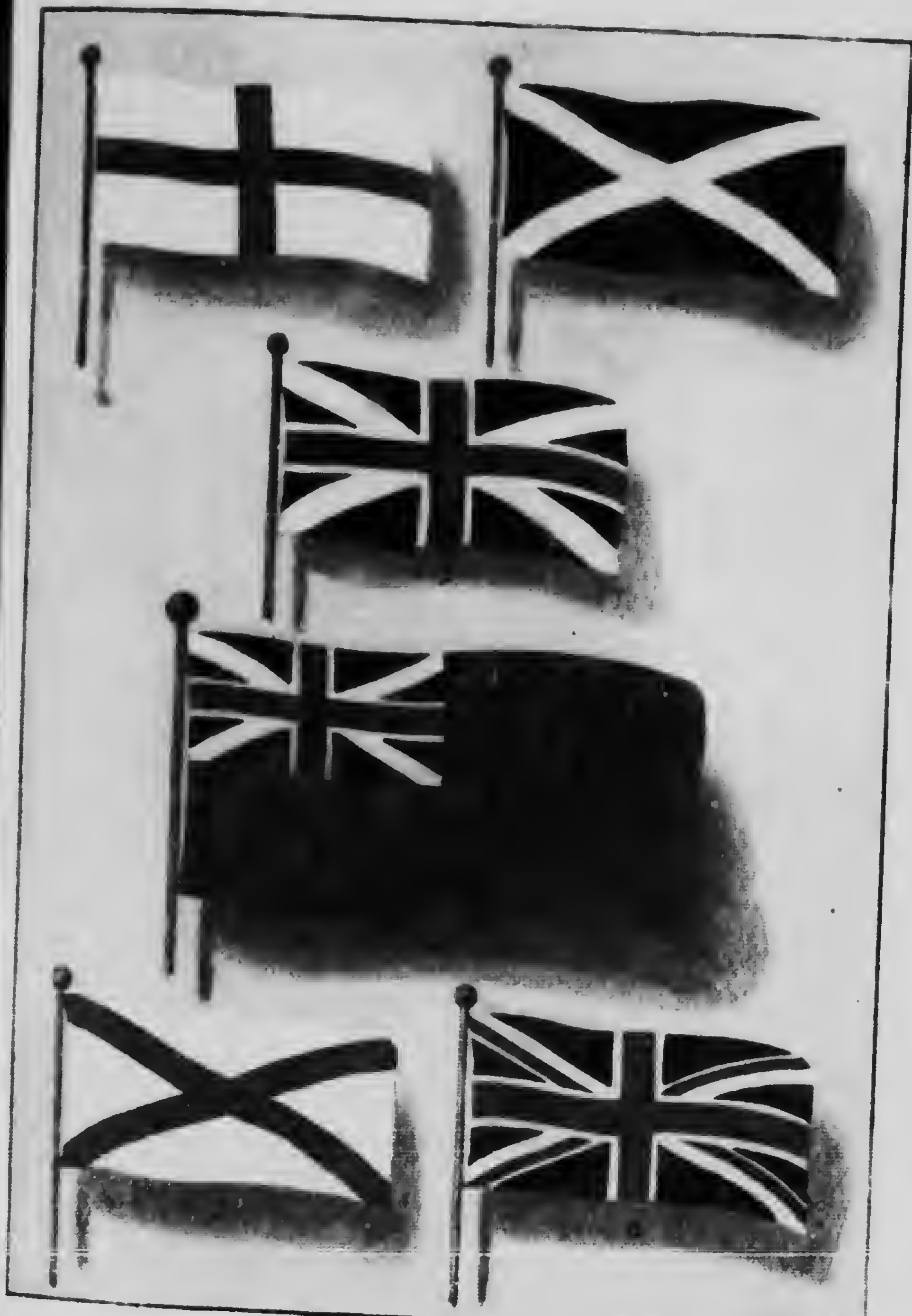
St. Patrick are combined. When the crowns of England and Scotland were combined under James I., he issued a proclamation that the flag of a man-of-war should be the "red cross commonly called St. George's cross, and the white cross commonly called St. Andrew's cross, joined together according to a form made by our heralds, and sent by us to our admiral to be published to our said subjects." This was the first Union Jack; strictly speaking, it should be called the "Great Union," and it is only a "jack" when flying from the jackstaff of a man-of-war. Probably the name of the king, "Jacques," the French for James, gave the name to the flag and then to the staff on which it was hoisted. Various changes were made by Cromwell and by Charles II, and in 1801, after the legislative union with Ireland, the cross of St. Patrick was added, so that the arrangement of the three crosses now in use was adopted. The Union Jack is the most important of all British flags and is flown by representatives of the empire all over the world. With the Irish harp on a blue shield in the center, it is the flag of the lord lieutenant of Ireland. The star and arms of the order of the Star of India indicate the flag of the Viceroy of India. Colonial governors use it with the arms of their colonies displayed in the center. With the royal arms in the center it is used by the British government's diplomatic representatives and also as a military flag, flown over fortresses and headquarters. When it is hoisted at the mainmast of a man-of-war it is a sign that the admiral of the fleet is on board.

The royal standard is divided into four quarters. The upper left-hand and lower right-hand quarters have three lions in gold on a red field; these are for England. In the upper right-hand quarter is a single lion within a frame, both red on a field of gold. The golden Irish harp on a blue field is in the lower left-hand quarter.

The three ensigns—the red, the white and the blue—were originally all naval. In the days of huge fleets, such as that which met the Armada, there were three admirals, each with his special ensign. The admiral in command used a plain red flag. The vice-admiral, who generally commanded the van, used a white flag, and the rear-admiral a blue one. All these three flags later bore the combined crosses of St. George, St. Andrew and St. Patrick, and until 1864 they were used only by the royal navy. By a change in the regulations in that year, the navy retained only the white ensign, the mercantile marine was allowed to use the red ensign and the blue ensign was given to all vessels on public service except those of the navy. For the various departments of government, special devices are used; for instance, the telegraph uses a blue ensign on which is represented Father Time with his hour-glass shattered by lightning.

The Union Jack is flown from all fortresses and garrisons of Canada, under the charge of the colonial militia authorities. The Dominion also has authority to display on all public occasions a national flag. This is the red or blue ensign with the Union Jack in the upper corner next to the mast and the Dominion coat of arms in the field. The red ensign is used at the opening and closing of Parliament and on national occasions of any sort. As in England, the blue flag distinguishes the government vessels.

The governor-general uses a plain Union Jack with the Dominion coat of arms surrounded



THE BRITISH FLAG

... of St. George. 2.—Scotch Jack, Cross of St. Andrew. 3.— ... Cross of St. George and St. ... Union Jack of Queen Anne, 1707. 4.—Red Ensign of Queen Anne ... Combination of the Union Jack of Queen Anne and the ... Cross of St. Patrick fiercer attack for the recovery of what to them was perhaps the most sacred thing on earth.

The earliest flags were almost purely of a religious character. In fact, the aid of religion seems to have been sought to give sanctity to national flags, many of which can be traced to a sacred banner, as the oriflamme of France and the Dannebrog of Denmark. The story goes that King Waldemar of Denmark, while leading his troops to battle in 1219, at a critical moment saw a cross in the sky. It was forthwith adopted as the emblem of Denmark and called the "Dannebrog," that is, the strength of Denmark. The standards of the early kings of France bore the blue hood of St. Martin; later the oriflamme, the emblem of St. Denis, was substituted. Similarly the cross of St. George was used in England, the cross of St. Andrew in Scotland, and the cross of St Patrick in Ireland.

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FLAG OF THE DOMINION

St. Patrick are combined When the crowns of England and Scotland were combined under James I., he issued a proclamation that the flag of a man-of-war should be the "red cross commonly called St. George's cross, and the white cross commonly called St. Andrew's cross, joined together according to a form made by our heralds, and sent by us to our admiral to be published to our said subjects." This was the first Union Jack; strictly speaking, it should be called the "Great Union," and it is only a "jack" when flying from the jack-staff of a man-of-war. Probably the name of the king, "Jacques," the French for James, gave the name to the flag and the staff on which it was hoisted. Various changes were made by Cromwell and by Charles II, and in 1801, after the legislative union with Ireland, the cross of St. Patrick was added, so that the arrangement of the three crosses now in use was adopted. The Union

Jack is the most important of all British ... and is flown by representatives of the ... all over the world. With the Irish harp ... blue shield in the center, it is the flag of the ... lieutenant of Ireland. The star and ... the order of the Star of India indicate the ... of the Viceroy of India. Colonial govern... it with the arms of their colonies display... the center. With the royal arms in the ... it is used by the British government ... matic representatives and also as a mili... flown over fortresses and headquarters. ... it is hoisted at the mainmast of a man ... it is a sign that the admiral of the fleet ... board.

The royal standard is divided into quar... ters. The upper left-hand and lower right ... quarters have three lions in gold on a re... these are for England. In the upper right ... quarter is a single lion within a frame ... on a field of gold. The golden Irish ... blue field is in the lower left-hand quarter.

The three ensigns—the red, the white ... blue—were originally all naval. In ... huge fleets, such as that which met the ... there were three admirals, each with ... ensign. The admiral in command ... red flag. The vice-admiral, who ... manded the van, used a white flag ... admiral a blue one. All these ... bore the combined crosses of St. ... Andrew and St. Patrick, and ... were used only by the royal navy ... in the regulations in that year, the ... only the white ensign, the ... was allowed to use the red ensign ... ensign was given to all vessels ... except those of the navy. ... departments of government, ... used; for instance, the telegraph ... ensign on which is represented ... with his hour-glass shattered by ...

The Union Jack is flown from ... and garrisons of Canada under ... the colonial militia authorities. ... also has authority to display ... sions a national flag. This ... ensign with the Union Jack ... ner next to the mast and the ... arms in the field. The red ... the opening and closing of P... national occasions of any ... the blue flag distinguishes the ...

The governor-general ... Jack with the Dominion ...

THE BRITISH FLAG

1—English Jack, Cross of St. George. 2—Scotch Jack, Cross of St. Andrew. 3—Crosses of St. George and St. Andrew, combined to make the Union Jack of Queen Anne, 1707. 4—Red Ensign of Queen Anne. 5—Irish Cross of St. Patrick. 6—Present Union Jack, a combination of the Union Jack of Queen Anne and the Irish Cross of St. Patrick.

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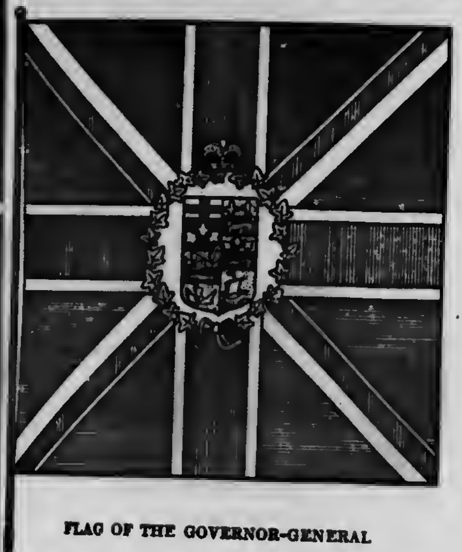
by a garland of maple leaves and surmounted by a crown. The Union Jack is flown at the government house at Ottawa and at the provincial capitols on ordinary occasions. On the King's birthday and on the days of his accession and coronation the royal standard is flown. The lieutenants-governor of each province has a flag, displaying the provincial arms (see page 293 and following) surrounded by a wreath of



FLAG OF THE GOVERNOR-GENERAL

maple leaves on the white ground of the Union Jack.

The colored plates accompanying the article on *Flags* in Volume II show the flags of the United States and of a number of foreign nations. A further aid to the study of this interesting subject will be found in the outline and questions which follow:

Outline on Flags

I. Meaning of the Term

II. Uses

- (1) Primary
  - (a) Rallying point in battle
  - (b) Emblem of nationality
  - (c) Religious emblem
- (2) Secondary
  - (a) To distinguish divisions of army in war
  - (b) To denote rank of officers in army and navy
  - (c) Private emblems
  - (d) Signs or signals
    - (1) Quarantine
    - (2) Flag of truce
    - (3) Sign of distress
    - (4) Sign of respect to superior officers
    - (5) Mourning
    - (6) Signals at sea
    - (7) Salute
    - (8) Danger

III. History

- (1) Ancient Standards
  - (a) Egyptian
  - (b) Assyrian
  - (c) Persian
  - (d) Greeks
  - (e) Roman
    - (1) Eagle for infantry
    - (2) Cavalry emblems
    - (3) Imperial
- (2) Medieval flags (of cloth)
  - (a) Religious
    - (1) St. George
    - (2) St. Andrew
    - (3) St. Patrick
    - (4) St Martin
    - (5) St. Denis
  - (b) Knightly
    - (1) Pennon
      - (a) Like modern pennant
      - (b) Personal ensign
    - (2) Banner
      - (a) Denoted leader of military expedition
      - (b) Battle flag
      - (c) Also personal ensign
    - (3) Standard
      - (a) Ceremonial
      - (b) Denoting position of the owner
      - (c) Not carried into battle
- (3) Modern national flags
  - (a) England
    - (1) Royal standard
    - (2) Union Jack
    - (3) Royal navy
    - (4) Ensigns
    - (5) Colonial
  - (b) Canada
    - (1) National
    - (2) Governor-general
    - (3) Lieutenant-governor
  - (c) Germany
    - (1) Imperial standard
    - (2) Imperial navy
    - (3) Mercantile marine

(d) France
   (1) Oriflamme
   (2) Fleur-de-lis
   (3) Tricolor
(e) Austria-Hungary
   (1) Imperial navy
   (2) Mercantile marine
   (3) Imperial standard
(f) Italy
   (1) Man-of-war
   (2) Mercantile marine
   (3) Royal
(g) Spain
   (1) Navy
   (2) Mercantile
(h) United States
   (1) National Flag
   (2) Union flag and Jack
   (3) President's standard
   (4) Naval and military flags
(i) Other countries

Questions on Flags

What were the primary uses of flags and standards?

What are some of the secondary uses?

What were some of the devices used as standards by the ancient Egyptians?

What were some of the Roman standards? What finally became the only standard of the legions?

What other ancient peoples are known to have used flags or standards?

What was the character of the earliest flags?

What were the three classes of knightly standards in the Middle Ages?

Describe the oriflamme

What is meant by "Dannebrog"? Why was the term applied to this cross?

Describe the national flags of France, Russia and the Netherlands

What is the difference between the national flags of Italy and Mexico?

What do the stars and the stripes of the American flag represent? How many of each are there?

Describe the British merchant flag.

Explain the origin of the red, white and blue ensigns.

When did the white ensign become the official flag of the imperial navy?

What is the probable origin of the name "Union Jack"?

What three crosses are combined in the present Union Jack?

What changes make it the flag of the lord-lieutenant of Ireland? Of the viceroy of India? Of a colonial governor?

What does it indicate when it flies from the mainmast of a man-of-war?

Describe the ensign used by the British telegraph branch.

How many divisions are there on the royal standard? Describe each of them.

What is the national flag of the Dominion?

On what special occasions is it used?

Why should every child be taught to love the flag of his country?

Famous Inventions and Discoveries

History, in the broadest sense of the word, has been defined to include "everything that has happened." A nation's progress is measured by many factors, by its territorial expansion, by governmental development, by social and industrial growth. At first glance a table of great inventions and discoveries may seem to have no place in history; yet it is true that all great inventions have exercised some influence, whether direct or indirect, on the progress of nations. Few of us realize that the persistency of slavery as an institution in the United States was due largely to the profits made possible by the invention of the cotton gin. Not many of us are conscious every day of our lives that the great internal development of the Dominion would have been impossible without the railroad, the steamboat and the telegraph. Many people still living can appreciate the difference that the telephone and the telegraph have made in the development of Canada. If telegraph and cable systems had been in use in 1815, the battle of New Orleans would never have been fought, for the treaty of peace had been signed two weeks before. Numberless instances might have changed or actually did change the course of events, but enough has been said to show that great inventions and discoveries have a proper place in the study of history, just as much as laws, battles or statesmen. On the next page is a table of some of the great inventions which have influenced life and history in modern times. The remarks explain as briefly as possible the character and importance of each device or process. It is hoped that this outline may be an added help to teacher and parent in enlisting the child's interest in some of the improvements of modern civilization.

Discovery or Invention	Date	Discoverer or Inventor	Remarks
Submarine Boat......	1775	David Bushnell......	As developed by later inventors, this invention has resulted in the construction of a new type of war vessel; its practical uses have already been demonstrated.
Cotton Gin...........	1792	Eli Whitney..........	The cotton gin reduced the labor of separating the fiber from the seed; made the American cotton industry possible, and through it enabled this country to supply a large part of the cotton used throughout the world.
Steamboat...........	1807	Robert Fulton........	Revolutionized transportation on the water; made definite time schedules possible for boats, and has reduced the time for crossing the Atlantic from several weeks to less than one week.
Use of Anthracite.....	1812	Josiah White and Erskine Hazard....	Made the use of anthracite for fuel possible; placed at the disposal of the country the vast quantity of anthracite coal, and provided a source of fuel which could be transported to all parts of the country. One of the most influential discoveries on industries.
Locomotive...........	1830	Stephenson........... (English)	The first American-built locomotive was made in New York: without the development of railway building the enormous expansion of the United States would have been impossible
Reaping Machine.....	1834	C. H. McCormick......	This machine is doubtless the most useful of agricultural inventions. It reduced the labor of harvesting to such an extent as to make possible the great farms in the grain growing regions of the world.
Vulcanizing Rubber...	1837	Charles Goodyear....	The discovery that the addition of sulphur renders rubber elastic, waterproof, and unchangeable in texture has been responsible for the application of rubber to hundreds of new uses.
Friction Matches.....	1837	John Walker (English) Alonzo Phillips......	
Telegraph............	1837	S. F. B. Morse........	The introduction of this invention has been of untold benefit to every civilized nation. Made possible almost instant communication between distant points. Its influence upon commerce is beyond measure.
Screw Propeller.......	1839	John Ericsson.......	This device perfected the steamboat and changed the plan of ocean steamers, resulting ultimately in the modern ocean liner.
Use of Ether.........	1842	Dr. C. W. Long......	This relieved the pain and distress attendant upon surgical operations, and has made modern surgery possible.
Submarine Cable.....	1842	S. F. B. Morse........	This is but another application of the telegraph. Its use practically brings all parts of the world together, making it possible to communicate within a few minutes with points thousands of miles away.
Sewing Machine......	1846	Elias Howe...........	This machine was to the manufacture of clothing what the reaper was to the harvesting of grain. It made the factory system of manufacturing clothing possible.
Cylinder Printing Press..............	1847	Robert Hoe.........	This form of press has made possible the rapid printing of newspapers and magazines in large quantities at low cost.
Petroleum...........	1853	Dr. Brewer..........	The discovery of petroleum as an illuminant practically changed the methods of illumination throughout the country, producing a useful and strong illuminant at such a price as to bring it within the reach of all.
Gatling Gun.........	1861	Richard Gatling.....	The adoption of the rapid-fire machine-gun has revolutionized modern warfare.
Typewriter...........	1868	Chas. L. Shoals......	The typewriter is an important invention for business purposes. Its use has practically changed the methods of correspondence and greatly systematized the office methods.
Telephone............	1876	Alex. G. Bell........	The telephone has made it possible to converse at long distances. In a great measure it has taken the place of the telegraph, and in cities and towns has become indispensable to the transaction of business.
Phonograph..........	1876–88	Edison..............	Originally merely a toy and a diversion, the phonograph is now of great commercial importance; various forms are in use as dictating machines and other appliances in daily business use.
Incandescent electric Light.............	1879	Edison..............	The perfection of this invention and its commercial development have made possible central lighting systems in large establishments and easy regulation of the quantity of light.
Steam Turbine.......	1884	Parsons, De Laval ...	The application of the steam turbine to steamships in 1897 revolutionized marine transportation.
Wireless Telegraph....	1897	Marconi.....	Marconi was the first to demonstrate the practical uses of wireless telegraphy. His system is now in use in all parts of the world, and has become especially valuable for communication with vessels at sea.

History of Canada Since Confederation

To treat adequately the four centuries of Canadian history, through the periods of exploration, colonization, conquest and union, is a task out of proportion to the scope of this book. But it seems fitting that the student and teacher should have material on the history of Canada as a nation. For this reason the period of Confederation, or the movement for Confederation, as it is generally called, has been chosen as the starting point of the brief statement of the principal events in the history of Canada. In the article on Canada in Volume I and in the outline on pages 407 to 409 of this volume will be found additional material for a more extended study of the subject. The outline should be expecially useful, as it presents all the facts in simple form.

The Confederation Movement. The idea of a federal union—one in which there would be a central government, while each province retained its local administration—was by no means a new one in 1864. Lord Durham (see page 150) recommended union in 1840, and Dorion (see page 148) and others had suggested it at various times later. The cause of the discussion of a federal union was the endless friction between Upper and Lower Canada. In the Canadian Parliament, as established by the Act of Union, the two provinces had equal representation. In the next twenty years the population of Upper Canada (now Ontario) had increased very rapidly, so it was 250,000 more than that of Lower Canada. Upper Canada demanded more representatives in Parliament; "representation by population" was the cry of the reformers. The people of Lower Canada, however, pointed out that for many years their population had been greater than that of Upper Canada, and yet the representation had been the same. Other local causes only added to the constant irritation between the two sections. In Parliament the parties were so evenly balanced that deadlocks became common occurrences. Sir John Macdonald, in describing the situation, said: "We had election after election, we had ministry after ministry, with the same result. Parties were so evenly balanced that the vote of one member might decide the fate of the administration."

Such a state of affairs naturally led to plans for a federal union of the two Canadas, and then of all the provinces. In every province were men of all parties who later joined hands in the common cause of union. Yet it remained for external affairs to crystallize public sentiment. During the American Civil War occurred the Trent Affair (see Volume V), which threatened to drag the United States and Great Britain into war. The mere possibility of a war with the United States showed the provinces their weakness, and led to a meeting at Charlottetown, in 1864, when delegates from New Brunswick, Nova Scotia and Prince Edward Island met to form a maritime union. Meanwhile the idea of a union of all the provinces was gaining ground in the Canadas. At last, in 1864, a joint ministry of Liberals and Conservatives was formed and pledged to seek a federal union. When the Canadians heard of the meeting at Charlottetown, they asked to be allowed to take part in it. Eight representatives, including Sir John Macdonald, Hon. George Brown and Sir Georges E. Cartier, were sent to Charlottetown. Here the broader scheme of confederation was discussed, and the idea of a maritime union was left in the background. The delegates agreed to meet again at Quebec for the purpose of discussing confederation.

The Fathers of Confederation. A month later the Quebec Conference began. Thirty-three delegates from Canada, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland, assembled in the old Parliament buildings. These "Fathers of Confederation" were men of French, English, Irish and Scotch descent. No more suitable presiding officer could have been chosen than Etienne Paschal Taché, a veteran of the War of 1812, who made the famous remark that "the last gun that would be fired for British supremacy in America would be fired by a French-Canadian." The delegation from Canada was headed by Sir John A. Macdonald, who had already played an important part in public life. Sir Alexander Galt, Sir Oliver Mowat, Hon. William McDougall, Sir Georges Cartier, Hon. George Brown, Sir Charles Tupper, Sir Adams G. Archibald and Sir Samuel Leonard Tilley were among the other leaders in the conference. "No greater achievement," says a popular history, "has marked the progress of our country than the uniting of the British North American provinces; there are no names more worthy of a high place in the memory of Canadians than those of the Fathers of Confederation." After considerable discussion, the Quebec Conference adopted a set of seventy-two resolutions, which formed the basis of the British North America Act. It unanimously agreed "that the best interests and present and future prosperity of British North America will be promoted by a federal union under the crown of Great Britain, provided such union can be effected on principles just to the several provinces." The British government welcomed the new plan, as did both Upper and Lower Canada. Newfoundland absolutely refused to consider it and has remained an independent province to this day. Prince Edward Island refused to enter the confederation, but New Brunswick and Nova Scotia, after a year's uncertainty, decided in its favor.

OLD BISHOP'S PALACE, QUEBEC, WHERE FIRST PARLIAMENT OF LOWER CANADA MET IN 1792

Meanwhile a delegation was sent to London to help in the preparations of the law which should make the resolutions effective. Here as at Quebec, Sir John Macdonald, ably seconded by Sir Charles Tupper and others, took a leading part. In March, 1867, the British North America Act was passed and on May 22, a proclamation by Queen Victoria declared that the new constitution should come into effect on July 1. The birthday of the Dominion has been fixed as a public holiday and is observed each year as "Dominion Day." Lord Monck, who had been governor of Canada, was appointed governor-general of the Dominion. At his request Sir John Macdonald formed a ministry, composed of prominent men from each province. The first general election was held in August, and except in Nova Scotia was favorable to the administration. In Nova Scotia agitation for repeal of the union had arisen, under the leadership of Joseph Howe (see page 161). Howe went to London to advocate repeal, but the British government made it clear that the withdrawal of Nova Scotia from the Dominion was impossible. Though the open disturbances were thus brought to an end, bitter feeling remained for many years.

The new government had many problems to face. It had to respect the prejudices and the wishes of the separate provinces; yet it had to subordinate these to the best interests of the new Dominion. The reorganization of the government held the attention of the first Parliament. The postal system was put on a firm footing and the rates were reduced. In 1868 the militia was organized, the tariff was systematized and a civil service act was passed. In the next year a system of decimal currency was adopted for the whole Dominion. In this way the machinery of state soon began to run smoothly.

Red River Rebellion. A month after the opening of the first Parliament a new question was brought before the government. Hon. William McDougall (see page 168) introduced a resolution asking that Prince Rupert's Land and the Northwest Territories be added to Canada. With Sir Georges Cartier, he was sent to London to negotiate the purchase of the Hudson's Bay Company's territorial rights. The purchase was finally completed in 1868, the Company surrendering its control over all land except a small part in the south, but retaining its trading posts and its trading rights. The deed of surrender is dated November 19, 1869. Several weeks before, Hon. William McDougall had been appointed governor of the territories and had started for Fort Garry (now Winnipeg). Meanwhile disturbances were beginning in the west. The Métis, or half-breeds, were afraid that the new government would in some way take away their rights. Louis Riel (see page 179) was at the head of this movement in opposition. He organized a provisional government of which he was elected president. When the new governor reached the boundary line, he was met by a crowd of Riel's followers and prevented from entering the territory. A number of the white settlers opposed the provisional government, and one of them, Thomas Scott, was tried for treason and executed. This cold-blooded murder excited great indignation throughout the Dominion. An armed force, composed partly of Canadian volunteers and partly of British regulars, was placed under the command of Colonel (later Lord) Wolseley. On the approach of these troops, the rebels quickly dispersed and Riel fled to the United States. While the troops were on the march, Parliament had passed an act establishing the province of Manitoba. The arrival of the soldiers was followed almost immediately by the first lieutenant-governor, Sir Adams Archibald, who organized the provincial government.

New Provinces. Manitoba was thus the first new province to be formed under the provisions of the British North America Act. In 1871, British Columbia decided to join the Confederation. The Dominion of Canada now extended from ocean to ocean. The entry of British Columbia was subject to a very important condition, namely, that a transcontinental railway should be begun within two years and completed within ten years. This condition, as we shall see, was a disturbing factor in politics for many years. Fifteen years were to elapse before the railroad was completed, but with the driving of the last spike British Columbia was firmly bound to the Dominion

In 1873 Prince Edward Island, which had steadily refused to enter the Dominion, reconsidered its decision. The Dominion government assumed the heavy financial obligations of the province and bought out the rights of certain absentee owners of lands. The Dominion now included all of British North America except Newfoundland. Finally, in 1878, in order to remove all possible doubt about unoccupied territory, an imperial order in council was issued, annexing to the Dominion all British possessions in North America except Newfoundland.

Relations with the United States. As the result of the Civil War several disputes arose between the United States on one side and Canada and Great Britain on the other. In 1871 an attempt was made to settle all differences by the appointment of a joint commission. Sir John Macdonald was Canada's representative, this being the first time that a colonial had ever been called upon to assist in settling international disputes. The commission met at Washington, the capital of the United States, in February, 1871. The United States claimed that Great Britain should pay for the damages inflicted by a Confederate vessel, the *Alabama*, which had been fitted out in England. (See *The Alabama*, Volume I). This claim was arbitrated and decided in favor of the United States. Canada's claim for damages on account of the Fenian raids was withdrawn at the request of the British Government. In return for the surrender of these claims, Great Britain guaranteed a loan for the construction of Canadian railways. The navigation of the St. Lawrence and the Great Lakes was thrown open to both countries. The boundary of British Columbia was now definitely established and a commission to determine the value of the fisheries was appointed. The fisheries commission, which met at Halifax, granted the United States unrestricted use of Canadian waters for ten years in return for a payment of $5,500,000. The Treaty of Washington thus disposed of many troublesome questions.

The Pacific Railway Scandal. One of the conditions of British Columbia's entrance into the Confederation was the building of a transcontinental railway. In 1872, therefore, this problem was faced by Parliament. Two companies sought the charter, one headed by Sir

Hugh Allan, the other by Hon. David Macpherson. While negotiations were under way to unite the two companies, a member of the House of Commons made a public charge that certain members of the government had received and used money furnished by Sir Hugh Allan to influence voters in the elections of 1872. These charges were never proved, but the evidence was clear that Allan had paid large sums of money, evidently on condition that his company receive the contract. Public feeling was so strong that the Macdonald ministry felt it necessary to resign in October, 1873. Hon. Alexander Mackenzie, the Liberal leader, immediately formed a new ministry, which received an overwhelming majority at the general elections. The new premier announced that it would be impossible to build the road as had been planned. He proposed that the Dominion government should undertake the enterprise and build the railway gradually, as the finances of the country permitted. But British Columbia insisted on having the road built at once. Finally a compromise was arranged: the government agreed to build a wagon road and telegraph line at once and to complete the railway by 1890.

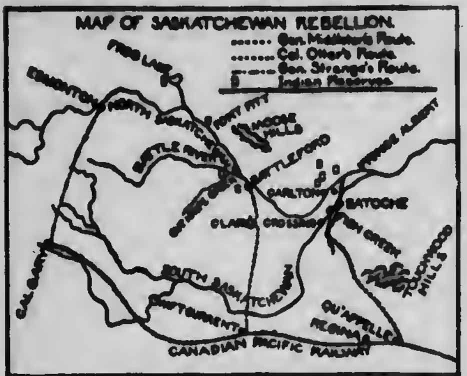
Mackenzie's Administration. During the years that the Mackenzie ministry remained in power many important measures were proposed and passed. One of the most noteworthy was the establishment of the Dominion Supreme Court in 1873; another was the introduction of the Australian ballot system (see *Ballot*, Volume I). Another great change, of a totally different character, was the organization of the Northwest Territories. No sooner was order restored after the Red River Rebellion than settlers began to flock into the west. Until 1876 the whole district was governed by the lieutenant-governor of Manitoba and a council of eleven members. After that year only Keewatin was retained under the personal control of Manitoba's governor and the other districts were united under a resident governor and a council of five. The opening of the west to settlement brought the Northwest Mounted Police (see page 220). Though the idea originated with Sir John Macdonald, it was in Mackenzie's administration that the organization of the force was completed. The Liberal government introduced many improvements, but it was seriously hampered by Conservative strength in the Senate and by a strong opposition in the House of Commons itself. Then, too, the popularity of the government suffered because of poor business conditions. Great depression prevailed in the United States following the panic of 1873. The factories of the United States now tried to flood the Canadian markets with goods which they could not sell at home. This gave the opposition a chance to adopt what Sir John Macdonald called a "national policy." This was simply a protective tariff and a cry of "Canada for the Canadians." The tariff became the principal issue in the elections of 1878, by which the Conservatives were returned to power.

The year 1878 also marked the end of Lord Dufferin's term of office as governor-general. He was succeeded by the Marquis of Lorne, whose wife, Louise, was the daughter of Queen Victoria.

Conservatives in Power. Sir John A. Macdonald immediately took up again the question of a transcontinental road. He discarded Mr. Mackenzie's plan to have the government build the railway and awarded the contract to a group of capitalists. Two prominent members of the new Canadian Pacific Railway Company were Lord Mount Stephen and his cousin, Lord Strathcona. The road was to be completed by 1890, but the work was pushed so vigorously that Lord Strathcona drove the last spike in November, 1885. Without such great transcontinental railways permanent union of the east and west would probably be impossible.

The Riel Rebellion. After the Red River Rebellion each half-breed had been given 240 acres. As the settlements spread, many of the Métis gave up their lands and settled farther west, on the banks of the Saskatchewan. The opening of the new railway brought to a head the discontent which had been rising among the half-breeds. Their natural unrest was increased by the fear that their lands, to which they had no title, would be seized by settlers and speculators. Some dissatisfaction was felt, too, with the government's land survey, which interfered with the old French plan of having all the farms fronting on the river. While affairs were still in this state of unrest, Louis Riel was called on by some of his friends to lead the half-breeds. At first Riel was moderate in his demands, but an accidental encounter of the Mounted Police with a band of Métis at Duck Lake started open rebellion.

The news of this affair at Duck Lake was the signal for a rising among the Indians. The Crees, fortunately, were the only tribe to join the Métis, but there was always constant danger that other Indians might rise. When the news of the outbreak reached Ottawa, the government took prompt action. The distance from Ottawa to Batoche, the center of the rising, 1,840 miles, was a great obstacle, but within less than two months, 4,500 men were in the field under the command of General Middleton. The troops were divided into three columns: one, under General Middleton, was to advance from Qu'Appelle to Batoche; another, under Colonel (later Brigadier-General) Otter, was to advance



from Swift Current to Battleford; and the third, under General Strange, was to march from Calgary to Edmonton. General Middleton's column met the Métis near the junction of Fish Creek with the Saskatchewan River. Two days later the Métis were badly defeated at Batoche. Meanwhile Colonel Otter's force had met the Indians under Poundmaker and the third column was proceeding to his relief. Riel, Poundmaker and Big Bear, another Indian chieftain, were soon captured and the rebellion was at an end. Riel was tried at Regina, was found guilty of treason and was hanged. The greatest influence of the rebellion was on the Dominion as a whole rather than upon the Northwest alone. All the provinces were interested in suppressing the revolt. Common hardships and common dangers "strengthened in the hearts of Canadians the union which Confederation had brought about."

Political Affairs. In the general election of 1887 the principal issue was the protective tariff, but the Macdonald ministry also sought approval of its policy toward the rebellion in the Northwest. On both issues the voters expressed their confidence in the ministry. From 1887 to 1891 the tariff continued to be a serious question, the Liberals constantly agitating for closer trade relations with the United States. The Conservative party, on the other hand, took the position that commercial union would eventually lead to political union. The election of 1891 practically made protection the settled policy of the country. Shortly after the election Sir John Macdonald died. The student of Canadian history must study the life of this man (see page 167). For forty years he was active in political life, and for one-half of the period he was the dominant force in Canada. Under his direction were formed the policies which have made Canada a great confederated state.

During the next five years a series of deaths weakened the Conservative party. Sir John Macdonald's successor as premier was Sir J. J. C. Abbott, but he retired after a year on account of ill health. From 1892 to 1894 Sir John Thompson was premier. An earnest man who said little, he would probably have done much more for his country had he lived to carry out his plans. During his term of office the Bering Sea controversy (see Volume I) was settled in favor of Canada, Thompson being Canada's representative on the commission which decided the question. The ministry of Sir Mackenzie Bowell, the next premier, was marked by quarrels in the Conservative ranks. In 1896 the ministry was reorganized with Sir Charles Tupper as premier, but at the general elections of that year the Liberals were victorious by a large majority.

The Laurier Ministry. Sir Wilfrid Laurier, who had succeeded Hon. Edward Blake as leader of the Liberals, was called on by Lord Aberdeen to form an administration. The new ministry was strengthened by drawing into it the premiers of Ontario, New Brunswick and Nova Scotia. The next fifteen years show a remarkable development of national feeling and material prosperity. The growth of the strong feeling of Canadian unity and individuality has been no less marked than the growth of the ties which bind Canada to the empire. This has been illustrated in many ways. The outbreak of the war in South Africa in 1899 gave an opportunity to show Canada's loyalty. Three contingents of troops saw active service in the field. In 1894 the first colonial conference at Ottawa was a step in the same direction. This spirit was illustrated in other ways. The laying of a Pacific cable, the establishment of penny postage throughout the empire, the grants of preferential tariffs to British goods, the assumption of responsibility for defence at Halifax and Esquimalt

—these are merely instances of the truly national spirit which has been developed. National defence is under the control of the Dominion government. After Confederation all British troops were withdrawn, but it was only a few years ago that the British naval stations at Halifax and Esquimalt were turned over to Canada.

The Militia. The Canadian militia is under the control of the militia council, whose chairman is the minister of militia and defence. The other members of the council include the chief of the general staff, the adjutant-general, the quartermaster-general, the master-general of ordnance and the deputy minister of militia and defence. There is a permanent militia of 1,000 men and an active militia of 47,000 men, serving for three years and drilling only a certain number of days each year. With certain exceptions, all the male inhabitants of the country between the ages of eighteen and sixty may be called out for service.

The Canadian Navy. After the war in South Africa had proved Canada's willingness to furnish land forces to fight the battles of the empire, the thoughts of the people turned toward a navy. In 1910 the Dominion Parliament passed the naval service bill. This act provided for the beginning of a navy, a naval college, a navy volunteer force and a naval reserve. The naval college was soon established at Halifax and boys were admitted after competitive examination. Two protected cruisers, the "Niobe" and the "Rainbow" were then purchased from the British government and were sent to Canadian posts—the "Niobe" to Halifax and the "Rainbow" to Esquimalt. Thus the Canadian navy was established.

Foreign Relations. When we consider the greatness of the questions sometimes involved, it is a source of gratification that all our difficulties with other nations have been settled without the use of arms. In the last decade several important agreements have been made with the United States. In 1903 the Alaskan boundary dispute was settled. In the same year the many questions relating to the use of the international waterways led to the appointment of a joint commission to arbitrate all disputes. In 1908 an agreement was reached to provide for more accurate marking of the boundary line between the United States and Canada. At the same time the fisheries claims were being arbitrated by the court of arbitration at The Hague. The decision of this tribunal upheld the claims of Canada and Newfoundland on all the important questions raised.

Another step of great importance was the negotiation of a commercial treaty with France in 1907. This was striking evidence of the growing influence of Canada and a practical acknowledgment of her right to be considered in the making of treaties which concerned her interests. The treaty was negotiated by two Canadians and was ratified by the Canadian Parliament.

Alberta and Saskatchewan Provinces. The end of the nineteenth century saw great changes in the Northwest Territories. A rapid increase in population led the government to realize that the temporary territorial organization was no longer satisfactory. In 1905 the districts of Alberta, Assiniboia, Saskatchewan and Athabasca were formed into two provinces, Alberta and Saskatchewan. Saskatchewan is now entitled to four senators and fifteen members of the House of Commons in the Dominion Parliament and Alberta to four senators and twelve members of the House of Commons.

Quebec Tercentenary. For several years previous to 1908 there had been much discussion of the advisability of a great celebration to commemorate the three hundredth anniversary of the founding of Quebec by Champlain.

In September, 1907, His Excellency Lord Grey advocated as a leading feature of the celebration the acquisition of the Plains of Abraham and the battlefield of Sainte Foy and the making of these battlefields into a national park. This idea, which had been given first public utterance three years before by Mr. Chouinard, editor of the Quebec *Telegraph*, met with universal approval in the Dominion and was sanctioned by the King, who contributed liberally towards its consummation. The nature and objects of the plan and the historical situation were clearly set forth by Lord Grey in an address at a public meeting in Ottawa. He said:

"The immortal associations which cling around the battlefields of Quebec are the precious inheritance of Englishmen, Scotchmen, Irishmen and Frenchmen. They contain enough and more than enough to feed and stimulate the national pride of all, no matter whether they be of British or French descent. There is another aspect from which the battlefields of Quebec should be specially dear to you. It was there that French and British parentage gave birth to the Canadian nation. Today the inhabitants of the Dominion are neither English nor French. They stand before the world, not as English and

French, but as Canadian. It is from the inspiring standpoint of Canadian nationality that the proposal to celebrate the three hundredth birthday of Canada, by the nationalization of the famous battlefields of Quebec, should win the enthusiastic support of every patriotic Canadian. If we regard the question sectionally I would ask where is the well-informed Briton to be found, no matter in what part of the empire he may reside, who has not a personal interest in the Plains of Abraham, where the cornerstone of Great Britain was laid? I might say the same of every well-informed American. It is known that the battlefield of 1759 was the parchment on which in 1775 the Declaration of Independence was inscribed. If the Battle of the Plains decided the fate of North America, it was equally certain that the Battle of Ste. Foye won for the French-Canadians the secure enjoyment of their language, their religion and their laws."

As finally carried out, the chief features of the celebration included (1) the acquisition and dedication of a national park; (2) a series of pageants, eight in number, commemorating the foundation of Canada; (3) the dedication of a monument to Bishop Laval; (4) sports and tournaments on land and sea. The time set for the event was July 10th to 31st, 1908. Invitations were extended to Great Britain, the United States and other foreign nations, all of which sent representatives. The United States was represented by Vice-President Fairbanks, and the British Empire by His Royal Highness the Prince of Wales (now His Majesty, King George V). This royal visit and the presence of British, French and American warships did much to emphasize the international feature of the occasion and add to its spectacular success.

The Quebec Tercentenary was of great national and international significance. Never before in the history of the Dominion has there been such a gathering within its borders of noted men and historic names as occurred at Quebec in July, 1908. The participation of all the provinces in the celebration tended to unite them more firmly to the Dominion. The honor paid by Canada to the United States, France and other nations in inviting them to join in the events, cemented the friendship already existing between the Dominion and these nations, and the presence of the heir to the British throne strengthened the bond of union which, ever since the Confederation has existed, has been strong between the empire and her foremost colony.

The General Election of 1911. In 1910 the Laurier ministry conducted negotiations with the United States government looking toward a reciprocity agreement. In January, 1911, the text of the provisional tariffs was made public and immediately started a long debate in Parliament. This discussion, which continued until May 19, when Parliament adjourned for the Imperial conference and the coronation of King George, was resumed on July 18. Suddenly, on July 29, Parliament was dissolved and the question was thus submitted to the Canadian people. The general election on September 21 resulted in a conservative majority of about forty-five, therefore causing the resignation of the Laurier ministry and the rejection of the reciprocity agreement.

The Imperial Conference of 1911. This conference lasted from May 23 to June 20. The Dominion was represented by Sir Wilfrid Laurier, Sir Frederick Borden and Hon. L. P. Brodeur. Twenty-eight resolutions on various subjects were adopted by the conference. Those of especial importance to Canada were in favor of freer trade relations between Canada and other countries.

Important Legislation. The last session of Parliament during the Laurier administration passed a number of important acts. One of these continued the customs tariffs on imports from Japan, with a view to the negotiation of a new commercial treaty with that nation. Another act authorized the governor-general in council to subsidize steamship service between the Pacific coast of Canada and China and Japan.. Another important act provided for the uniform registration of physicians throughout the Dominion. Various other acts in the interest of the public good, such as the prohibition of the sale or manufacture of cocaine and opium except for medical purposes, were passed.

The Borden Government. Shortly after the general election, Sir Wilfrid Laurier and the members of his administration resigned. Hon. R. L. Borden, the leader of the opposition, then formed a ministry (October 10), composed of the following:

Hon. Robert Laird Borden, premier and president of the privy council.

Hon. George Eulas Foster, minister of trade and commerce.

Hon. William J. Roche, secretary of state.

Hon. Charles J. Doherty, minister of justice and attorney-general.

Hon. John D. Hazen, minister of marine and fisheries and naval service.

Hon. Col. Samuel Hughes, minister of militia and defense.

Hon. Louis P. Pelletier, postmaster-general.

Hon. Martin Burrell, minister of agriculture.

Hon. Frederick D. Monk, minister of public works.

Hon. William T. White, minister of finance.

Hon. Frank Cochrane, minister of railways and canals.

Hon. Robert Rogers, minister of the interior.

Hon. John D. Reid, minister of customs.

Hon. W. B. Nantel, minister of mines and internal revenue.

Hon. T. W. Crothers, minister of labor.

Hon. A. C. Kemp, Hon. G. H. Perley, Hon. J. A. Lougheed, ministers without portfolio.

The Governor-General. From 1904 to 1911, the position of governor-general was filled with great success by Earl Grey. His term of office closed in October, 1911, and on the twelfth of that month he sailed for England. On the thirteenth, his successor, H. R. H., the Duke of Connaught, was welcomed at Quebec, and on the fifteenth took up his official residence at Ottawa. A month later His Royal Highness formally opened the session of Parliament. Among the important laws passed at this session and later approved by the governor-general were acts enlarging the provinces of Manitoba, Ontario and Quebec, providing a third member of the civil service commission and reducing the number of railway commissioners to one.

Internal Development. The great internal development of Canada in the last years of the nineteenth century and the first years of the twentieth century is probably the most remarkable feature of recent Canadian history. The discovery of gold in the Yukon and the organization of Alberta and Saskatchewan as provinces each in turn led thousands of settlers westward. The settlers on the prairies were the people who came to stay and to work. The unparalleled development of agriculture in these provinces, the great increase in railway facilities and the enormous increase in population are signs that the west is being developed for the future. All eyes are turned to the west as the farming center. At the same time Canadian manufactures have taken great strides. The manufactures of a single year are now worth one billion dollars. The fisheries have been developed and are now the most extensive in the world.

With all this rapid advance there has been a steady growth of the desire to meet the new problems which these conditions cause. To control the railroads a railway commission was appointed, to secure justice for the shipper as well as for the railroads. Labor disputes are settled by a board of arbitrators. To preserve the natural resources of the country a national commission of conservation was appointed. The annual reports of this commission are extremely valuable for the light they throw on such great questions as preservation of the forests and irrigation. These are merely examples of the frankness and strength with which Canada faces the future.

Important Events

In the History of Canada

1492—Discovery of America by Columbus
1497—The first of the Cabot voyages
1534—Cartier's first voyage
1583—Sir Humphrey Gilbert took possession of Newfoundland

In the History of Other Countries

1066—Norman Conquest
1215—Magna Charta
1517—Luther nails the ninety-five Theses to the church door at Wittenberg
1600—East India Company chartered

1601-1700

In the History of Canada

1603—Champlain's first visit to Canada
1605—The Port Royal settlement planted
1608—Quebec founded by Champlain
1610—Hudson's Bay discovered
1613—Port Royal taken by Argall of Jamestown
1627—The Company of the Hundred Associates chartered
1629—Quebec captured by Kirke

In the History of Other Countries

1603—James I becomes King of England
1607—Jamestown, Virginia, founded by Englishmen
1618—Beginning of the Thirty Years War in Germany
1625—Accession of Charles I
1632—The Treaty of St. Germain
1648—Treaty of Westphalia

1635—Death of Champlain
1642—Montreal founded by Maisonneuve
1649—Destruction of the Hurons by the Iroquois
1663—Royal government established
1670—The Hudson's Bay Company chartered
1672—Frontenac made governor
1673—Marquette and Joliet discovered the Mississippi River
1682—LaSalle reached the mouth of the Mississippi
1689—King William's War began
1697—The Peace of Ryswick restored Acadia to France
1698—Frontenac died

1649-1660—The Commonwealth and Protectorate
1660—Charles II succeeds to the throne
1664—England acquired New York from the Dutch
1686-1688—James II
1688-1702—William and Mary
1689—Outbreak of war between England and France
1697—The Peace of Ryswick

1701-1800

1702—Queen Anne's War began
1713—The treaty of Utrecht gave Acadia to England
1731—Verendrye set out in search of the Pacific
1744—King George's War began
1745—Louisburg captured by New Englanders
1748—The Peace of Aix-la-Chapelle restored Louisburg
1755—War began in America—Braddock defeated
1758—The capture of Louisburg and Fort Duquesne
1759—The fall of Quebec
1760—The fall of Montreal
1763—The Treaty of Paris
1769—Prince Edward Island became a separate province
1774—The Quebec Act
1775—Invasion of Canada by the Americans
1783—The Treaty of Versailles
1784—New Brunswick became a separate province
1784—The Northwest Fur Company formed
1791—The Constitutional Act, creating Upper and Lower Canada
1793—Sir Alexander Mackenzie reached the Pacific

1702—Anne becomes Queen of England
1702—The War of the Spanish Succession began
1713—The Treaty of Utrecht
1714—George I ascends the throne
1725—Death of Peter the Great
1740—War of the Austrian Succession began in Europe
1748—The Peace of Aix-la-Chapelle
1756—The Seven Years' War began in Europe
1760-1820—George III
1762—Publication of Rousseau's *Social Contract*
1763—The Treaty of Paris
1772—First partition of Poland
1774—Louis XVI becomes king of France
1775—The beginning of the American Revolution
1783—The Treaty of Versailles
1786—Death of Frederick the Great
1789—French Revolution
1793—Britain declared war against France
1795—Last partition of Poland
1799—Napoleon becomes First Consul of France

1801-1900

1812—The War of 1812 began
1812—The beginning of Manitoba in the Selkirk settlement
1814—The Treaty of Ghent
1821—The Hudson's Bay Company and the Northwest Company united
1837—The Canadian rebellions
1841—The union of the Canadas
1842—The Ashburton treaty
1843—British Columbia had its beginning in a settlement on Vancouver Island

1803—Britain declared war against Napoleon
1806—Berlin Decree; Orders in Council
1809—American Non-Intercourse Act
1812—United States declared war against Great Britain
1814—The Treaty of Ghent between Great Britain and United States
1815—Battle of Waterloo
1820-1830—George IV
1830-1837—William IV
1832—The Reform Bill

1846—The Oregon Boundary treaty
1854—The reciprocity treaty
1864—The Charlottetown and Quebec conferences
1867—The confederation of Nova Scotia, New Brunswick, Quebec and Ontario
1870—Manitoba and the Northwest admitted to Confederation
1871—British Columbia admitted to Confederation
1871—The Washington treaty
1873—Prince Edward Island admitted to Confederation
1876—The Intercolonial Railway opened
1885—The Saskatchewan rebellion
1885—The Canadian Pacific Railway completed

1837—Victoria becomes Queen of England
1852—Napoleon III becomes Emperor of France
1854—The Crimean War
1857—Mutiny in India
1861—Outbreak of the Civil War in United States
1867—The British North America Act
1867—United States purchased Alaska from Russia
1869—Opening of the Suez Canal
1870—Franco-Prussian War
1871—Formation of the German Empire
1899—The South African (Boer) War began

Since 1901

1903—The Alaskan Boundary award
1905—Provinces of Alberta and Saskatchewan formed
1911—Imperial Conference

1901—Death of Queen Victoria and accession of King Edward VII
1904—Russo-Japanese War
1910—Accession of George V

Outline of Canadian History

I. Discovery, Exploration and Settlement
- (1) Age of discovery, 1000-1603
  - (a) Norsemen
  - (b) John and Sebastian Cabot
  - (c) Cortereal and Verrazano
  - (d) Jacques Cartier
    - (1) Sailed up the St. Lawrence
    - (2) Three voyages
- (2) Age of exploration and settlement, 1603-1663
  - (a) Settlement of Acadia, 1604
    - (1) Established by the French
    - (2) Destroyed by the English
    - (3) Changed hands several times
  - (b) Founding of Quebec, 1608
    - (1) Explorations of Champlain
    - (2) Champlain and the Indian wars
    - (3) Progress of the settlement
  - (c) Founding of Montreal, 1642
  - (d) The work of the missionaries
    - (1) As pioneers and explorers
    - (2) Among the Indians
      - (a) Hurons
      - (b) Iroquois
  - (e) The Hundred Associates
    - (1) Monopoly of fur trade
    - (2) Bringing of settlers
  - (f) Internal strife among the colonists
  - (g) Indian raids; heroes of the Long Sault
- (3) Canada becomes a royal colony of France, 1663
  - (a) Opposing interests of
    - (1) Priests
    - (2) Traders
    - (3) Royal governor
  - (b) Comte de Frontenac
  - (c) Opening of the interior, 1670-1682
    - (1) Explorations of Marquette and Joliet
    - (2) Voyages of La Salle
    - (3) Hudson's Bay Company founded, 1670
  - (d) Social and economic conditions
    - (1) Despotic government
    - (2) Trade controlled by great companies
    - (3) Feudalism

II. The Struggle for New France (see *French and Indian Wars,* Volume II.)
- (1) Queen Anne's war, 1697-1713
  - (a) Attack on the English colonists
  - (b) Capture of Port Royal
  - (c) Acadia and Newfoundland ceded to England, 1713
- (2) King George's war, 1744-1748
  - (a) Only a part of the struggle between France and England
  - (b) Capture of Louisburg
  - (c) Treaty of Aix-la-Chapelle; Louisburg restored to France

(3) The fall of New France
- (a) Braddock's march against Fort Duquesne
- (b) Exile of the Acadians
- (c) Siege and capture of Louisburg
- (d) Capture of Quebec
  - (1) Montcalm and Wolfe
  - (2) The plan of battle
  - (3) Result
- (e) Minor battles
  - (1) Siege of Ticonderoga
  - (2) Niagara taken by the English
  - (3) Montreal surrenders
- (f) Peace of Paris, 1763
  - (1) End of French rule in North America
  - (2) New France becomes an English colony.

III. THE EARLY YEARS OF BRITISH RULE, 1763-1815

(1) Problems of organization and control
- (a) Military rule
- (b) Conspiracy of Pontiac
- (c) The Quebec Act, 1774
  - (1) Enlarged the province
  - (2) Provided government by the governor and council
  - (3) French civil law, the law of the province
- (d) The Constitutional Act, 1791
  - (1) Divided Quebec into Upper and Lower Canada
  - (2) Provided governor, executive council and two legislative bodies for each province
  - (3) All officials appointed and dismissed by the home government
- (e) The failure of representative government as established
  - (1) Opposing interests of the Assembly and the councils
  - (2) The Assembly, though elected by the people, practically without power

(2) Opening of the West
- (a) Development of the fur trade
- (b) Rivalry of the fur companies
- (c) Exploration
  - (1) Samuel Hearne
  - (2) Sir Alexander Mackenzie
  - (3) Simon Fraser
- (d) Lord Selkirk's scheme
- (e) Union of the fur companies

(3) The war of 1812-1814
- (a) Causes
- (b) Principal campaigns and battles
  - (1) Land
  - (2) Sea
- (c) Results

IV. THE STRUGGLE FOR RESPONSIBLE GOVERNMENT, 1815-41

(1) The issues
- (a) Demand of the Assembly to control the revenue
- (b) Responsibility of the executive

(2) Popular leaders
- (a) Louis Joseph Papineau
- (b) William Lyon Mackenzie
- (c) Robert Baldwin
- (d) Egerton Ryerson
- (e) Joseph Howe
- (f) Louis H. La Fontaine
- (g) Lemuel Allan Wilmot

(3) Rebellion and reform
- (a) Rebellions in Upper and Lower Canada
  - (1) Papineau and Mackenzie
  - (2) Quickly suppressed
  - (3) Caused popular reaction against reform
  - (4) Led to appointment of Lord Durham as governor-general
    - (a) Durham's report
    - (b) Act of Union, 1840; in effect, 1841
- (b) Reform in New Brunswick
  - (1) Executive and Legislative Councils separated
  - (2) Conditional control of revenue granted to Assembly
- (c) Nova Scotia
  - (1) "Twelve resolutions" by the Assembly and submitted to the British Government, 1837
  - (2) Some desired changes in government granted
    - (a) Separation of the two legislative bodies
    - (b) Partial control of the public funds by Assembly
  - (3) Principle of responsibility to the Assembly not yet allowed

(4) Triumph of responsible government, 1841-48
- (a) The first union Parliament, 1841

(b) Lord Elgin puts the principle into operation in Canada (the present provinces of Ontario and Quebec)

(c) After several years the principle in force in the other provinces

(5) Fruits of responsible government

(a) Control of appointments, crown lands and public funds

(b) Provinces free to regulate their own tariffs

(c) Establishment of a system of municipal government, 1849

(d) Abolition of seigniorial tenure, 1854

(e) Secularization of clergy reserves, 1854

(f) Reciprocity treaty with the United States, 1854

(g) The Legislative Council of Canada made elective

(h) Government established in British Columbia

V. CONFEDERATION

(1) Movement for union

(a) In the Canadas

(1) The coalition ministry in favor

(2) Caused by friction between the sections

(b) Charlottetown Conference

(1) For union only of the Maritime Provinces

(2) Confederation overshadowed local issues

(3) Decided to hold general conference at Quebec

(c) Quebec conference, representing Canada, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland

(1) "Fathers of Confederation"

(a) Sir John A. Macdonald

(b) Hon. George Brown

(c) Sir Georges Etienne Cartier

(d) Sir Etienne P. Taché

(e) Sir Alexander T. Galt

(f) Hon. Thomas D'Arcy McGee, Sir Oliver Mowat, Sir Charles Tupper, Sir Adams G. Archibald, Sir Leonard Tilley, and a number ofothers

(2) The Quebec resolutions

(a) In favor of union

(b) Plan of government mapped out

(c) Referred to provinces

(d) Reciprocity treaty ended Fenian raids

(2) British North America Act

(a) Passed by the British Parliament in March, 1867

(b) Terms of the Act (see pages 208 to 216)

(c) In effect on Dominion Day, July 1, 1867; Ontario, Quebec, Nova Scotia and New Brunswick included in the Dominion

VI. GROWTH AND EXPANSION

(1) Development of the west

(a) Hudson's Bay Company surrenders its territorial rights; trading privileges retained

(b) Northwest territories

(1) Northwest rebellion

(2) Royal Northwest Mounted Police

(c) Manitoba (1870) and British Columbia (1871) join the Dominion as provinces

(d) Prince Edward Island enters Confederation (1873)

(e) Transcontinental railway, Canadian Pacific

(2) Industrial and commercial progress

(3) Foreign affairs, Canada and the United States

VII. THE TWENTIETH CENTURY

(1) Internal development

(a) Territorial changes

(1) Alberta and Saskatchewan become provinces

(2) Yukon organized as a territory

(3) Ontario, Quebec and Manitoba enlarged

(c) Transportation

(1) Railways

(2) Canals and Rivers

(d) Industries

(e) Education

(f) Political affairs

(1) Important legislation

(2) Election of 1911

(3) The Bordern government

(2) Canada's position as a nation

(a) In relation to the British Empire

(b) To other countries

Questions on Canadian History

When and where are the Norsemen said to have landed about 1000 A. D.?

Who was Leif Ericsson?

Who were the Cabots, and why are they famous?

Why were the explorations of Cartier important?

When was Acadia settled? By whom?

When was Quebec founded? Who was the founder? Give a brief account of his work as a pioneer.

What were the conflicting internal interests which threatened the existence of the colony?

Explain the importance of Frontenac's work.

Name three explorers, not already mentioned, who traveled through the interior of the New World.

Give a brief account of the discovery of Hudson's Bay.

Who were the Hundred Associates? Were they successful?

When and by whom was Montreal founded?

When did the Hudson's Bay Company receive its charter? Who were some of its first members? What can you say of the influence this company has exerted on Canadian history?

Who discovered the Mississippi River? When did La Salle reach its mouth?

What is meant by the expression, "the struggle for New France."

Summarize the principal incidents of King William's War. What were its most important results?

Show as well as you can the connection of these wars in America with general European history.

Explain General Wolfe's plan for the capture of Quebec. What was the importance of his victory?

Who was Pontiac? What was the purpose of the great conspiracy?

What were the important provisions of the Quebec Act?

When was Canada divided into Upper and Lower Canada? By what name is this Act known?

Outline the method of government at that time.

What can you say about the explorations of Sir Alexander Mackenzie?

When was the Northwest Fur Company organized?

Why was the fur trade instrumental in opening the West?

What did Hearne and Fraser accomplish?

Who was Lord Selkirk? Why is he famous?

What were the causes of the War of 1812?

Name several important victories won by General Brock,

Who was Laura Secord?

Explain briefly Canada's position in the War of 1812.

What were the leading issues in the struggle for responsible government?

Name four popular leaders of the movement.

Who was the Earl of Durham? What was the importance of his famous report?

When was the Act of Union passed? When did it go into effect?

Who was Lord Elgin?

Who were the two premiers whose ministry marks the beginning of responsible government in Canada?

Name at least three great changes which may properly be called the results of the triumph of responsible government.

What place does Sir James Douglas hold in the history of Canada?

When was the Charlottetown Conference held? What did it accomplish?

Name six "fathers of Confederation."

What were the Quebec resolutions? What did they propose? How were these resolutions put into effect?

Who was the first premier of the Dominion?

When was the British North America Act passed? What is the anniversary of the day on which it came into effect?

What was the cause of the Red River Rebellion? Of the Northwest Rebellion? Who was the leader of both?

When did Manitoba and British Columbia become provinces?

What caused the Pacific Railway scandal? Who became premier of Canada as a result of this disclosure?

When was the Royal Northwest Mounted Police organized? Outline the duties of this force.

Who were the four Conservative premiers who followed Sir John Macdonald?

When did Sir Wilfrid Laurier become premier? Name some of the important events of his administration.

When was Queen Victoria's diamond jubilee celebrated?

Give a brief account of the Quebec Tercentenary Celebration.

What was the principal issue in the election of 1911?

Country	Ruler	Birth	Accession	Title
Abyssinia	Lidj Eyassu	1896	1908	King of Kings
Afghanistan	Habibullah Khan	1872	1901	Ameer
Argentine Republic	Roque Saenz Pena		1910	President
Austria-Hungary	Francis Joseph I	1830	1848	Emperor
Belgium	Albert I	1875	1909	King
Bolivia	Eliodoro Viliason		1909	President
Brasil	Hermes da Fonseca		1910	President
British Empire	George V	1865	1910	King
Bulgaria	Ferdinand	1861	1887	Czar
Chile	Ramon Baros Luca		1910	President
China	Yuan Shi Kai		1912	President
Colombia	Carlos E. Restrepo		1910	President
Costa Rica	Ricardo Jimines		1909	President
Denmark	Christian X	1870	1912	King
Ecuador	Emilio Estrada		1911	President
France	M. Armand Fallieres	1841	1906	President
German Empire	William II	1859	1888	Emperor
Greece	George I	1845	1863	King
Guatemala	Manuel E. Cabrera	1856	1911	President
Haiti	Cincinnatus Leconte		1911	President
Honduras	Francisco Betrand		1911	President
Italy	Victor Emmanuel III	1869	1900	King
Japan	Yoshihito	1879	1912	Mikado
Korea	Yi Chok	1874	1907	Emperor
Liberia	D. E. Howard		1911	President
Luxembourg	Wilhelm	1852	1908	Grand Duke
Mexico	Francisco Madero		1911	President
Montenegro	Nicholas I	1841	1910	King
Mo-occo	Mulai Hafid	1873	1908	Sultan
Nepal	Dhiraj Shamsher Jang	1875	1881	Maharaja
Netherlands	Wilhelmina	1880	1898	Queen
[illegible]	Louis Mena		1911	President
[illegible]	Haakon VII	1872	1905	King
[illegible]	Seyyid Feysal Turki		1888	Sultan
[illegible]	Pablo Arosemana		1911	President
[illegible]	Ahmed Mirza	1897	1909	Shah
Peru	Augusto B. Leguia	1863	1908	President
Portugal	Manuel de Arriaga	1840	1911	President
Roumania	Carol I	1839	1881	King
Russia	Nicholas II	1868	1894	Czar
Salvador	Manuel Araujo		1911	President
Santo Domingo	Gen. Ramon Caceres		1906	President
Servia	Peter I	1844	1903	King
Spain	Alfonso XIII	1886	1902	King
Sweden	Gustavus V	1858	1907	King
Switzerland	M. Forrer		1912	President
Turkey	Mehmed V	1844	1909	Sultan
United States	Wm. H. Taft	1857	1909	President
Venezuela	Gen. Gomes	1856	1908	President

INDUSTRIES

The Supremacy of Industry. A great Englishman, John Ruskin, eminent in so many directions that it would be difficult to state in what he excelled, believed in labor and in the supremacy of industry. He said that a nation which labors, and takes care of the fruits of its labor, will be rich and happy, though there be no gold in the universe.

The source of the wealth of the world is the earth—in what is produced through agriculture and what is dug from its depths, the gold, silver, iron, coal, etc., with which are wrought the miracles of modern commerce. The present age is especially characterized by great development along these industrial lines, and nowhere do we find more striking examples of this than in the United States and Canada. Recognizing the importance to the student of this phase of national life, we present outlines on several important industrial products, such as corn, wheat and lumber, and have also included products that are raised in other countries and used extensively throughout the world, such as coffee and tea. In the arrangement, the outlines on products that are prominent in the United States and Canada are placed first.

Extent of Treatment. In regular alphabetical order in these volumes will be found extended articles on all the subjects included below among the industries, besides carefully prepared descriptions of many other agricultural and manufacturing enterprises which in one way or another contribute to our higher civilization. Attention is directed particularly to the following, among the most important:

Metals and Minerals

Aluminum	Lead
Asbestos	Marble
Asphalt	Nickel
Clay	Platinum
Coal	Radium
Copper	Salt
Gold	Silver
Gypsum	Tin
Iron	Zinc

Industrial

Basketry	Meat Packing
Blast-furnace	Mining
Book-binding	Printing
Brewing	Rubber Manufacture
Bricklaying	Silk
Calico Printing	Spinning
Cooperage	Steel
Fish Culture	Tanning
Fisheries	Waterproofing
Forestry	Weaving
Gilding	Well Boring
Lumbering	Woolen Manufacturing

Agricultural

Agriculture	Grains
Apiary	Barley
Breeding	Corn
Cattle	Oats
Coffee	Rice
Cotton	Rye
Creamery	Wheat
Dairying	Poultry
Forestry	Sugar
Fruits	Tea
Gardening	Wool

It must not be assumed that the titles above include all the subjects treated in these volumes on the subject of the world's industries. Only those most important to mankind are named in the three groups, but hundreds of other articles all related to the general theme appear in The New Practical Reference Library. The General Index at the end of this volume should be referred to for a more complete outline of our industrial life. Consult the divisions—

Agriculture,	Minerals,
Industrial,	Plants,

and note the careful subdivisions of each general subject, by which one may study all related topics and know that no important item is omitted. Nearly a thousand titles refer to various features of the world's industrial life.

In presenting outlines for study on various industrial topics, we have included those of greatest general interest and importance; from these suggestions any person will be able easily to outline other subjects, as necessity may require.

Corn

Importance of the Corn Crop. According to the authority of one of the greatest agricultural schools in the United States, the value of the corn crop of that country is more than twice that of any other crop. In 1909 it amounted to $1,720,000,000, which was thirty-five per cent of the value of all field crops. The world's annual corn crop amounts to about 3,500,000,000 bushels, of which the United States produces more than three-fourths. With these enormous totals in mind, it is clear that corn is not yet raised in Canada in sufficient quantity to affect the total, but it is equally clear that there is great opportunity for an increase in the production. Ontario is the only province in which corn forms an important crop; this province's field crops in 1911 were valued at $193,260,000, of which corn represented $21,623,000, nearly one-eighth of the total The only crop of greater value was oats. Manitoba produces about $600,000 worth of corn for fodder each year, and Quebec about $1,600,000 worth of fodder corn and $800,000 worth of corn for husking. As farming becomes more mixed in the western provinces there is no doubt that corn, especially as feed for animals, will become a crop of increasing importance.

What Becomes of the Corn Crop. More than four-fifths of the cor[illegible] [illegible]sed in the United States is fed to live sto[illegible] [illegible]he farms where it is produced; in Canada fodder corn represents one-ninth of the crop (21,350,000 bushels in 1911). The high percentage of fodder corn in the United States indicates a degree of mixed farming which has not yet been reached in the Dominion. Practically all the corn raised is consumed in Canada; only $5,000 worth was exported in 1910. The portion of the corn crop not used for food—either for man or animals—is made into various manufactured products, including alcohol, many grades of laundry and cooking starches, glucose, table s[illegible]p, confectioner's sugar, paste, oil, etc

Cost of Producing Corn. In the *Census and Statistics Monthly* for March, 1912, are [illegible]teresting figures, based on a wide range of statistics, showing the average cost of the different items of production and the profits from corn crops. The average per acre is as follows:

Items	Canada	Ontario	Quebec
Preparation	4.31	4.49	4.05
Seed	.88	.75	1.06
Seeding	3.37	.87	1.70
Cultivation	2.98	2.93	3.03
Harvesting	3.18	3.05	3.35
Threshing	3.52	3.85	3.08
Interest	3.10	3.00	3.20
Depreciation	.54	.54	.53
Total	21.88	19.48	20.00
Value of produce	32.12	28.13	37.64
Profit	10.24	8.65	17.64

The average yield of corn for the entire Dominion is 60 bushels per acre, for Ontario it is 61 bushels, and for Quebec 30 bushels. The apparently high profit made in Quebec was partly due to the fact that the corn crop was less affected by drought than in the other provinces. The figures for Canada must be taken to show profits in a poor year. The ordinary farmer produces a yield of less than 40 bushels per acre. The more careful farmers get an average of about 60 bushels per acre. From the above table it appears that the cost of growing the corn crop is about the same regardless of results. The farmer who produces a crop of 60 bushels an acre is sure under general conditions of making a greater profit than the man who gets only 40 bushels. With the best possible conditions in Quebec many farmers make a profit of 50 to 100 per cent more than the average. In the great corn belt of the United Stated yields of 80 bushels per acre are not uncommon and crops of as many as 100 bushels to the acre have been obtained under unusually favorable conditions. The chart on page 414 shows the distribution of the corn belts of the world.

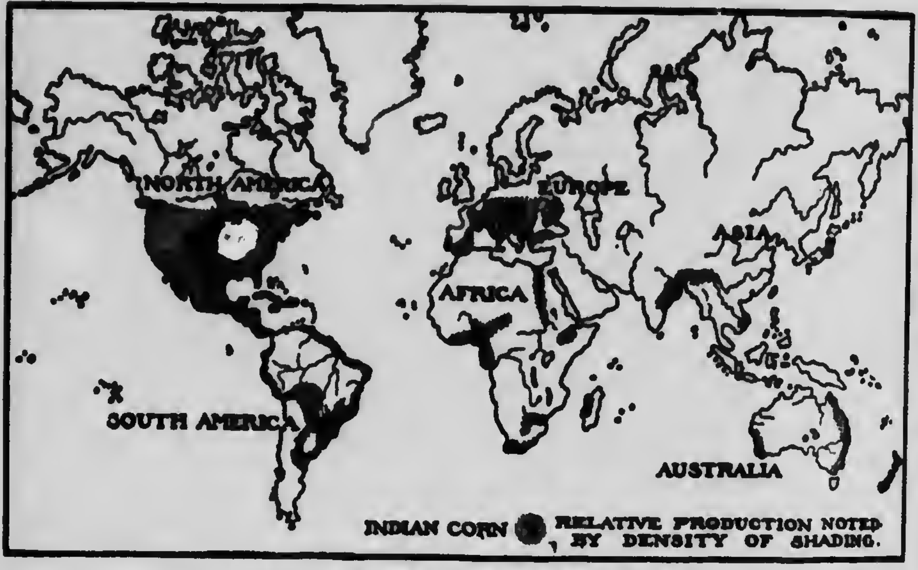
Loss Through Waste. Officials of the Dominion Department of Agriculture declare that every 100 pounds of cornstalks will yield 6½ pounds of alcohol; in not utilizing this by-product the agriculturist has been allowing a very great amount of wealth to go to waste. No man with the interests of his fellow-being at heart would advocate an increase of the production of alcohol for improper uses. We do not like to think that any helpful drug produces drunkards and all the ills that follow in the train of drink, but there are many legitimate uses for alcohol and were it more plentiful and cheaper, the opportunities to use it would multiply.

If one acre of corn will yield from 10 to 12 tons of cornstalks, which is about 20,000 pounds, that amount of raw material would produce easily 1,200 or 1,300 pounds of alcohol, or over 200 gallons. Alcohol is worth at the present time probably 40c per gallon

If ground in a wet condition, then dried, cornstalks may be kept indefinitely and be held ready at any time for manufacture into alcohol. The alcohol derivable from cornstalks that now go to waste in this country would not only drive all the machinery of our factories [illegible] the government authorities, but would furnish the requisite power for all our railroads, steamboats, run all our automobiles, heat and illumine all our houses and light the streets of every city in the Dominion.

Experiments are being carried on at the present time to determine whether cornstalks cannot be manufactured into paper on which to print books and newspapers, especially the latter. Very soon it will be necessary for manufacturers to find some acceptable substitute for wood for the manufacture of printing paper, for our forests are rapidly being cut away. Every time a great Sunday newspaper is printed a good-sized forest is destroyed. Experiments thus far made have not determined the value of cornstocks in the manufacture of paper, but manufacturers are hopeful in this direction.

Outline for Study. The following outline is suggested for the use of the teacher or the parent who wishes to make a careful and detailed study of the subject:



PPINCIPAL CORN GROWING AREAS OF THE WORLD

Outline on Corn

I. GENERAL DESCRIPTION
- (a) Stalk
  - (1) Height
  - (2) Jointed
  - (3) Color
  - (4) Structure
- (b) Leaves
  - (1) Shape
  - (2) Length
  - (3) Position
- (c) Flowers
  - (1) Silk
  - (2) Tassel
  - (3) Location on stalk
  - (4) Location of ear

(d) Fruit—Ears
(1) Arrangements of kernels
(2) Covering
(3) Location on stalk

II. History
(a) Where first cultivated
(b) When first used by white men
(c) How introduced to all nations

III. Kinds
(a) Flint corn
(1) Characteristics
(2) Where cultivated
(b) Dent corn
(1) Characteristics
(2) The corn of commerce
(c) Sweet corn
(1) Canning industry
(2) Table luxury
(d) Pop corn
(1) Extent of cultivation
(2) Commercial uses

IV. Planting
(a) How soil is prepared
(b) Machinery used in planting
(c) When planted

V Cultivation
(a) Care of corn field
(b) Extent of care required

VI. Harvesting
(a) Time of harvest
(b) Method of harvesting
(c) Where gathered corn is stored

VII. Where Cultivated
(a) United States
(1) Raises what proportion of world's crop?
(2) Importance of nation's crop
(a) Annual yield
(b) Value of annual crop
(3) Exports to what countries?
(b) Canada
(1) Extent of annual crop
(2) Value of annual crop
(3) Comparison of methods and times of planting and harvesting with same in United States
(4) Importance of industry to Canada
(c) Other countries
(1) Argentine Republic
(2) Russia
(3) India

VIII. Uses
(a) As food
(1) For mankind
(a) Meal
(b) Hominy
(c) Hulled corn
(2) For animals
(b) Miscellaneous uses
(1) Starch
(2) Glucose
(3) Alcoholic liquors
(c) By-products
(1) Cobs
(a) Syrup manufacture
(b) For fuel
(2) Husks and stalks

IX. Markets
(a) Local
(b) Foreign
(1) Portion of crop exported
(2) Value of exports
(3) Principal foreign customers

Questions on Corn

Why called Indian corn?

How many dishes are made from corn meal in your home?

Start with the farmer and name some of the industries that arise from or are dependent upon corn.

To what family of plants does corn belong?

How does corn rank as a food throughout the world?

What does corn contain that makes it valuable as a food?

In general appearance what plant does it resemble?

How many kinds of flowers has the plant? Which flower forms the tassel? Which the silk? What is at the inner end of each thread of silk?

Do the ears have an odd or even number of rows? How are they covered? Why?

Of what continent is corn a native? What is known of its use among the Aztecs and Incas? How far north is corn now cultivated?

What is the difference between the corn belt in the cool temperate regions and that of the warmer corn belt?

How does corn compare in value with wheat?

What is the average price of corn per bushel? What is the average yield per acre?

What are the results of a failure in the corn crops of the United States?

Describe flint corn. What are the two chief varieties of flint corn? Where is the yellow variety generally raised? Where is the dent corn grown? From what does it take its name? How high does it grow?

What is the total annual corn crop of the Dominion? Is any of it exported? What percentage of the total is used as fodder corn?

How does sweet corn differ from field corn? What great industry is connected with this article?

Why is corn used as a fattener of stock?

In what manner did the Indians grind corn? How is it cultivated and prepared for food by the native Mexican to-day?

How is corn planted? Cultivated? Harvested? When does the cultivation begin? Upon what do the methods of harvesting depend? What machines are now in use on the larger corn farms?

What proportion of people use it as a food? Give three forms in which it is commonly used.

Give three manufactured products made from it which are used extensively.

Of what value are the stalks? How is green corn used as fodder? Describe the process in detail.

What proportion of the world's product is raised in the United States?

Which is the leading corn-producing province?

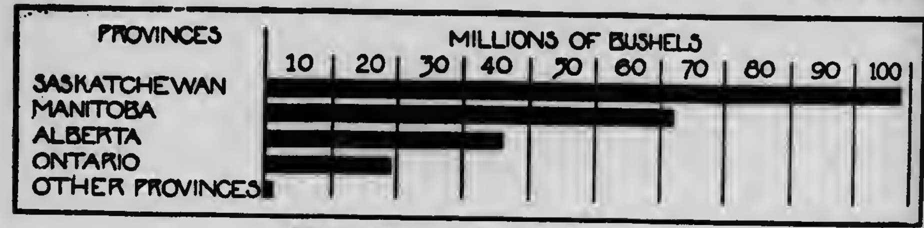
How many billion bushels are raised annually in the United States? What is the value of the yearly crop?

How does it compare with the production of gold? Silver? Iron? Cotton?

What other countries produce large quantities of corn?

Wheat

A Most Valuable Crop. Wheat is one of the principal food crops of the world; it stands second only to rice, which sustains a greater part of the human race than any other crop. The average yield of wheat varies in different countries; approximately, as follows: Great Britain, 32 bushels per acre; Germany, 26; Canada, 20; France, 19.5; Hungary, 15.5; the United States, 15; Russia, 9. In 1910 the wheat crop of the United States reached the total of 737,000,000 bushels, of which approximately 500,000,000 were winter wheat and the remainder spring wheat. This crop represents a value of $500,000,000. In the same year Canada produced 150,000,000 bushels, of which 133,000,000 bushels were spring wheat. That Canada is now taking an important place as a wheat producer may be seen from the fact that the total wheat product of the country increased from 55,000,000 bushels in 1901 to more than 215,000,000 bushels in 1911. Russia, in spite of a low average per acre, produces more than 400,000,000 bushels per year. The United States alone produces from one-sixth to one-fifth of the world's supply of wheat. Next in importance are Russia, India, Hungary, Argentine and Canada. Ontario is the leading province for winter wheat, the crop being about 17,000,000 bushels, but in the production of spring wheat it is greatly exceeded by Saskatchewan, Manitoba and Alberta, in the order named.

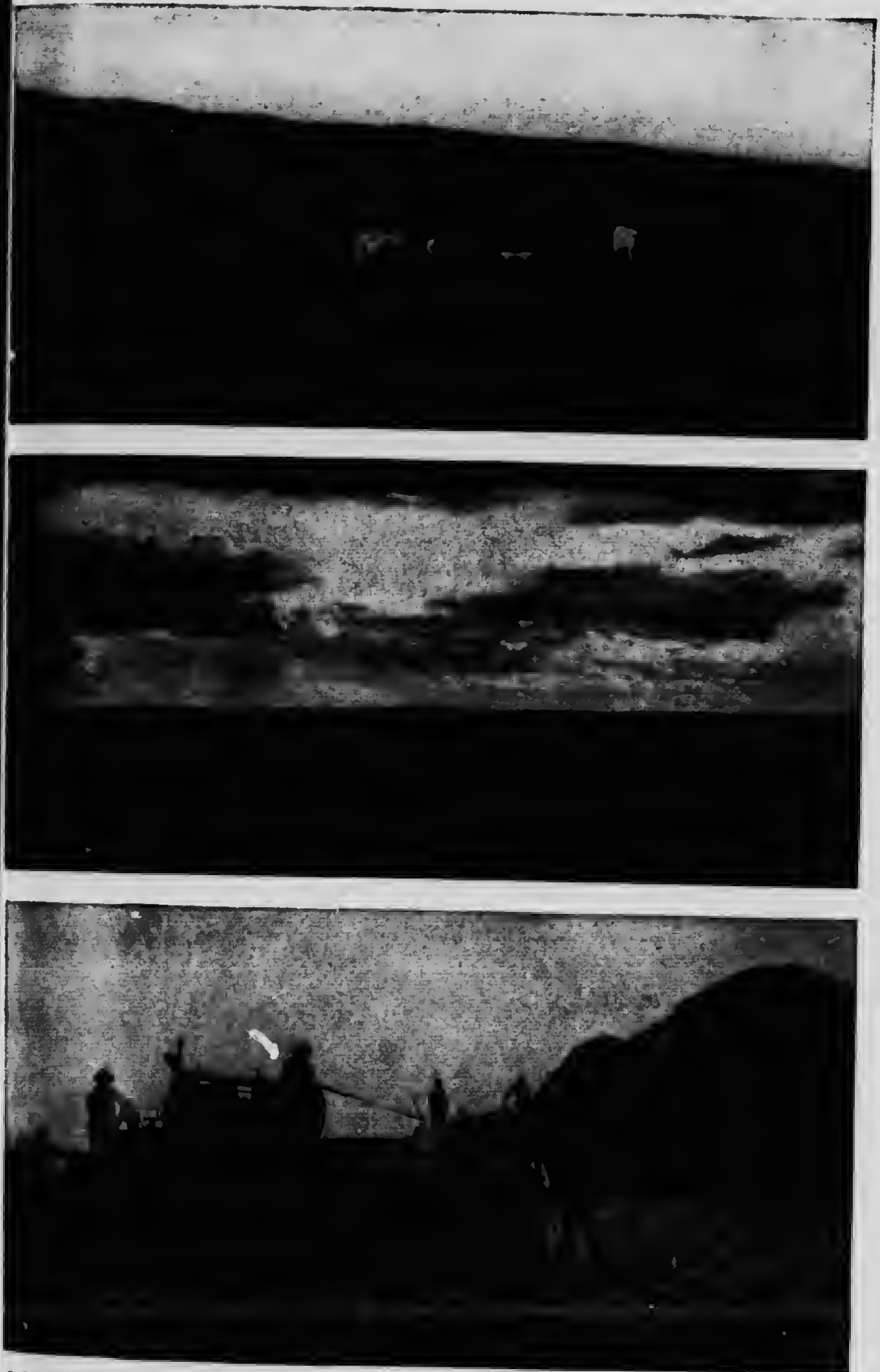


WHEAT CROP OF CANADA, BY PROVINCES

In Canada the average cost of producing this crop is about $13 an acre, made up as follows:

Items	Fall Wheat	Spring Wheat
Preparation.......	$ 3.93	$ 3.10
Seed.............	1.62	1.74
Cultivaton.......	1.00	1.00
Harvesting........	1.72	1.55
Threshing.........	2.09	2.32
Rental Value......	2.82	2.68
Depreciation......	.39	.48
Total......	$13.57	$12.87

A fair average crop in a good year would be 20 bushels to the acre, at an average price of sixty to eighty cents per bushel. Under favorable conditions the farmer may make a profit of $4 to $7 an acre, which may be anywhere from five to eight per cent of his invested capital. According to the latest census reports the average size



CATTLE RANCH WHEAT FIELD THRESHING

FARM SCENES IN NORTHWEST PROVINCES

of farms producing wheat is 25 acres. The great size of many farms in the western wheat belt is offset by hundreds of small areas under wheat in the east. The average value of the crop is about $17 per acre for the whole of Canada; in Saskatchewan and Alberta the average is less than $14, but in the more settled districts of the east, where cultivation is more intense, it is as high as $24. In British Columbia the average is $36, but this is because high grade fruit land is generally broken with a crop of wheat or sometimes oats or barley.

Markets and Prices. The greatest wheat market in the world is Chicago; wheat is shipped from the local centers of the United States, and even from Canada, to Chicago, where it is stored in elevators. In recent years Minneapolis, Duluth, Winnipeg, Rosthern, Fort William and Port Arthur, because of their proximity to the wheat-growing areas, have received a great deal of wheat for storage, but it is still true that the general movement is toward concentration of supply before distribution to retail dealers.

This tendency is partly the cause of and partly caused by the so-called "Grain Exchanges." In the United States the Grain Exchanges are known as Boards of Trade, which must not be confused with Canadian chartered Boards of Trade, whose function is quite different. Originally a Grain Exchange was made up of middlemen, who sought to act as agent for the farmer and for the consumer. In the course of time the middleman's position at the central markets led to an increase in his power. By bargaining with other commission men he fixed the price at which wheat might be bought and sold. Thus we see that the Grain Exchange was originally the outgrowth of necessity. It set a price and furnished a market. Incidentally, the commission men made profits. They dictated prices; they dictated classifications of wheat. The Dominion government now inspects and grades wheat. This standardization of the wheat supply has made possible the enormous growth in central control of the wheat markets. If you buy one thousand bushels of Grade 1 you know that the wheat will be of that grade whether delivered in January or in June, in Winnipeg or in Montreal.

Unfortunately the immense power of the Grain Exchanges has brought some evil results, the chief of which is unrestricted dealing in a possible future supply. This is simply gambling, which must eventually be stamped out. So long as the Grain Exchanges act honorably in the attempt to equalize the advantages of production and distribution, their existence is highly desirable.

Outline for Study. For the benefit of the student who would like to know the details of the subject, the following outline is added. It will enable any boy or girl to arrange the facts in a logical, orderly way:

Outline on Wheat

I. General Description
  - (a) Plant as a whole
  - (b) Stalk
  - (c) Leaves
  - (d) Fruit

II. History
  - (a) Where first cultivated
  - (b) Early cultivation in general
  - (c) Introduction into Europe and North America

III. Species
  - (a) Beardless
  - (b) Polish
  - (c) Spelt

IV. Process of Production
  - (a) Planting
  - (b) Harvesting
  - (c) Threshing
  - (d) Milling

V. Uses
  - (a) Food for human beings
    - (1) Flour
    - (2) Bran
    - (3) Macaroni
    - (4) Cereals
  - (b) Other products
    - (1) Feed for animals
    - (2) Straw
    - (3) Straw-board
    - (4) Paper

VI. Markets
  - (a) Local
  - (b) Grain Exchanges

Questions on Wheat

What is the average yearly production of wheat in Canada?

What are the other leading wheat producing countries in the world?

What proportion of the world's crop does the United States produce?

What machines are used in preparing the soil for wheat?

Who invented the harvester?

With what tool did our forefathers cut their grain?

Is that tool still in use?

Name the different varieties of bread that you know.

Which do you consider the best? Why?

For what purpose is wheat straw used?

Where are the great wheat regions of Canada?

How long has wheat been known?

Which province ranks first as a producer of winter wheat? Of spring wheat?

What is the average cost of production of spring wheat? Average profit?

Of what region is wheat probably a native plant?

What is bearded wheat? Bald wheat?

What is red wheat?

What is known as hard wheat?

Cotton

Brief History. The oldest cotton producing country is India, where the plant has been known from time immemorial. It was used there in the manufacture of clothing, which was said by Herodotus, the early Greek historian, to be of better quality and finer fiber than that made from the wool of sheep. On account of the character of the plant, he called it "tree wool," the name by which it is still known in some countries.

The first attempts to grow cotton in North America were made in Virginia about 1721. Until the later years of the same century its cultivation was confined chiefly to that colony and the Carolinas, where it was grown principally for domestic uses. The first exportation of cotton, consisting of eight bags, weighing 1,200 pounds, was from Virginia in 1784. In 1791 the United States furnished less than one-sixth of one per cent of the cotton importation of Great Britain; a century later its crop was sixty per cent of the world's supply. The increase was from 8,889 bales weighing two hundred and twenty-five pounds each to 9,534,700 bales weighing five hundred pounds each.

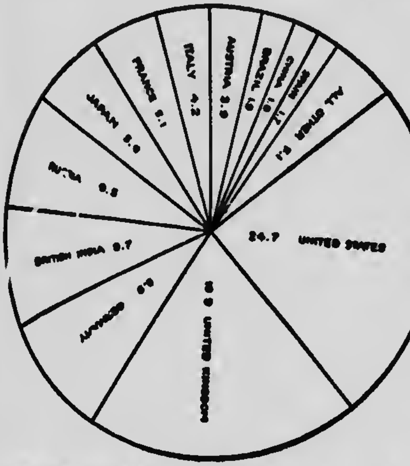
Growth of Industry. Cotton is one of the few great staples not produced in Canada. It requires a sub-tropical climate, such as that of the southern part of the United States; but the importance of the cotton manufactures is shown by the fact that Canada produces over $100,000,000 worth of textiles a year; of this total $18,000,000 are pure cotton goods, and a large percentage of the remainder are part cotton.

Canada is dependent upon the United States for her importation of cotton, yet the abundance of power and the increasing demand have given rise to an industry which seems destined to become even greater. There are as yet only twenty-five mills for the exclusive manufacture of cotton goods; but there are nearly 2,000 mills and factories in which cotton and cotton products are used. These include blankets, clothing, hats and caps, mats, thread. Woolens and silks comprise only about one-tenth of the textile products of the Dominion, cotton products being the great bulk of the total. Canada imports over $35,000,000 worth of cotton products a year, besides $10,000,000 worth of raw cotton.

The growth of the industry is sufficient proof that it has been profitable. The margin between the price of a pound of raw cotton and that of a pound of goods is so small, however, that the profits of a mill during the whole year may depend on the judgment or luck of the purchasing agent in buying his raw material at the right time. The general condition of the country determines the demand for the finished products, but the cost of production depends greatly on the price of cotton. Cheap cotton and a brisk demand make the manufacture profitable; dear cotton, a sluggish demand and labor troubles reduce or extinguish profits. Unfortunately the latter set of conditions is too often presented. The decade from 1901 to 1911, it must be admitted, however, was a prosperous one, in spite of several bad years.

The World's Supply and Consumption. There are late and quite accurate statistics showing the annual crops of all cotton-producing countries; the consumption of the mills in Great Britain, the United States, Canada and other countries takes practically all the world's production. The consumption of the mills for 1899-1900 was 13,535,000 bales of five hundred pounds each, but this figure is somewhat in excess of the crop for the year, as the two preceding crops were the largest in the history of cotton production, and a part of the cotton consumed by the mills in the year 1899-1900 was brought forward from preceding years. Of the total quantity grown in the United States from thirty to forty per cent was exported. The following figures for 1910 furnish an interesting basis for comparison:

Country	Crop in Bales
United States	11,483,000
British India	3,508,000
Egypt	1,535,000
Russia	900,000
China	725,000
Brazil	360,000
Other countries	660,000
Total	19,171,000



PROPORTION OF TOTAL CONSUMPTION OF THE WORLD'S COTTON SUPPLY—FROM CENSUS REPORT, 1911

Country	Cotton Spindles	Mill Consumption
United States	29,149,000	4,799,000
Great Britain	53,397,000	3,372,000
Germany	10,200,000	1,660,000
Russia	8,250,000	1,457,000
France	7,100,000	951,000
British India	5,657,000	1,653,000
Austria-Hungary	4,643,000	785,000
Italy	4,200,000	753,000
Japan	2,005,000	1,028,000
Spain	1,853,000	265,000
Canada	1.497,000	140,000
Belgium	1,322,000	180,000
Other countries	5,213,000	1,278,000
Total	134,526,000	18,321,000

The figures show that the United States produces more raw cotton and also uses more in the manufacture of cotton goods than any other country. At the same time it exports annually from thirty to forty per cent of its crop. The only countries that produce grades of cotton required in American manufacture are Egypt and Peru. The Egyptian cotton is not as fine as the sea-island cotton, and does not command as high price, but it is much better than the upland for the manufacture of goods requiring a smooth finish. Goods made from it have an appearance somewhat like silk. The Peruvian cotton possesses a rough, strong fiber, but it is

PROPORTION OF WORLD'S SUPPLY OF COTTON CONTRIBUTED BY EACH COUNTRY—FROM CENSUS REPORT, 1911

shorter than the upland of the United States. It is well adapted to mixing with wool, and is used in the manufacture of mixed goods, principally underwear and hosiery, which require a soft finish. Finished cotton goods, however, have always been imported in considerable quantities, but these importations have been confined almost exclusively to fine grades. The tariff has helped the Canadian manufacturer to control the home market, but until recent years he confined his attention to staple goods, and left the fancy and expensive stuffs for his foreign competitor to make.

Outline on Cotton

I. Varieties
  (1) Long fiber or sea island cotton
  (2) Short fiber or upland cotton
II. Where Raised
  (1) United States
    (a) Sections
  (2) Other countries
    (b) Names

III. Planting
  (1) Methods
    (a) Rows—distance apart
    (b) By what means
  (2) Season

IV. Cultivation
  (1) Soil
    (a) Sandy loam—lime and phosphates
    (b) Heavy rainfall while planting
  (2) Dry season, to mature
  (3) Temperature
    (a) Not less than a mean annual temperature of 60 degrees

V. Harvesting
  (1) Time
    (a) Bursting of pods or bolls
  (2) How picked. All bolls not ripe at same time
  (3) Sent to gin house
    (a) Seeds removed by cotton gin
    (b) Pressed into bales of 500 lbs. each

VI. Seaports, Raw Material
  (1) United States
  (2) Other countries

VII. Factories
  (1) Canada
  (2) Foreign countries

VIII. Products
  (1) Cloth
    (a) Clothing
    (b) Household furnishings
  (2) Cottolene
  (3) Fodder and fertilizer
    (a) Seeds from which oil has been pressed ground into powder

IX. History and Growth of Cotton Industry
  (a) Domestic
  (b) Foreign

Questions on Cotton

When and how are cotton seeds sown? How is cotton cultivated?

How long after the flowering has commenced do the seeds open?

How is cotton harvested? How is it separated from the seeds?

How did the invention of the cotton gin affect the production of cotton? Who invented it?

In what form is the cotton sent to the manufacturers?

What is the weight of a bale?

Which is the oldest cotton-growing country? Who introduced cotton into Europe?

Name the chief cotton-producing countries.

Where and when was cotton first planted in the United States?

What states make up the cotton belt?

Which variety of cotton is most extensively cultivated in the United States?

What is the average height of the sea-island plant? Of the upland plant?

What are the leading cotton ports of the United States?

How does the value of the average cotton crop compare with the corn crop? with wheat? with wool?

Name some of the by-products of the cotton industry.

Wool

Brief History. The history of wool dates back to the earliest times of which we have record, and as civilization has progressed its uses have steadily increased. The chief wool-producing countries are Australia and New Zealand, Argentina, England, the United States, Russia, India and British South Africa. The total world's clip is estimated at nearly three billion pounds a year. Some idea of the amount of product may be obtained from the fact that one pound of wool will yield about one hundred miles of thread.

Wool may be considered a product of domestication, as no wild animals are known which resemble the wool-bearing sheep. The sheep was originally covered with fur or coarse hairs, among which was a softer hair or wool close to the skin. Under the influence of good care and protection from the weather, the longer coarse hair has largely disappeared, and only the shorter, softer wool remained. By careful breeding various classes of sheep have been developed with unusually long and fine wool. While wool is generally characterized by its fine, soft, curly nature, the true distinction between it and hair lies in its covering of pointed scales or plates, which overlap very much like fish scales. Another important characteristic of wool is its elasticity, which gives it softness and strength.

All wool in its natural state contains fat or grease called yolk, which covers the individual hairs. This keeps the fiber from getting too dry and also protects it from injury. Before the wool is used for manufacturing purposes the yolk must be removed by scouring, so that the fibers will grip more firmly and will take dye. White is the most common color of cleaned sheep wool, but black, fawn, cream and gray shades produced by various breeds are utilized in their natural colors for certain kinds of cloth.

Kinds. The three main classes of wool are generally given as follows: (1) carding or clothing wools, short fine fibers, such as merino, suitable for clothing; (2) combing wools (Southdown, Shropshire, etc.), long fibers suitable for worsteds; (3) miscellaneous or carpet wools, chiefly hair, used for carpets, blankets and coarse clothing. The best wool is the merino, used in all-wool goods. In making yarn for worsteds the fibers are carefully drawn out and laid parallel. For this purpose the long wools are obviously best. For the ordinary woolen goods no particular attention is paid to the arrangement of the separate fibers. An examination of the two kinds of yarn will show the difference. Shoddy, contrary to general opinion, is all-wool, but it is made of old stuffs and shredded again. As many of the scales of the fibers are torn off in this process the thread does not hold together so well and the cloth is weaker.

Canadian Production. Canada imports about $2,000,000 worth of wool and woolen goods a year and manufactures about $10,000,000 worth. The number of sheep shows a decline from 2,831,000 in 1908 to 2,389,000 in 1911. This decline has been due chiefly to the steady settlement of the eastern provinces, and the consequent increase in mixed farming and decrease in sheep raising. In addition to this discouraging decline is the fact that the actual importations of raw wool are less now than they were in 1875. A special report published by the department of agriculture in November, 1911, explains the reasons for the decline and shows that only system and energy are needed to bring sheep raising to its proper importance. The opportunities are great, and the only obstacle in the way is the ignorance of the farmers. The total raw wool production is now about 11,200,000 pounds a year, an average of four pounds per head. As the government continues its campaign of support and education there is no reason why our annual production should not exceed 50,000,000 pounds.

Marketing Wool. The marketing of the raw wool presents some unusual difficulties. It should first be noticed that there is no speculation in wool as there is in the cotton or grain markets. The place of a Grain Exchange is taken by the "wool merchant," the middleman who bears the risks. These risks are unusually great, for various reasons. In the first place, there is no uniformity in grades of wool, even in wool from the same flock in different years. Unless he has personally inspected the wool to be bought the wool merchant has no security. This complexity of the raw material is a risk which must be borne chiefly by the commission merchant. Furthermore, he bears the load of price variations, which are frequent in the wool market.

The manufacturer, on the other hand, risks an unusually large investment. The high labor and mechanical cost are responsible for the concentration of the manufacture of woolen goods in the eastern part of the country near the great central markets. The situation in England and the United States is identical. The raw wool is shipped to distant manufacturing centers, because these are the best markets. Small mills, unless making specialties at fancy prices, cannot bear the risks of the market. They are practically at the mercy of the commission houses, which fix prices and practically dictate what shall be made at the mill. The American Woolen Company is an attempt to overcome some of the difficulties. It was incorporated in 1899 with a capital of $50,000,000 to buy and sell raw material on a large scale. The formation of this company has helped to a slight degree to standardize conditions, for it controls one-third of the United States clip and one-fourth of the total supply, including imports. The company has incurred the enmity of many classes interested in the wool markets; it is by no means a solution of all the difficulties. Further remedies will be the development of years, not the rash conclusion from an imperfect knowledge of the facts.

The woolen industry is one of the most interesting, in all its branches. In a short space it is not possible to point out more than a few of the features which distinguish it from all other industries. Anything connected with the industry, the raising of sheep or goats, the shearing and preparation of the wool, the manufacturing processes, all these are worth studying. Technical problems and economic questions both remain to be solved. The outline and questions on wool have been prepared for the purpose of guiding the student or general reader who wishes to know more about the subject:

Outline on Wool

I. DEFINITION
II. SOURCES
  (1) Sheep
    (a) Coarse-wooled
    (b) Medium-wooled
    (c) Fine-wooled
  (2) Alpaca and goats
III. CLASSES
  (1) Carding wool
    (a) Description
  (2) Combing wool
    (a) Description
IV. QUALITY
  (1) Most valuable
    (a) Where obtained
V. OUTPUT
  (1) Leading countries
  (2) Amount in the United States
  (3) Amount in Canada
VI. MANUFACTURE
  (1) History
    (a) Ancient
      (1) Jews, Greeks and Romans
      (2) Reason for early development
      (3) Introduction into England
    (b) Modern
      (1) Effects of development of spinning and weaving
  (2) Processes (see colored plate in the article on *Woolen Manufacture*, Vol. V.)
    (a) Sorting
    (b) Cleaning
      (1) Dusting
      (2) Scouring
      (3) Dyeing
      (4) Drying
    (c) Removing burs
    (d) Picking
      (1) Pulling tufts apart
      (2) Mixing
    (e) Carding
      (1) Drawing out fiber
      (2) Reducing size and strengthening
      (3) Result
    (f) Spinning
      (1) Machine used
      (2) Regulation of size and twist
      (3) Winding yarn
    (g) Weaving
      (1) Arrangement of spools
      (2) Regulation of width of warp
    (h) Pressing
    (i) Winding into bundles
  (3) Classification of products
  (4) Output in Canada
VII. COMPARATIVE IMPORTANCE OF WOOLEN INDUSTRY

Questions on Wool

Which are the principal wool-growing countries?

What qualities in wool are most desirable?

Why is the merino the most valuable of wool-producing animals? What is the native country of this sheep?

To what extent was woolen manufacture developed by the Greeks and Romans?

What modern country first became famous for woolen manufacture?

How is a fine hard woolen thread produced?

When is the dyeing process introduced into the manufacture of wool?

What is the present condition of the industry in Canada? What seem to be the principal reasons for it?

Iron

Its Importance. The world would have made in generations and ages past but very little progress had its peoples been deprived of iron. Excellent substitutes could be found even today for a great number of our most useful articles, were we to be deprived instantly of any of them, but no substitute could be named which would in any measure take the place of iron. Without iron we should have no speeding express trains; no immense buildings; we should have neither the telephone nor the telegraph. Iron is indispensable in the construction of these and many other things we could not well do without.

Its Adaptability to Use. What gives iron its immense value, aside from its great abundance, is its cheapness, its strength, and certain properties it possesses by which man can adapt it to a multiplicity of uses. It can be made extremely hard by sudden cooling; if it be heated and cooled slowly it will remain soft and very pliable. Man has learned how to make iron as ductile as copper or as brittle as glass; how to render it springy or springless at will; he has contrived processes by which it will conduct heat and the electric current with the greatest ease, or, on the contrary, give it high resisting power to these elements. It can be made to melt by application of heat or be so treated that it can be fused only with greatest difficulty.

Iron is the most abundant of all the metals, and it is fortunate that the most useful of all should be most plentiful. The iron industry of the world has reached gigantic proportions. In 1909 in the United States, the iron and steel industry was capitalized at almost a half-billion dollars.

Production. Reports for the United States and Canada have been brought down to date. While in 1906 the production in the United States was 47,750,000 long tons, it increased in 1907 to nearly 52,000,000 and in 1910 reached a total of about 54,000,000 long tons. The production of pig iron in Canada for the year 1906 was 515,200 long tons; for 1911 it was 900,000 long tons.

The reader is referred to Volumes III and V for full treatment of the nature and history of iron and steel, in regular alphabetical order.

It will be a most interesting study to trace the facts respecting iron through such an outline as the following. One should know as much as possible about a metal which can be tempered to the hard cutting edge of a razor and the point of a fine needle, or made soft enough to meet requirements for horseshoe nails.

Outline on Iron

I. Properties
- (1) Ductility
- (2) Malleability
- (3) Hardness (tempering)
- (4) Magnetism

II. Ores
- (1) Kinds
  - (a) Red hematite
  - (b) Brown hematite
  - (c) Magnetite
  - (d) Spathic
- (2) Distribution
  - (a) United States
  - (b) Canada
  - (c) Other countries

III. Mining Ore
- (1) Methods
  - (a) Blasting—ore in form of ledge
  - (b) Steam shovel—when ore is soft
- (2) Shipping
- (3) Smelting—Object
  - (a) Crusher
  - (b) Blast furnace

IV. Pig Iron
- (1) Characteristics
  - (a) Coarse
  - (b) Brittle
- (2) Uses
  - (a) Iron castings—
    Stoves, framework, etc.

V. Wrought Iron
- (1) Characteristics
  - (a) Flexible
  - (b) Ductile
  - (c) Malleable
- (2) Uses
  - (a) Nails, wire, etc.

VI. Steel
- (1) Characteristics
  - (a) Hard
  - (b) Tenacious
  - (c) Gray in color
- (2) Principal Uses
  - (a) Framework of large buildings
  - (b) Bridges
  - (c) Steel rails and ties

Questions on Iron

What is iron? Why are steel plants generally built near extensive coal beds?

Why does iron rust easily? What is rust? What kind of iron in your kitchen range?

Is there any other known metal that could be used for the same purposes as iron?

Which would you miss the more, gold or iron? Which constitutes the greatest factor in the world's progress?

Who was Krupp? Bessemer?

Why is coke used for blast furnaces?

What is slag? To what practical uses is it put?

Distinguish between pig iron, cast iron, wrought iron and steel. Name articles made from each.

What effect do repeated smeltings have on iron?

How did they handle iron in the iron age? What are some of the new uses of steel?

What is the name of the one continent which has no iron supply? Where is the best iron found in Europe?

How does the United States stand in the production of iron ore?

What is the method of mining iron ore?

How are the impurities separated from the iron?

How is a blast furnace operated?

In what is the molten iron cooled?

Sugar

Introduction into North America. During the middle of the eighteenth century sugar cane was introduced from southern Europe into Louisiana, where the manufacture of sugar has been carried on successfully ever since. The articles on *Sugar* and *Sugar Cane* in THE NEW PRACTICAL REFERENCE LIBRARY give a complete account of the plant as well as the processes by which the sugar is produced. The modern sugar factory is equipped with every mechanical device for securing the best results. Every year sees new improvements made and new inventions applied. There have been increased efforts, especially in the United States, Canada, and Germany, to substitute sugar from beets and other plants for cane sugar. Today the world's production of sugar is about evenly divided between sugar cane and beet sugar. In 1911 the total amount of cane sugar produced was 8,522,000 long tons, of beet sugar, 8,575,000 long tons. This is an increase in the world's output of sugar of 2,000,000 tons in two years. The five leading sugar producing countries of the world, British India, Dutch East Indies, Germany, Russia, Cuba, produce more than two-thirds of the total supply.

Sugar Production. In 1909 the United States produced 5.3 per cent of a world total of 15,000,000 long tons; in 1911 the percentage had risen to 10. No other figures could show so well the great advances made by the sugar industry under the encouragement of the government. The greatest increase in the cane sugar supply has not been in the United States itself but in Porto Rico and the Philippines. The quantity produced in Louisiana and the other southern states fluctuates very little.

Sugar is one of the most important imports of the United States; like Canada, it can never hope to produce enough to meet local demands, even with wide extension of the beet sugar industry.

Beet Sugar. It is clear that climate and soil limit the area in which cane sugar may be produced. Beet sugar, on the other hand, thrives in more temperate zones of wider area. It is only since 1901 that the cultivation of sugar beets in Canada has become a recognized industry; the census of that year makes no mention of sugar beets. In 1911 over 177,000 tons of sugar beets were raised on an area of 20,878 acres. Ontario produced all but 15,000 tons of the total; there are factories at Wallaceburg and Berlin. Alberta is the only other province producing sugar beets for the market; the irrigated district around Raymond, where there is a factory, yields a high average per acre. The net profit to the farmer ranges from $30 to $100 an acre. The chief difficulty today is the closing of the factory during the greater part of the year. The "season" lasts from sixty to ninety days, according to the size of the crop; when the crop has been harvested and made into sugar, the factory closes. This is a serious obstacle to the investment of capital. Furthermore, the sugar beet demands a large amount of field labor. Experience seems to show, however, that the industry is especially favorable to small investors because the returns are high. It seems certain that the beet will be cultivated in increasingly large areas, as further study will improve the conditions of the industry.

Outline on Sugar

I. SOURCES
- (1) Sugar cane
  - (a) Where grown?
    - (1) United States
    - (2) Other countries
  - (b) Description
    - (1) Height
    - (2) Leaves
    - (3) Resembles what plant?
  - (c) Sugar mills
    - (1) Processes
    - (2) Crushing stalks
    - (3) Reduction of sap
    - (4) Refining, etc.
  - (d) Products
    - (1) Granulated sugar
    - (2) Loaf sugar
    - (3) Brown or raw sugar
- (2) Beets
  - (a) Where grown?
    - (1) Canada
    - (2) Other countries
  - (b) Sugar factories
    - (1) Processes
    - (2) Slicing beets
    - (3) Drawing juice
    - (4) Refining, etc.
- (3) Maple sap
  - (a) Where produced?
  - (b) Season
  - (c) Securing sap
  - (d) Sugar-making (see sugar cane)
  - (e) Flavor, value, etc.
- (4) Sorghum
  - (a) Resembles what plant?

(b) Process (see sugar cane)
(c) Product
(1) Syrup
(2) Sugar—not of commercial importance

II. Sugar Refineries
(1) Location of
(2) Work of refining
(3) Annual output cane sugar, beet sugar
(4) United States
(a) Annual output of cane sugar
(b) Annual output of beet sugar
(c) Annual consumption of sugar
(d) Annual importation of sugar
(e) Annual consumption of individual

III. By-Products
(1) Molasses and syrup
(a) Sorghum
(b) New Orleans molasses
(c) Foundation for all syrups
(2) Bagasse
(3) Beet chips

Questions on Sugar

How many pounds of sugar are made from a ton of beets? From a ton of West India cane? Louisiana cane?

How many pounds of sugar are used to each individual yearly in the United States? In Canada?

What is the sugar you use daily made from—beets, sugar cane or maple sap?

How is loaf sugar made? In what manner is it mostly used?

In what cities are some of the sugar refineries located in the United States? Where are some beet sugar factories in Canada? With what product do they work? What stage of the work do they handle?

What are the chief uses of maple sugar?

What is sorghum? Why is not the cane suitable for sugar?

What do we mean by raw sugar? Brown sugar?

What countries lead in the raising of sugar cane?

How does the cane in the tropics compare with that in cooler climates?

What becomes of the crushed stalks?

Upon what does the growth of the sugar cane depend largely?

For how long a period does one planting last? Is this an important factor?

What is done with the beets after extraction of the sugar? With the cane stalks?

What color is the raw sugar? What is used to whiten it?

Salt

Where Salt Is Found. Salt is found in many parts of the world in one of three forms: in ocean or lake water, in underground brine, and as rock salt. Since all rivers carry some salt, the accumulation may become very great when the rivers enter a reservoir which has no outlet. It is in this way that the salt lakes have been formed, and the salt of the ocean has also probably come from the wash of the lands. We must remember that salt is really a mineral, found in the earth; its existence in water is due to solution. In the Caspian Sea the water has only 0.63% salt; the Mediterranean contains 3.37%; the Atlantic Ocean averages 3.63%; and the Dead Sea has 22.30%. When the quantity of water evaporated exceeds that entering a natural reservoir, the water becomes saturated, and salt will gradually be deposited on the bottom. The drying-up of lakes or the evaporation of sea water in enclosed bays has thus led to the formation of rock salt deposits.

How Salt is Obtained. The simplest method of obtaining salt is by the evaporation of sea water, but this is seldom done except in countries which have no other source of supply. It consists in conducting sea water into shallow tanks and then evaporating the water by artificial heat or by the sun's rays. Underground brines are extracted by driving wells through which they are pumped to the surface. Rock salt is mined just like any other mineral. When brought to the surface it is either dumped in large lumps or put through a "breaker," or series of crushers, toothed rolls and screens, for breaking up the lumps.

It sometimes happens that rock salt is in such a formation that the ordinary mining methods are ineffective. In this case a well is bored down to the salt deposit in the same manner as an oil well. It is customary to case the well with a pipe; inside of this is put a second tubing, which usually extends to a lower depth than the outer pipe. Water is forced down between the outer and inner tubing. The water at the bottom dissolves the salt, and the solution is forced up through the inner tube. It is also possible to bore several wells, the water being forced down one and the brine up the other. The coarser grades of salt are produced by allowing the water to evaporate by the sun's heat, but for the better grades artificial heat at a very high temperature is necessary. A tank is about twenty to twenty-four feet wide, one hundred feet long, and ten to twelve inches deep. The tanks rest on brick arches and the heat is supplied from grates set at one end of the tank and somewhat underneath it. Instead of using grates, hot water or steam pipes are often run under the tank. In another process the brine is poured into large kettles having a capacity of 120 gallons.

Small quantities of salt in the form of brine springs occur in northern Alberta and near Sussex, King's county, New Brunswick. Practically all the salt for commercial use, however, comes from Ontario, in Middlesex, Huron, Bruce and Lambton counties. The evaporating process is the only one used; in the United States, whose annual output is about 4,000,000 tons, most of the salt is mined. The beds are at depths varying from 200 to 2,700 feet; New York and Michigan lead, though large quantities are now evaporated from the Great Salt Lake in Utah. Canada's output of salt is over 80,000 tons, valued at $400,000. In addition to the domestic output, all of which is consumed in Canada, the imports of salt amount to 130,000 tons, at an average value of $5 a ton.

Outline for Study. The following outline may be found of value in the further study of salt and the salt industry:

I. SOURCES
   (1) Salt water
   (2) Brine springs
   (3) Rock salt
II. PRODUCTION
   (1) Methods
      (a) Evaporation of sea water
      (b) Boring wells
      (c) Mining
   (2) Chief producers
III. USES
   (1) Seasoning and preserving
   (2) For chemicals
      (a) Soda
      (b) Chlorine
   (3) Miscellaneous
      (a) Glazing pottery
      (b) Hardening soap
      (c) Making glass clearer
      (d) Fertilizer

Questions on Salt

What is salt?

What process causes the formation of salt deposits?

Where is most of the salt extracted from sea water produced? What is it generally called?

What are the processes of drying? By which process is the best salt produced?

From what source is most salt produced?

Where in the United States is rock salt found? Where underground springs or wells? Which is the leading salt-producing state?

For what has salt been used since the earliest times?

Of what chemicals is it the chief source?

What are some other uses for salt?

Where is salt produced in Canada?

What is the chemical name for salt?

Is salt unknown anywhere in the world?

Dairy Products

The Dairying Industry. Although butter and cheese are mentioned among the early exports from the North American colonies, dairying as a special branch of agriculture did not appear to a considerable extent till well along in the nineteenth century. Its history as an industry, therefore, is identified with the general industrial progress of United States and Canada in the last century. The rapid growth of cities and the enormous development of transportation facilities have exerted a great influence on the progress of this industry. As the growth of the cities has increased the dependence of millions of inhabitants on the farmer for food, the demand for dairy produce has greatly increased, while the improved means of transportation have made possible the delivery of the produce to the cities at a profit to the farmers. The general changes in the character of industry have thus led many to adopt dairy farming as a specialty instead of following it incidentally.

In the early part of the nineteenth century the methods and utensils used in dairying were very crude. Winter dairying was unknown. The cows generally calved in the spring, going dry in the fall or early winter, and often, through lack of proper care, dying of starvation or exposure. In some sections the milk was set in pans for the cream to rise, and in others all the milk was churned, a method still used in some sections of the southern states, where butter is made every day.

Early Cheese-Making. In Herkimer county, New York, the making of cheese was begun as early as 1810. This section is still famous for its produce, and New York is still the leading dairy state of the Union. Ranked according to the number of dairy cows, the most important states are New York, Iowa, Illinois, Wisconsin, Pennsylvania. In general it may be said that in the North Atlantic states dairying is the principal source of income of a large proportion of the farmers who own cows; the Central West has more dairy cows, but they are kept as incidental to the more general cattle industry, or to other branches of agriculture. The total production of milk in the United States is about 8,000,000,000 gallons per year, an average of 424 gallons per cow.

Dairying in Canada. Dairying was naturally one of the first branches of agriculture practiced by the early colonists. We know that the farmers of Nova Scotia and New Brunswick were famous for the excellence of their dairy products. As settlers spread westward, the dairying industry kept pace. As early as 1852 cows were kept successfully at Fort Simpson. At Fort Good Hope, just outside the Arctic Circle, also at York Factory and Churchill, cows have been kept for many years.

There are about 3,000,000 dairy cows in the Dominion. Ontario leads with 1,240,000, followed by Quebec with 875,000 and Manitoba with about 160,000. Taking the average of milk per cow as 400 gallons, the production for Canada is about 1,200,000,000 gallons. The fact that a considerable percentage of milk and its products is consumed on the farms makes accurate records impossible, but a conservative estimate places the annual value of dairy products at $100,000,000, an increase of over 60 per cent in ten years. Most of the dairy products are for home consumption, but over $20,000,000 worth of cheese is exported each year, all but one per cent being sold to Great Britain.

Perhaps the most noteworthy feature in recent years has been the development of the factory system. It has been the means of introducing better systems of dairying and butter-making among farmers who are unable to send milk to factories, and this has greatly increased the average value of dairy products in the last thirty years. The census of 1911 shows that there are 3,628 factories in operation. The quantity of butter made in the year was 59,875,097 pounds, having a value of $15,682,564; this is 23,818,358 pounds more than in 1901. The quantity of cheese was 231,012,798 pounds, a slight increase over 1901, but with a lower value. The number of condensed milk factories increased from four in 1901 to twelve in 1911, and the value of the product from $260,520 to $1,830,871. There are now six factories in Ontario, two each in Nova Scotia and Quebec, and one each in British Columbia and Prince Edward Island. The following table summarizes the factory production of dairy products, according to the census of 1911:

Provinces	Butter	Cheese	Cond. Milk
Alberta.....$	533,422 $	23,473 $	......
British Columbia..	420,683	....	44,326
Manitoba..	511,972	81,403	......
New Brunsw'k	212,205	129,677	......
Nova Scotia	88,481	29,977	133,956
Ontario.....	3,482,171	14,845,661	1,335,689
Prince Edward Island.....	156,478	354,378	50,900
Quebec......	9,895,343	6,152,689	275,000
Saskatchewan	381,809	3,396	......
Total....	$15,682,564	$21,620,654	$1,839,871

Outline for Study. The subject of dairying includes too many details to be treated here except in mere outline, but it is a subject which will repay further investigation along any lines in which the student is interested. The following outline and questions may be of value in helping the reader to grasp the subject:

Outline on Dairy Products

I. MILK
 (1) Description
 (2) Composition
  (a) Water
  (b) Casein
  (c) Sugar
  (d) Fat
  (e) Salt
 (3) USES
  (a) Food
  (b) Basis for butter, etc.
II. BUTTER
 (1) Manufacture
 (2) Packing and shipping
 (3) Uses
III. CHEESE
IV. BY-PRODUCTS
 (1) Oleomargarine
 (2) Butterine
  (a) How made?
  (b) Legal restrictions
  (c) Tax
 (3) Condensed milk

Questions on Dairying

What work is performed by the separator?

What is a creamery? Generally located where? Name the different kinds of cheese. What foreign country is noted for its cheese?

What causes milk to sour? Give uses of sour milk. What is whey?

How is milk regarded as a diet?

How is it possible for milk to be the means of spreading disease? What are some of the rules for the taking care of milk?

Name some of the dishes prepared in cooking whose foundation is milk or cream.

How can milk be adulterated?

Tea and Coffee

Source of Supply. Two articles in common use, but not produced in the United States or Canada, are tea and coffee. While the features of their production are interesting and worth knowing, the articles on *Tea* and *Coffee* in The New Practical Reference Library make it unnecessary to repeat any of the facts already stated. Our concern is with the industry as it affects the United States and Canada; the former, especially, has a large trade in these commodities. The simplest way to secure an accurate idea of the extent of the trade is to glance at the figures for the sources of supply and consumption of coffee in the leading countries. It will be noted from the figures given that Brazil produces nearly all the coffee in the world.

Source of Coffee Supply

	Pounds
Brazil	2,232,911,000
Other South American countries	184,156,000
Central America	192,472,000
Mexico	81,000,000
West Indies	98,258,000
East Indies	107,006,000
Other countries	24,409,000
Total	2,920,212,000

The World's Largest Consumer of Coffee. The United States is by far the largest consumer of coffee; its annual consumption is two and a half times that of Germany, the next important consumer, and more than three times that of France. None of the other nations of the world, except Austria, Belgium and The Netherlands, are of importance. Canada uses only 700,000 pounds per year. A great deal of coffee is consumed by the natives of coffee-growing countries, but this is a cheap quality, generally mixed with other matter, and is not considered in estimates of supply and consumption.

Consumption of Leading Countries

	Pounds
United States	833,066,000
Germany	375,883,000
France	245,964,000
Austria-Hungary	131,340,000
Sweden	91,868,000
Netherlands	90,603,000
Belgium	81,864,000
Italy	51,632,000
Great Britain	29,195,000
Other countries	988,797,000
Total	2,920,212,000

Tea. Like coffee, tea is used extensively in the countries where grown. Unfortunately, there is no way of determining the quantities thus consumed; the only available figures are for exports and imports. The following figures show the exports of the chief tea-producing countries of the world:

British India	254,301,000 pounds
China	208,133,000 pounds
Ceylon	192,887,000 pounds
Japan	43,489,000 pounds
Java	33,517,000 pounds
Formosa	23,285,000 pounds

Largest Consumer of Tea. England consumes about twice as much tea as any other nation. In 1910 almost 287,000,000 pounds of tea were consumed in England, an average of 6.39 pounds for each man, woman, or child. Russia used 147,000,000, an average of only nine-tenths of a pound. The United States used 99,367,000, an average of 1.06. Canada, although it used only 34,000,000 pounds, had the high average consumption of 4.34. About one-half of the tea imported into North America comes from Japan, one-fourth from China, and the remainder from the minor tea-producing countries.

How Business is Handled. The business of handling tea and coffee, because of the detailed knowledge required, has gradually grown apart from the general trade in foodstuffs. Most of the importers are commission men, but many of the larger firms own their own plantations and handle only special brands of product. As tea, and more especially coffee, are easily adulterated before they reach the consumer, the importance of a reputation and good name is clear. Each firm, as a rule, has certain standard grades which are sold regularly. If any purchaser wishes a special mixture it is easy enough to accommodate

TEA AND COFFEE

...tically none of the importers or whole-... sell directly to the consumer; the ... first sold to the retailer, who sells teas ... under the importer's brand. The use ... packages has helped to do away with ... by dishonest retail dealers; the ... knows that he is getting the original ... as it was received from the importer.

Outline on Coffee

... PLANT
... racteristics
Height
Size and appearance
... aves
... Surface
... Color
... ssoms
... Fragrance
... Color
... Shape
...
... Size
... Color
...
... conditions
...
... America
...
... Indies
...
... OWTH
...

... er Coffee

... the coffee tree? How ... with the plum tree? ... number of pounds of ... crop? ... the berry before being

Describe the leaves, the blossoms, the fruit.

How are the berries gathered? How dried How is the husk removed? How is coffee packed for shipment?

Of what countries is it a native?

Where does the best coffee come from and what is it called?

What country supplies two-thirds of all the coffee used?

From what country does the United States get most of its coffee? Does Canada receive its supply from the same source?

Outline on Tea

I. The Plant
  (1) Height
  (2) Leaves
    (a) Color
    (b) Size
  (3) Flowers
    (a) Fragrance
    (b) Shape
    (c) Color
II. Cultivation
  (1) Where
    (a) China
    (b) Japan
    (c) British India
    (d) Other countries
  (2) Method
    (a) Three crops yearly
    (b) Harvesting leaves
      (1) Picking
      (2) Drying
      (3) Rolling
      (4) Packing
III. Composition
  (1) Nitrogenous substances
  (2) Theine
  (3) Tannin
  (4) Other substances
IV. Kinds of Tea
  (1) Green
  (2) Black
  (3) Cheap grades
V. Consumption
  (1) Great Britain
  (2) Russia
  (3) United States
  (4) Canada
  (5) Other countries
VI. Value as Food

Questions on Tea

Why is the shrub under cultivation made to branch freely?


5a
4a
1
1b
3b
4b
2b

him. Practically none of the importers or wholesalers ever sell directly to the consumer; the goods are first sold to the retailer, who sells teas and coffees under the importer's brand. The use of small packages has helped to do away with adulteration by dishonest retail dealers; the purchaser knows that he is getting the original package, just as it was received from the importer.

Outline on Coffee

I. The Plant
- (1) Characteristics
  - (a) Height
  - (b) Size and appearance
- (2) Leaves
  - (a) Surface
  - (b) Color
- (3) Blossoms
  - (a) Fragrance
  - (b) Color
  - (c) Shape
- (4) Fruit
  - (a) Bean
    - (1) Size
    - (2) Color
    - (3) Cells

II. Cultivation
- (1) Necessary conditions
- (2) Where grown
  - (a) Brazil
  - (b) Central America
  - (c) Mexico
  - (d) West Indies
  - (e) Ceylon
  - (f) Java

III. Consumption
- (1) United States
- (2) Canada
- (3) Germany
- (4) France
- (5) Austria
- (6) Other countries

IV. Conditions of Growth
- (a) Heat
- (b) Shade
- (c) Moisture

V. Food Value
- (1) Stimulant

Questions on Coffee

What is the height of the coffee tree? How would it compare in size with the plum tree?

What is the average number of pounds of coffee per tree from each crop?

What is the color of the berry before being roasted?

Describe the leaves, the blossoms, the fruit.

How are the berries gathered? How dried? How is the husk removed? How is coffee packed for shipment?

Of what countries is it a native?

Where does the best coffee come from and what is it called?

What country supplies two-thirds of all the coffee used?

From what country does the United States get most of its coffee? Does Canada receive its supply from the same source?

Outline on Tea

I. The Plant
- (1) Height
- (2) Leaves
  - (a) Color
  - (b) Size
- (3) Flowers
  - (a) Fragrance
  - (b) Shape
  - (c) Color

II. Cultivation
- (1) Where
  - (a) China
  - (b) Japan
  - (c) British India
  - (d) Other countries
- (2) Method
  - (a) Three crops yearly
  - (b) Harvesting leaves
    - (1) Picking
    - (2) Drying
    - (3) Rolling
    - (4) Packing

III. Composition
- (1) Nitrogenous substances
- (2) Theine
- (3) Tannin
- (4) Other substances

IV. Kinds of Tea
- (1) Green
- (2) Black
- (3) Cheap grades

V. Consumption
- (1) Great Britain
- (2) Russia
- (3) United States
- (4) Canada
- (5) Other countries

VI. Value as Food

Questions on Tea

Why is the shrub under cultivation made to branch freely?

What part of the shrub is of commercial value?

How are green and black teas prepared?

Which of the annual harvests yields the best grade?

May all grades and varieties of teas be prepared from the same plant?

Examine a tea leaf after steeping and compare it with those in the plate shown. Examine a number after steeping and compare them in size with each other.

Look at the color plate and point out the parts of the plant.

What is the effect of excessive tea drinking? Is it beneficial in mild quantities? Why? Is it a stimulant?

In what countries is tea chiefly cultivated?

Cacao

An Increasing Trade. It is not necessary to repeat the description of the cacao tree; this will be found in its alphabetical order in these volumes. A few interesting facts in regard to the trade and manufacture of the commercial cacao, or "cocoa," will be of value. The following figures will give some idea of the increase in the production of the article:

	1910	1905 (Long tons)	1901 (Long tons)
Tropical America and West Indies......	166,000	103,114	82,541
West Africa........	22,700	32,425	18,508
Asia...............		5,035	3,974
Other countries.....	29,800	800	700
Total..........	218,500	141,374	105,723

By 1911 the world's production of cacao had increased to nearly 240,000 long tons.

Practically all civilized nations use cacao in increasing quantities. The figures for the world's consumption for 1905 are as follows:

	1905 (Long tons)	1910 (Long tons)
United States............	34,958	50,420
Germany................	29,663	44,033
France..................	21,748	25,110
Great Britain............	21,106	24,100
Holland.................	19,295	19,230
Spain...................	6,102	5,530
Switzerland..............	5,218	9,108
Belgium.................	3,019	4,800
Austria-Hungary..........	2,668	4,972
Canada..................	.....	2,230
Other Countries..........	4,988	13,850
Total................	148,665	203,383

How Manufactured. In the manufacture of cocoa and chocolate the beans are cleaned and sorted to remove foreign bodies of all kinds and are also graded into sizes to secure uniformity in roasting. The roasting is done in rotating iron drums in which the beans are heated to a temperature of 260° to 280° F.; the result is the peculiar aroma and the elimination of the bitter elements. The beans are dry and their shells are crisp. The beans are next crushed, the light shells removed and the beans left in the form of "cocoa-nibs" or kernels, occasionally seen in the shops. Cocoa-nibs may be prepared with hot water, in the same way that coffee or tea is, but for most people this beverage is too rich. The fat is usually extracted from the beans, which are then ground to a fine powder. It is then ready for use in the ordinary way.

In the preparation of chocolate the preliminary processes are followed as for cocoa, except that the fat is not extracted. Sugar and sometimes other materials are added to the ground paste, together with vanilla or other suitable flavoring materials. The final result is a semi-liquid fluid which is moulded into the familiar tablets or other forms in which chocolate comes on the market.

Outline

I. Description
   (1) Tree
   (2) Fruit
      (a) Pod
      (b) Seeds
II. Production
   (1) Tropical America
   (2) West Africa
   (3) Other countries
III. Products
   (1) Cocoa
   (2) Chocolate
   (3) Cocoa Butter
IV. Consumption of Products

Questions on Cacao

Which are the principal cacao-producing countries? The principal cacao-consuming countries?

By what process is the commercial chocolate made? Cocoa?

Where are these articles used largely as a beverage?

What is the commercial importance of each?

What per cent of fat do the seeds contain?

What element does chocolate contain that is lacking in cocoa?

Apples

Among the World's Greatest Crops. A fruit of much greater importance than any other is the apple. It is one of the most widely cultivated and appreciated of fruits belonging to temperate climates. The apple is more successfully cultivated in higher latitudes than any other tree; good crops have been obtained in Norway and other countries as far north as 65 degrees north. The blossoms are very susceptible to injury from frost, but they appear much later than peach or apricot blossoms and so avoid the night frost which would be fatal to fruit bearing. Besides Europe and North America the apple is now extensively cultivated in South Africa, Northern India and China, Australia and New Zealand. North America is the leading apple-growing region of the world. Apples are raised for commercial purposes from Nova Scotia to Virginia and from New England to British Columbia. In recent years there has been a remarkable development in the apple industry of Idaho, Montana, and other western states. The apples of this section are noted for their fine color and great size. It is true in general that the apples of the cold northern climates are smaller and harder than those of the hot summer climates of Canada and the United States.

The Principal Canadian Fruit. The apple is unquestionably the chief fruit product of the United States and it is gradually attaining the same position in Canada. In 1871 the apple crop in Canada amounted to 6,000,000 bushels; in 1911 it was over 20,000,000, about eight per cent of the total being exported. Though the British Columbia crop is rapidly increasing, its annual value is by no means equal to that of Ontario. The Fraser Valley, the Columbia-Kootenay district and the Okanagan Valley are especially famous for fine apples. In Alberta apples are raised in considerable quantities in the district south of Edmonton. Apple-raising in Manitoba is not yet a distinct industry, though many varieties of crab-apple are cultivated. Ontario has about 11,500,000 apple trees, which yield a crop worth over $16,000,000; the province produces from 30,000,000 to 35,000,000 bushels each year, over half the apple crop of the Dominion. A considerable part of Ontario's crop is sent to the western provinces. These western shipments, which include some of the best fruit, total nearly 1,000,000 bushels a year. For many years Quebec and Nova Scotia each produced about ten per cent of the total for Canada, but since the great development of fruit raising in British Columbia their relative importance is slightly less. The bulk of the Ontario crop is sold within the province; at the same time the province exports more apples to Great Britain than any other state or province in North America. In 1911 Great Britain bought over $4,000,000 worth of apples from Canada, in addition to large amounts from France, Belgium and Holland. The greater part of the Canadian output finds a ready market at home; but a constantly growing fraction is exported, mainly to Liverpool, London and Glasgow. It seems that the Mediterranean countries may also be counted as future markets for Canadian apples. The growing use of apples at home, and the expanding markets abroad both for fresh and dried apples, indicate that the future will make the apple crop even more valuable than it is to-day. In the United States the predominance of this fruit is marked; fifty-five per cent of all the orchard trees and eighty-two per cent of the bushels of fruit are apple. About one hundred varieties are commonly raised in the United States; Baldwins, Bishop Pippins, Golden Russets, Stark and Northern Spy are among the important varieties in Canada, and many other kinds are successfully raised.

Essentials to Successful Growth. Good cultivation is an important part of orchard management. Two crops can seldom be profitably grown on the same soil at the same time; the orchard should not be used as pasture or as regular farm land. Another essentiel of good management is pruning. This must be modified to suit the variety, the locality, and the purpose for which the tree is grown. In general, a low head, wide-spreading branches evenly ranged about the trunk at different heights are desirable. Most apples in the market to-day are so-called "winter apples," which are allowed to remain on the trees as long as possible without being frozen. Fruits so treated are usually better flavored and colored than those picked early in the season, and experiments show that they are better for preservation in cold storage, as they are more likely to keep their flavor.

Suggested Outline. The outline on the next page is suggested to help in further study. The items of interest on pages 293 to 311 should also be consulted.

Outline on the Apple

I. Description
 (1) Tree
  (a) Shape
  (b) Branches
  (c) Leaves
  (d) Blossom
 (2) Fruit
  (a) With core and seeds
   (1) Shape
   (2) Color and texture of skin
   (3) Pulp
   (4) Core and seeds
  (b) Seedless
   (1) Color
   (2) Flavor
   (3) Size
II. Where Grown
 (1) North America
 (2) Europe
 (3) South Africa
 (4) India and China
 (5) Australia
III. Uses
 (1) Food
  (a) Raw
  (b) Cooked
  (c) Dried and canned
 (2) Feed for animals
 (3) Cider and vinegar
IV. Harvesting
 (1) Picking
 (2) Packing
 (3) Shipping
V. Waste
 (1) On tree
  (a) From disease
  (b) From neglect
 (2) After packing
VI. Marketing

Questions on the Apple

To what family does the apple tree belong?
Of what continent is it a native?
What continent now leads in its production?
How many barrels will one tree yield in a season, under favorable conditions?
From what two species have all varieites been derived?
How many cultivated varieties of apples are known?
How many cultivated varieties are grown in the United States? In Canada?
How many of these are profitable?
Do the seeds produce the fruit from which they are taken?
How is vinegar made from apples?
How are orchard trees prepared?
What is grafting?
Why is clover sown in an orchard to insure a good crop?
Who has succeeded in growing the seedless and coreless variety of apples?
What is peculiar about the skin of these apples?
Why is the blossomless tree an important feature of this variety?
What danger is removed by the lack of the flower?
What are the indications that the seedless apple will in time displace all the old seed-bearing varieties?

Peaches

An Important Crop. The peach is second only to the apple as an orchard fruit. It has a wider range for possible growth than the apple, and some varieties succeed equally as well in the north as in the south. According to the latest available figures Ontario, with over 700,000 bushels, is far in the lead as a producer, but the production in British Columbia is rapidly increasing. The district bordering on Lake Erie and Lake Ontario, because of its low altitude and the influence of the lakes, produces large quantities of fruits and is generally known as the peach belt. The same condition exists to-day in the peach-growing as in many of the apple-growing districts: large numbers of trees have been planted but have not yet reached the age at which they bear large crops. Such sections as the Okanagan and Kamloops districts of British Columbia are bound to become increasingly large producers of fruit of all kinds.

Kinds of Peaches. Peaches are popularly divided into clingstone and freestone, but these two classes gradually merge into each other in the different varieties, and even the same variety may be clingstone or freestone in different seasons. There are nearly three hundred varieties of peaches grown in North America, which may be roughly grouped as follows: (1) Peen-to, a flat, medium sized, greenish white, early peach, suitable for commercial culture only in the hot Gulf states; (2) South China, a rather small, oval fruit; (3) Spanish or Indian, a late peach, nearly always yellow, with a hairy skin; (4) North China, a large, oval fruit; (5) The Persian, which includes the great majority of large, yellow or white fleshed varieties grown in the more northern latitudes. In addition, there are certain smooth skinned peaches called "nectarines," which are really variations but may be cultivated like other varieties of the peach.

In America peaches are grown in orchards like apples, but in Europe they are usually trained against walls or other protection and often kept under glass.

How Raised. Peaches are raised from seed, which is usually covered with moist sand in the fall and left exposed to freezing and thawing, which softens and cracks the pits. In spring the pits are planted six to eight inches apart in rows wide enough to allow cultivation with horses. In August or September the seedlings are budded (see *Grafting*, subhead Budding) with the desired varieties, since the peach does not, as a rule, reproduce true to seed. In warmer climates the budding may be done earlier in the summer. In the North, trees budded one fall are allowed to grow the following season before transplanting to the permanent orchard. Peaches thrive best on light, sandy, gravelly soil, though larger trees will grow if heavier soils are used. High or rolling lands are desirable to insure good soil and air drainage, for the peach must be planted in protected localities free from late spring frosts. Occasionally the trees are thoroughly whitewashed in the fall or winter, because this has a tendency to delay blossoming; planting on a northern slope will sometimes have a similar tendency. In the permanent orchard the trees are set about twenty feet apart each way, though they may be set fifteen feet apart if careful attention is given to pruning and fertilizing. The peach is not a long-lived tree, even under the most favorable conditions, seldom living more than thirty years. The life of a commercial orchard is from seven to nine years; new trees should be added at various times as the old ones die out.

In harvesting, the fruits are gathered when full grown and well colored, but before they begin to soften. Then they are graded according to size and marketed in various sizes of baskets or boxes.

Outline on the Peach

I. Description
- (1) Tree
  - (a) Size
  - (b) Shape
- (2) Leaves
- (3) Blossoms
- (4) Fruit
  - (a) Characteristics
  - (b) Kinds
  - (c) Shape
  - (d) Flavor
  - (e) Size

II. Where Raised
- (1) North America
- (2) Europe
- (3) Asia

III. Harvesting
- (1) Picking
- (2) Packing
- (3) Shipping

IV. Peach Diseases

V. Uses
- (1) Food
  - (a) Raw
  - (b) Cooked
  - (c) Dried
  - (d) Canned

Questions on the Peach

To what fruits is the peach allied?

In what country is it most extensively cultivated?

What kind of climate does it need? What kind of soil?

Into what classes may peaches be divided?

What is meant by "budding"?

What is the average life of a peach tree?

What is an average peach crop per tree?

What is the chief cause of a smaller crop?

Forestry and Lumbering

Forestry

A Forest's Usefulness. In a general way it may be said that forests are of direct and indirect value: direct, through the produce which they yield; indirect, through the influence which they exercise on climate, the amount of moisture, quality of the soil, healthiness and beauty of the country. Let us first consider the indirect usefulness. It is clear that a piece of land without vegetation is exposed to the full effect of the sun, rain, snow, and wind. If, on the other hand, the land is covered with a growth of plants and trees, it enjoys certain benefits which modify the effect on soil and air. These benefits are all due to vegetable life: the crowns of the trees cut off the sun's rays and the falling rain; the leaves, flowers, etc., besides certain plants which grow in the shade of trees, form a layer of mould which protects the soil against rapid changes of temperature and greatly influences the movement of water in it; the roots of the trees penetrate into the soil in all directions and bind it together.

Effect on Temperature. The effects of these factors are more numerous than are generally recognized. The most obvious, probably, is the difference in temperature. A lower temperature tends to keep more moisture in the air, and consequently more rainfall is likely. In lowlands, it is true, the effects of forests on the amount of rainfall are probably very small, but in highlands they are quite noticeable. The vegetation tends to regulate the water supply by keeping the springs well-fed from surface water. A very important fact is that the roots hold the soil together so that the rich surface loam is not washed away by rains. The history of the United States is full of instances where hills and mountain slopes have been made useless for cultivation because the cutting down of the trees has left the fertile soil to be washed down. Where trees are planted near human habitation they reduce the velocity of the wind, protect buildings and adjoining fields, and offer shelter to animals and birds. There can be no question that forests add to the beauty of the country. Surely every man, woman and child will be happier if the surroundings are beautiful than if the country is a barren desert. All these effects of extensive forests deserve consideration. Whether one or the other is the more important is not the question at issue. The fact is that every country under the sun will be benefited by a wise care of its forests.

The direct utility of forests is in their produce, fuel and timber, also material for dyes, medicines and other useful articles. In modern times iron, steel, and concrete have to a large extent replaced timber for building, and coal, peat, and similar materials are being substituted for firewood. But wood is still indispensable and seems likely to remain so. Even if no other motive than self-interest dictates the policy of the owners of forests, it is wiser to take good care of the property. Most of the owners of great tracts now realize that the practice of forestry as a definite system is to their own advantage.

Forestry in America. The conditions under which forestry is practiced in Europe and in America are so different that it seems best for our purpose to study only conditions in the United States and Canada. A rule that is an axiom in England might be useless in the United States. Among the factors to be noted are the highly developed and specialized methods of lumbering in America, the better facilities of transportation, the vast number of small holdings of forest land, and the enormous supply of low-grade wood. In a word, though the opportunities are great, American forests are not yet standardized. High taxes on forest properties, and above all, the customs of the lumbering business, are of great importance. Methods of forest management, to be of practical value and find ready acceptance, must conform as closely as possible to existing methods of lumbering. The introduction of system anywhere, in any industry, is a work of years of labor, not of a few moments' thought. The problems of forestry must be applied to actual conditions.

It would almost seem as if the white race had begun wrong on this continent. Needing cleared land for agriculture we started in the woods, and now that we need woods we start on the cleared land. The early settlers, coming from Europe, had practiced forest conservation at home, but in the New World the destruction of forests on the coast was at first a necessity and later a habit. In the southern portions of the provinces of Manitoba, Saskatchewan and Alberta and in the Peace River Valley, is a prairie country which is absolutely treeless, except for small clumps of timber in the large river beds and on a few isolated hills. This treeless area is about 200,000 square miles. Practically the whole remainder of the country was covered with timber when the earliest settlers landed at Quebec. In the maritime provinces and as far west as Manitoba was a great stand of pine; Ontario and Quebec had large bodies of hardwoods; from Nova Scotia to the Yukon was the great spruce belt; and on the Pacific coast was a coniferous forest containing the greatest amount of timber per acre of any forest lands in Canada. According to the Dominion Census about 110,000 square miles of land, of which only 20,000 are prairie, are now occupied, and about 100,000 square miles in addition have been cleared by lumbermen. The original timber area of Canada was about 1,900,000 square miles; of this approximately 200,000 have been cleared for settlement and lumber. The report of the Commission of

Conservation estimates that the actual stand of timber to-day is 2,000 billion feet less than it should be if no other causes were operating for destruction. This difference is due to forest fires. It is a quantity almost beyond comprehension; it is over 400 times as much as is yearly cut in Canada; it is fifty times as much as the combined yearly cut of the North American continent north of Mexico. It means that for every foot of timber ever cut by lumbermen in Canada, at least seven feet have been destroyed by fire.

Forest Reserves. Thus the great problem which has faced the government has been the prevention of forest fires. In common with most European countries and in contrast to the United States, Canada is fortunate in that practically the entire forest area is owned by the Dominion or provincial governments. This has greatly simplified the problem of control, yet in providing remedies little more than a beginning has been made. To prevent undue destruction of the forests, either by fire or by lumbering, is the reason for creating forest reserves. The reader should understand that timber may be cut under certain restrictions, but no settlements may be made on the reserves. The first Dominion reserve was the Rocky Mountain Park, established in 1887. Since that date there have been twenty-eight additions to the reserves, making a total of over 16,000,000 acres. In 1911 an act of Parliament provided for the formation of a new Rocky Mountain Forest Reserve, including the old Rocky Mountain Park, Jasper Park and Kootenay Lakes reserves. This new national forest has a total area of 11,656,000 acres. The Dominion reserves are all in the western provinces, as follows:

British Columbia	1,356,760 acres.
Manitoba	2,294,240
Saskatchewan	599,641
Alberta	11,881,280
Total	16,128,921 acres.

In addition to this area the provinces have reserves or parks over 200,000 square miles in extent; Quebec leads with 174,000 square miles, Ontario has 17,860, and New Brunswick 10,000. All timber land in Nova Scotia is subject to government control.

The Forestry Branch. The formation of reserves was the first step in advance. The second step was the establishment of the forestry branch of the interior department at Ottawa. The administration of the reserves is in the hands of a commissioner, who resides at Edmonton, and reports directly to the superintendent of forestry at Ottawa. Under the commissioner are the fire rangers and guards who actually cover the territory. In 1910 there were about 500 fires on Dominion lands and probably 1,000 more on other lands. To prevent the spread of fires, and so far as possible, prevent their origin, is the principal business of the rangers. They patrol their districts, mark timber, enforce the regulations and conduct the minor business arising from the use of the forests. In addition to the permanent foresters, the superintendents of the various parks are fire wardens and additional men are employed during the dry season. That the number and extent of fires is decreasing is a tribute to the efficiency of the regulations which have been adopted, but it is an even higher tribute to the character and ability of the handful of men who administer them.

The co-operation of the government with private owners will result in the eventual solution of the second great problem in forestry—the planting of areas which are now comparatively or absolutely treeless. The securing of natural reproduction of a forest depends on the method of removal of the full-grown trees. The forestry branch aims to regulate the cutting of timber on forest reseves so that the conditions shall lead to the plentiful reproduction of the most valuable species. On burned-over land the foresters plan to secure the best results by using proper scientific methods. But the forestry branch aims not only to prevent undue destruction, not only to replace destroyed forests, but actually to create new timber areas. It is here that co-operation with private owners is most obvious, for the government supplies trees free of charge and tells the farmer how to take care of them. (Send for *Bulletin No. 1, Tree Planting on the Prairies*, Forestry Branch, Department of the Interior, Ottawa.) Large nurseries have been established in various parts of the country, and young trees are distributed to settlers. The value of trees for shade, for conserving the water supply, and as windbreaks, is clear. In parts of Manitoba various coniferous trees are being planted as windbreaks for fruit orchards, apparently with excellent results. Quick-growing trees, such as cottonwood, are frequently cut for fuel. There is no space in a general article to mention the kinds of trees used, the conditions under which planting should take place, the care of the young growth and the many other necessary details. Some idea of the extent of the service which the government is rendering to its citizens may be gained from the fact that in 1910 over 8,000 applications for trees were received and 2,533,000 trees were distributed. The importance of this movement in the prairie sections for its ultimate influence on problems of water supply and agriculture, quite aside from any lumber value of the trees, can hardly be overestimated.

Lumbering

Lumber Producing Countries. The principal lumber producing countries of the world are the United States, Canada, Russia, Sweden, Germany and France, but some tropical sections furnish many beautiful varieties of timber, such as mahogany, ebony and rosewood, which are chiefly used in furniture making. Russia and Sweden are the only important European exporters of lumber; most of the other nations, especially Great Britain and Germany, import large quantities, or produce just enough for their own use. With the increasing demands for lumber there has been a corresponding increase in the varieties of wood available for industrial purposes. Substitutes have been found for many varieties formerly in use; and such substitutes have often proved better than the varieties they displaced. Distant countries are now being drawn upon to fill the supply, so that woods suited for particular purposes have thus been obtained.

Divisions of the Industry. According to the reports of best authorities the lumber industry is divided into three branches, as follows: "(1) The logging industry, including the felling of timber, cutting it into lengths, and transporting it by rail or by river to the mill. This industry is carried on in part by individuals, who own or operate the sawmills. The raw material of this industry consists of standing timber; the finished product consists of logs delivered at the mill. (2) The sawmill industry, in which the raw material consists of saw-logs, and the product of rough lumber, including beams, joists, scantlings, boards, shingles and laths. (3) The planing mill industry, in which the raw material consists of rough lumber, and the finished product of planed, with such minor manufactures as are carried on in connection with these mills. Some of the planing mills are operated in connection with sawmills, while others are under separate ownership and management." The details of the operations are carefully explained in the article on *Lumbering*, in Volume III; our present interest is only in the main features of the industry.

We shall confine our attention to lumbering in the United States and Canada, not so much because it is typical of lumbering in other countries as because it shows certain standards of organization and development of the use of machinery. All the operations of the lumber trade in these two countries are influenced by the peculiar unit of measure which has been adopted. This unit is the board-foot. It is generally defined as a board one foot long, one foot wide, and one inch thick, but in practice it is equivalent to one hundred forty-four cubic inches of manufactured lumber in any form. To purchase logs by this measure, one must know how much one inch timber each log will yield. For this purpose a scale or table is used, which gives the number of board feet of logs of various lengths and diameters. Under this system the buyer pays for nothing but the salable lumber in each log, without any expense for the waste in slabs and sawdust.

In parts of the United States, especially the northeastern and lake states, and also in Canada, lumbering was once only a winter industry, but generally it is now carried on the year around. River-driving, that is, floating the logs down stream to the mills, is still practiced wherever possible, but as the timber supply near the rivers is being exhausted, other means of transportation have been used. The logs are sometimes carried out of the woods by teams over temporary log roads. In the mountain forests enormous loads are drawn on sleighs by single pairs of horses—the roads are previously flooded and frozen, so that the surface is icy. In the south and west temporary railroads are sometimes built into the forests to transport the logs. In the far west machinery is used to a far greater extent than in the east on account of the great size of the timber. Donkey engines and traction engines are used in the woods for handling logs and for dragging logs over roads to the railway. For loading logs on the cars cranes are commonly used.

The lumber industry of Canada may be roughly divided into three great sections:

(1) The southern forests, including most of southern Ontario, the St. Lawrence Valley and the maritime provinces. The principal trees of this region are maple, beech, ash, birch, pine, spruce and cedar.

(2) The northern forests, which reach across the continent from the Gulf of St. Lawrence to

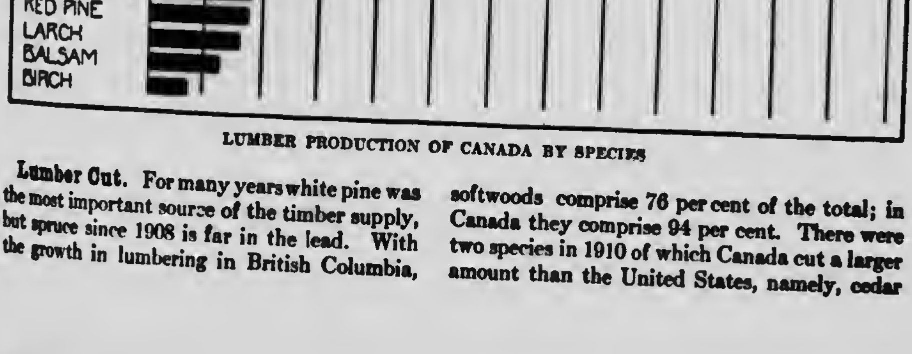
the Rocky Mountains. The southern strip as shown on the chart is densely wooded, spruce, pine, tamarack and poplar being the most valuable trees. North of this strip is another, known as the *not densely wooded*, including such hardy varieties as spruce, larch and canoe-birch.

DIVISIONS OF THE WOODED AREAS OF CANADA

(3) The western or Cordilleran forests, which extend from the Rocky Mountains to the Pacific Ocean. The common trees in this region are Douglas fir, cedar, black pine and white spruce.

Lumber Cut. For many years white pine was the most important source of the timber supply, but spruce since 1908 is far in the lead. With the growth in lumbering in British Columbia, the Douglas fir is gradually increasing in value. 400,000,000 board-feet of Douglas fir were cut in 1909; in 1910 the total was 717,476,000.

The following diagram illustrates graphically the lumber production by species, according to the latest reports of the forestry branch.



LUMBER PRODUCTION OF CANADA BY SPECIES

This chart shows that the leading timber products are softwoods. Larch and balsam together, as a matter of fact, are worth more than all the hardwoods. In the United States softwoods comprise 76 per cent of the total; in Canada they comprise 94 per cent. There were two species in 1910 of which Canada cut a larger amount than the United States, namely, cedar and balsam. Nearly 60,000,000 feet more of cedar and 15,000,000 more balsam were cut in Canada. Spruce is the only other timber in the output of which Canada approaches the United States; the production for the United States was 1,748,547,000 feet, as compared with 1,300,031,000 feet for Canada.

The total lumber cut in 1910 was 4,901,649,000 board-feet, valued at more than $77,000,000. It is interesting to notice that the increase in the lumber cut of Canada is about in proportion to that of the United States. The total cut of Canada is about one-ninth of the lumber cut of the United States, and a little less than the combined production of Washington and Maine. Ontario has been Canada's greatest lumber producer for many years; its forests of many species have enabled it to compete in the production of every kind of lumber. The most noteworthy feature of the last census is the enormous growth in the output of British Columbia. In 1900 the cut of lumber in that province was 276,000,000 board-feet; in 1906 it was 539,000,000; in 1908 it was 647,977,000 and in 1910 it had risen to 1,619,904,000 board-feet. All indications seem to show that this is not a temporary jump but a permanent growth. The forests of the east can no longer yield the enormous quantities required and new territory must be opened. The table below gives a summary of the lumber production for the years 1908 and 1910:

Province	1908	1910	1908	1910	Percentage of Distribution	
	Board-Feet—,000 omitted				1908	1910
Ontario....	1,294,794	1,642,191	$30,050,344	$30,011,009	38.7	33.5
British Columbia.......	647,977	1,619,904	11,374,989	24,823,441	19.3	33.1
Quebec................	690,137	790,197	9,489,386	11,340,323	20.6	16.2
New Brunswick.........	308,400	419,233	5,336,974	5,560,780	9.2	8.6
Nova Scotia............	216,825	260,871	3,273,177	3,344,075	6.4	5.3
Saskatchewan..........	91,166	75,931	1,448,079	1,092,571	2.8	1.6
Manitoba..............	56,447	45,127	1,025,268	644,717	0.7	0.8
Alberta................	41,382	42,922	798,320	615,215	1.3	0.8
Prince Edwards.........	....	5,273	22,940	71,056	...	0.1
Canada...............	3,348,176	4,901,649	62,819,477	77,503,187	100.	100.

In order that the reader may grasp the size of the industries dependent on the forests, he should know that the annual cut of timber is about three billion cubic feet, or thirty-six billion board-feet. One-half of this is used for firewood, three-tenths for lumber and shingles, one-tenth for poles, posts and rails. The annual values, as estimated by the forestry branch of the department of the interior at Ottawa, follow:

Lumber, lath and shingles........	$ 89,000,000
Firewood........................	45,000,000
Poles, posts and rails.............	11,000,000
Pulpwood.......................	5,000,000
Hewed ties......................	3,500,000
Cooperage.......................	2,000,000
Tanning materials...............	1,300,000
Miscellaneous....................	4,000,000
Total.....................	$160,800,000

Opportunities for Improvement. There is almost unlimited opportunity for improving the conditions and standards of lumbering. When we realize that lumbering is the greatest single industry in Canada, we may appreciate the importance of an adequate control by the forestry branch. No investigations have yet been conducted in Canada to show what percentage of the cut is wasted, but in the United States, where conditions are much the same as in Canada, it has been found that one-half of the timber cut is wasted either in cutting, logging, or in the mills. From ten to fifteen per cent of this loss is probably unavoidable, but the greater part is due to careless and short-sighted methods. These figures are evidence that much study and practical work remains to be done in bringing the lumbering industry to the high standard which it ought to have. The subject is such a large one that it is difficult to suggest all the possible lines of investigation. The following outline and questions, it is hoped, will give the student a working basis:

Outline on Lumbering

I. Kinds
- (1) Hardwood—mahogany, rosewood, ebony, etc.
- (2) Softwoods—pine, cedar, etc.

II. Saw Mills
- (1) Location
  - (a) Lumber camps
  - (b) Seaports, inland cities
- (2) Methods of sawing and handling trees
  - (a) Large timber—Machinery
  - (b) Small timber—Horses, etc.
  - (c) Transporting to mill

- (3) Product
  - (a) Rough lumber—logs, poles, planks, railroad ties, etc.
  - (b) Finished lumber—veneers, flooring, siding, interior finishings
  - (c) Finished articles—furniture, implements, etc.

III. Transportation of Logs to Distant Saw Mills
- (1) Methods
  - (a) Rafting
  - (b) Shipping by rail or water

IV. Drying
- (1) Kilns
- (2) Sun dried

V. Purposes
- (1) Buildings—public and private
- (2) Railways—all equipment of wood, etc.
- (3) Shipbuilding and yards, etc.
- (4) Furniture, etc.

VI. Lumber Producing Countries
- (1) Canada—British Columbia, Ontario, Quebec, other provinces
- (2) United States—Winconsin, Michigan, Minnesota, Washington
- (3) Other—South America, Sweden, Russia, Germany, France, Mexico, Canada, Africa

VII. Commercial
- (1) One of Canada's great industries
- (2) Leading industry in foreign countries
- (3) Lumber markets of world

Questions on Forestry and Lumbering

What are some of the indirect advantages due to forests?

What uses are made of the barks of different trees?

From what trees are the following obtained—dyes, tar, turpentine, quinine, camphor, rubber?

What do we mean by hardwood trees? Softwood? Name some of each.

Where is ebony procured? For what is it greatly valued?

What kind of trees would you expect to see were you to travel in Alaska? In Brazil? In the Philippine Islands? In British Columbia? In southern Ontario?

Which are the principal lumber producing countries of the world?

What are the main branches of the lumbering industry?

What is a board-foot? What is its importance as a unit of measurement?

How are logs transported from the forests to the mills?

Name some of the different pines used for lumber. Why is this wood largely used in construction work?

Is there much waste in the lumbering industry? Why? Do you think that conditions are likely to improve?

From what countries do our hardwoods come?

What do we mean by veneers? Are they largely used?

Why are mahogany and rosewood expensive?

Which province is the largest producer of lumber? Which ranks second? What kind of lumber does each produce?

What industry, dependent on lumbering, is centered in Quebec? Why?

Where is the largest national forest reserve? When was it established?

In what way is the national government co-operating with individual owners in order to improve lumbering and forestry conditions?

What is the *forestry branch*?

Fisheries

Extent of the Industry. By the terms of the British North America Act all fisheries of Canada, whether marine or inland, are under the control of the Dominion government. The department of marine and fisheries has consequently always had a clear field in the control of one of Canada's greatest industries. Although the government in recent years has given increasing support to the fisheries, the fishing industry of the United States still far exceeds that of the Dominion. A considerable part of this excess is due to the fact that fish caught off Canadian coasts by United States vessels and landed in United States ports are credited to United States fisheries. With the exception of an occasional year the Canadian fisheries show a steady growth, from $6,577,391 in 1870 to $29,965,433 in 1911.

To say that Canada possesses the most extensive fisheries in the world is no exaggeration; moreover, it is safe to add that waters in and around Canada contain the principal food fishes in greater abundance than the waters of any part of the world. The fisheries may be roughly divided into three sections—Atlantic, Pacific, and inland. Each of these is discussed in detail below.

The coast line of the Atlantic provinces, from the Bay of Fundy to the straits of Belle Isle, measures over 5,000 miles. Along this stretch are many natural harbors in many of which valuable fish are taken with little effort. The Atlantic fisheries may be subdivided into two distinct classes: the deep-sea, and the inshore or coastal fisheries. Deep-sea fishing is carried on in vessels usually from 40 to 100 tons. The fishing grounds are off the "banks," twenty to ninety miles from the coast. Trawling with hook and line, with herring and squid as bait, is the customary method of fishing. Cod, haddock, hake, pollock and halibut are the principal varieties caught. The inshore or coastal fisheries are carried on in smaller boats, with crews of two or three men, using nets, hand-lines and trawls. The principal fishes taken, in addition to those already mentioned, are herring, mackerel, shad, smelt, flounder and sardine. A great quantity of lobster is taken along the eastern shore of Canada and excellent oyster beds exist in many parts of the Gulf of St. Lawrence.

On the Pacific coast salmon is the most valuable catch, but an extensive halibut fishery is carried on in the northern part of British Columbia. The salmon fisheries yield a more valuable product than any other item. Herring are abundant and provide a plentiful supply of bait for the halibut fisheries.

In addition to the immense salt-water fishing area, the fresh-water area includes 220,000 square miles, abundantly stocked with many food fishes. In this connection the reader may be surprised to learn that the Canadian waters of the Great Lakes—Superior, Huron, Erie and Ontario—form only one-fifth of the total area of fresh-water lakes of Canada. The principal fishes caught are whitefish, trout, pickerel, pike and sturgeon. Fresh-water herring are found in Lake Erie and Lake Ontario.

Value of the Fisheries. The market value of all kinds of fish and fish products taken by Canadian fishermen in 1911 was $29,965,433. This is the highest total yet reached in any one year. The relative importance of each province is shown below for the years 1906 and 1911:

PROVINCES	1906	1911
Nova Scotia	$ 7,799,160	$10,119,243
British Columbia	7,003,347	9,163,235
New Brunswick	4,905,225	4,134,144
Ontario	1,734,856	2,026,121
Quebec	2,175,035	1,692,475
Prince Edward Island	1,168,931	1,153,708
Manitoba }	1,492,923	1,302,779
Saskatchewan }		172,903
Yukon }		118,365
Alberta }		82,460
	$26,279,485	$29,965,433

The sea fisheries contribute about ninety per cent of the yearly catch. According to the report of the department of marine and fisheries the salmon catch leads all other species in value, amounting to twenty-four per cent of the value of all the products of the fisheries. Cod ranks second, forming nearly twenty per cent. It is interesting to note that salmon and cod are the most valuable fish catches of the United States. The oyster product, however, is greater than either. The Canadian catch of cod in 1911 amounted to $5,921,248, an increase of $2,000,000 over the highest preceding year. Lobsters, herring, halibut, haddock and whitefish are next in order of importance. The table which appears on the next page shows the value of the fisheries by species:

Kinds of Fish	1906	1911
Salmon	$5,856,760	$7,205,871
Cod	3,471,186	5,921,248
Lobsters	2,922,927	3,784,099
Herring	2,704,596	2,278,842
Halibut	683,840	1,251,839
Haddock	766,896	1,218,759
Whitefish	906,759	983,594
Trout	791,467	825,290
Smelts	425,631	797,066
Sardines	514,916	539,227
Pickerel	713,437	508,513
Hake	384,490	508,345

Salmon, cod, lobsters and halibut maintain a steady increase. The increase in the catch of those fishes which are marketed, both fresh and preserved, is not adequately shown by the figures because of a change in the method of computation adopted by the fisheries department The increase in the salmon catch was from 55,000,000 pounds in 1906 to 96,798,100 pounds in 1911. The cod catch increased from 70,000,000 pounds to 314,689,700 pounds, and the lobster catch from 25,899,000 pounds to 57,910,300 pounds. The movements of schools of fishes frequently cause fluctuations in the value of the catch beyond the control of the fishermen. Perhaps a better way of measuring the growth of the fisheries is to compare the capital invested in the industry. This increased from $3,900,000 in 1880 to $10,990,000 in 1900 and $19,019,870 in 1911. Nearly $8,000,000 are invested in British Columbia fisheries and $5,300.0[illegible] n Nova Scotia. British Columbia is the [illegible] ince in which the shore equipment of [illegible], canneries, etc., is more valuable th[illegible] vessels and implements; the shore equipment represents 65 per cent of the total.

The Fishermen. Of the total number of persons (93,500) engaged in the industry, 68,600 were employed on vessels of various kinds. This fact establishes the predominance of the ocean fisheries. But it must be said that this is the least number employed since 1895, whereas the number of employes in lobster canneries, fish-houses, etc., shows a const[illegible] increase, being now over 25,000. The pecu[illegible] character of the fishing industry is shown by the fact that more than one-third of the person[illegible] engaged in it are proprietors and independent fi[illegible]men, and nearly two-thirds of this class ar[illegible] on the Atlantic coast. The nature of fishing is such that the small proprietor is likely to receive just as great a proportionate return on his investment as the great corporation. Except in the salmon fisheries, which require large capital, and to a less extent in the oyster and clam fisheries, there has been little tendency toward the formation of great companies to control the industry.

Fish Breeding. In addition to the important work performed by the inspectors and by the fisheries patrol boats, the government re[illegible]ers valuable assistance by granting bounties to vessels which have caught more than a fixed quantity of fish. Since 1882, when this system was first used, about $5,000,000 has been granted in this way. But by far the most valuable service rendered by the government is the planting of fry by the fish hatcheries. Like the free distribution of trees by the forestry branch, fish breeding brings no immediate return to the Dominion government; the benefit, however, will increase each year in the added value of the fisheries. There are forty-one hatcheries in operation, with a total distribution annually of over one billion fry. Two-thirds of the fry planted are lobsters, all in the Atlantic fisheries; whitefish comprise nearly one-fourth, salmon one-tenth, and the remainder are pickerel and trout. It will be noticed that the fish breeding operations of the department are almost entirely in the interest of the commercial fisheries.

In view of the great importance of the fishing industry, the following outline and test questions are suggested for further study:

Outline

I. General Description
- (1) Heart
- (2) Blood
- (3) Gills
- (4) Fins
- (5) Scales
- (6) Eyes
- (7) Vertebræ
- (8) Bladder or sound
- (9) Coloring
  - (a) Deep sea
  - (b) Fresh water
  - (c) Breeding season
- (10) Eggs
  - (a) Where laid
  - (b) How cared for
  - (c) Number

II. Salt Water Fish
- (1) Shellfish
- (2) Seals
- (3) Corals
- (4) Pearls

(5) Whales (not really fishes)
(6) Turtles
(7) Sponges
(8) Cod
(9) Herring
(10) Halibut
(11) Mackerel
(12) Haddock, etc.

III. FRESH WATER FISH
(1) Salmon
(2) Trout
(3) Whitefish
(4) Sturgeon
(5) Eel
(6) Pickerel
(7) Bass, etc.

IV. FISHING DEVICES
(1) Drawnets
(2) Stake-nets
(3) Hooks
(4) Harpoons

V. PRINCIPAL PRODUCERS
(1) Canada
(2) United States
(3) Japan
(4) Great Britain
(5) Russia
(6) France
(7) Sweden and Norw

VI. FISHERIES IN CANADA
(1) Divisions
(a) Atlantic
(b) Pacific
(c) Inland or fresh-water
(2) Products
(a) Salmon
(b) Cod
(c) Lobster
(d) Other fishes
(3) Government aid
(a) Regulations and patrol
(b) Bounties
(c) Fish-breeding

VII. INTERNATIONAL TRADE

VIII. CANNING AND PRESERVING INDUSTRY

Questions on Fishes and Fisheries

Has a fish ears? A heart? How does it breathe?

Is its blood warm or cold?

Where are highly colored fish found? At what season do these colors increase in brilliancy?

How many kinds of fish are known to exist? Have you any idea how many are extinct?

What are some of the differences between the characteristics of deep-sea fish and of fresh-water fish? Name several kinds that illustrate these characteristics.

Where are some of the richest fishing grounds in the world?

What is the most important fish taken from the Atlantic? From the Pacific? Name three valuable fresh-water fishes.

About how many people are engaged in the industry in Canada?

What is the value of a year's catch?

What are the five most valuable products of the fisheries?

Which province yields the greatest quantity?

Give a brief account of the work done by the fish-hatcheries.

Why should governments protect and encourage fisheries?

Coal

All Industries Depend Upon Coal. One of the great industries in Canada and the United States is the production of coal. A century ago practically no coal was mined on this continent; to-day almost every other industry is dependent on it. Without coal there could have been no such development of the railways as has taken place; there could have been little progress in the steel and iron industries; in short, wherever we turn, we shall find that coal is necessary to the processes of production. In 1876 the total production of coal in Canada was 994,762 tons; ten years later it was over 2,000,000 tons; thirty-five years later (1911) it was nearly 13,000,000 tons.

Canada as yet produces only one per cent of the world's output, but the rapid growth in the past and the opening of new coal fields in the western provinces justify the statement that the absolute as well as the relative importance of the Canadian coal fields is increasing. Various causes have operated to delay the development of coal mining in Canada. Chief among these has been the remoteness of the fields from the markets and the resulting high cost of transportation. The rapid development of industries dependent on coal is making possible the use of low grade coals near mines which formerly suffered from lack of local demand. The following table shows the production of coal by countries:

Country	Area of Coal Fields in Square Miles	Production in Long Tons
United States	210,000	411,431,000
China and Japan	200,000	20,000,000 (estimated)
Canada	70,000 (estimated)	13,000,000
Russia	27,000	24,080,000
Great Britain	12,000	263,774,000
Germany	3,600	217,445,000
France	1,800	37,840,000
Other countries	1,400	115,290,000
Total	525,800	1,102,8[illegible]0,000

The Visible Supply. According to conservative estimates the coal fields of China, Japan, Great Britain, Germany, Russia and India contain three hundred billion long tons of coal, which is enough for four hundred years at the present rate of consumption. If to the above be added the coal fields of the United States, Canada, and other countries, the supply will be enough for one thousand years. We must not forget in considering the possible future supply that new discoveries may increase the available resources. Nor is it certain that coal will always remain as important in the world's economy as it is to-day. Coal was probably used by the ancient Greeks and Romans, certainly by the Europeans as early as the ninth and tenth centuries, but it is only during the last two hundred years that it has been extensively used. The world's total consumption of coal previous to 1800 was probably less than the average annual consumption in our time. It is not outside the range of possibilities that some satisfactory substitute will take the place that coal now holds in industry.

Coal Production in Canada. Five provinces and one territory contribute to the Canadian coal output: Nova Scotia, British Columbia, Alberta, Saskatchewan, New Brunswick and Yukon Territory. The central part of Canada, including Ontario and Quebec, has no coal fields. The accompanying map shows the position and extent of the fields. Many of these coal areas are at present well developed and are producing steadily. In other sections, mainly in the western provinces, owing to the lack of means of transportation or lack of market, little more than prospecting work has been done, but their coal constitutes a valuable reserve which will probably be drawn on in the near future. In Nova Scotia there are several large areas of bituminous coal, most of which are being actively worked. The Nova Scotia fields, besides supplying the demands of that province, send their coal to Quebec, Ontario, the eastern part of the United States, New Brunswick, Newfoundland, Prince Edward Island and the West Indies; the relative quantity shipped to each is about in the order

COAL AREAS OF CANADA

named. All the coal mined in New Brunswick is used locally. In Manitoba and the northwest provinces there are large tracts of land underlaid by coal, varying from lignite in the east to bituminous as the Rocky Mountains are approached. In the mountain region itself are several basins, of which the Crow's Nest Pass field is most important, where high-grade bituminous and some anthracite coal is mined. The coal output of Alberta and Saskatchewan is used mainly in those provinces; a small proportion, however, is used in Manitoba and some is converted into coke and shipped to British Columbia and the United States. In British Columbia approximately one-third of the production is consumed in the province, one-third is manufactured into coke and one-third is exported to the United States. In addition to the domestic output, Canada imports each year $14,000,000 worth of anthracite coal and $13,000,000 worth of bituminous, practically all from the United States. To offset the imports are total exports of coal amounting to $5,000,000, sixty per cent to the United States.

COAL PRODUCTION BY PROVINCES, 1910

PROVINCE	QUANTITY	VALUE
Nova Scotia	6,431,142 tons	$12,919,705
British Columbia	3,330,745	10,408,580
Alberta	2,894,469	7,065,736
Saskatchewan	181,156	293,923
New Brunswick	55,455	110,910
Yukon	16,185	110,925
Totals	12,909,152 tons	$30,909,779

In 1911 the long continued strike in the coal mines of Alberta and British Columbia was responsible for a falling off in the coal production of Canada. The total coal production for the year was only 11,291,550 tons. This is a decrease of over twelve per cent from the production of 1910. Alberta showed the greatest decline, from 2,894,469 tons to 1,498,057 tons. Nova Scotia, on the other hand, produced 562,000 tons more than in 1910. The temporary decline thus caused by labor troubles is bound to give way to a marked increase as the years go by.

Outline on Coal

I. DEFINITION
II. VARIETIES
  (1) Anthracite
  (2) Bituminous
    (a) Cannel
  (3) Lignite
III. FORMATION
  (1) Decayed vegetation
    (a) By pressure
    (b) By heat
  (2) Upheavals
  (3) Coal measures
IV. PRESENT SOURCES OF SUPPLY
  (1) Canada
  (2) United States
  (3) Great Britain
  (4) Germany
  (5) Other countries
V. METHODS OF MINING
  (1) Open working
  (2) Closed working
    (a) Room-and-pillar system
    (b) Low-wall system
    (c) Ventilation
VI. BY-PRODUCTS
  (1) Coke
  (2) Gas
  (3) Tar
    (a) Naphtha
    (b) Creosote
    (c) Pitch
    (d) Dyes

Questions on Coal

What is coal? How is it formed?

How are the veins separated from one another?

What means have we of knowing the sort of vegetation from which coal was formed?

How is it possible to know the number of upheavals and depressions which took place in the formation of coal?

What is meant by coal *measures?*

What are the classes of coal according to hardness? Which is the best? Is it found near the surface?

Where are the largest mines of this variety? For what is it generally used?

Which variety is known as soft coal?

Where are the great fields of this coal found? What are its important uses?

What is cannel coal? Why is it especially desirable?

Where is lignite coal found? How does it compare in age with other varieties? Why is it useless for manufacturing purposes?

What per cent of the world's supply is produced by Canada? By Great Britain? By the United States?

Which province leads in the production of coal? Which province ranks second?

What do you think will be the future of coal mining in Canada?

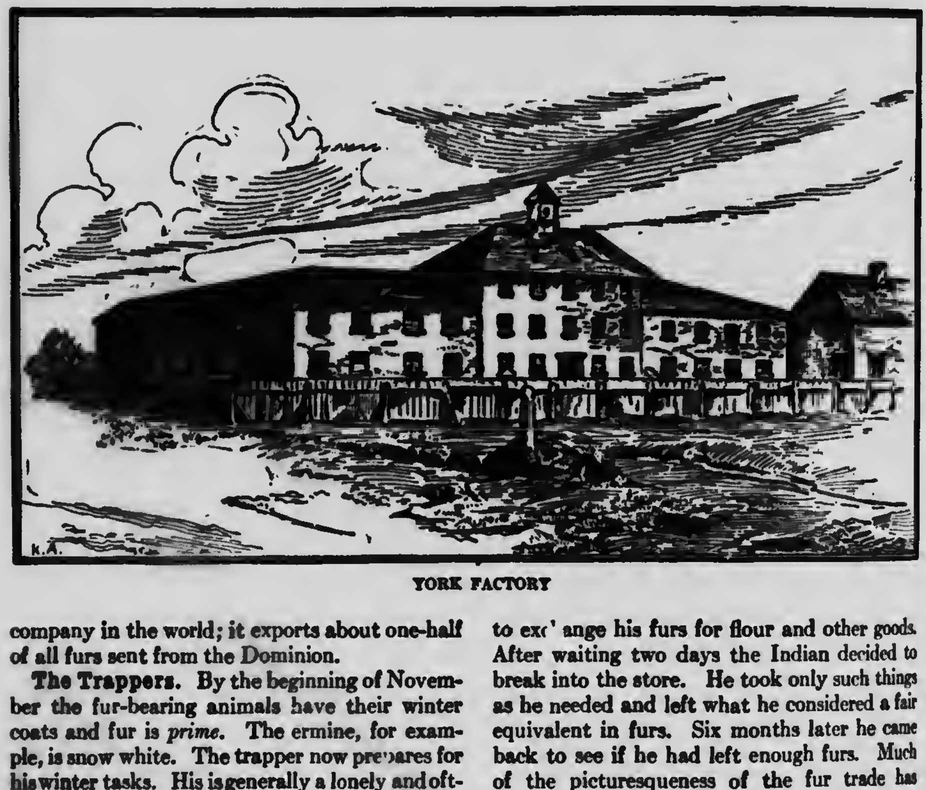
The Fur Trade

Early History. The use of furs as covering is probably as old as the human race itself. The most primitive people have always been sufficiently advanced to know that furs are useful for clothing. As people became more civilized they killed off the wild animals in the neighborhood and settled down to farming and cattle raising. Killing off the wild animals in the neighborhood made it necessary for hunters to go out into the forests for furs. This has been true in every country. A hundred years ago fur-bearing animals of many kinds could be killed in parts of Canada which are now occupied by great cities. The hunter and trapper have always been on the edge of civilization. In our country it was the trapper who became the explorer, then the settler, of the west. For many years after the first Europeans came to North America trading in furs was the principal occupation. The great profits in furs led to further exploration and colonization. In a few years fur-bearing animals in the vicinity of settlements became scarce, and trappers and traders found it necessary to travel farther and farther inland. In this way large sections of the country were gradually explored and opened to settlement. It is true that for many years the fur trade retarded the growth of permanent settlements. The rough, free life appealed to a class of men who did not care to submit to the restrictions of a community. These *coureurs de bois* or "runners of the woods," were hardy, fearless men. Many of them were hard fighters and hard drinkers, but as a rule they showed their worst side only when they came to town. These people cared little about the fate of Champlain's settlement at Quebec or of the Jesuits at Montreal except as they provided markets for furs.

The Hundred Associates. At the beginning of the seventeenth century the settlers in Canada were experiencing hardships. Montreal and Three Rivers were small trading stations, and Quebec, the center of population, could boast of only fifty or sixty inhabitants. Cardinal Richelieu realized the wretched conditions in New France. He ordered the withdrawal of all existing trading privileges and formed a new organization, known as the Hundred Associates, or the Company of New France, which was granted a perpetual monopoly of the fur trade. The territory granted included Acadia, Newfoundland, Canada and even Florida. The company, in return for these privileges, agreed to bring out at least 200 settlers immediately and to raise this number to 4,000 within fifteen years. Unfortunately the company failed to fulfill its obligations and the settlements grew but slowly.

The government tried to control the fur trade by inviting the Indians to bring their furs to the settlements. A great fair was held each year at Montreal where the Indians came in their canoes laden with beaver and other skins. After the fair had been formally opened trading became lively. Brandy was sold freely, so that too often the fair ended in drunken rioting. Other difficulties were faced by the government. The more daring traders and the *coureurs de bois*, in defiance of the laws, settled above Montreal, intercepted the Indians on their way to the fair or visited them in their villages, and secured the best furs. Yet the traders seemed to prosper; settlers slowly increased in number and conditions gradually improved.

The Hudson's Bay Company. While the French were developing their fur trade in the south, a great rival appeared in the north in the vast territory surrounding Hudson's Bay. In 1670 King Charles II granted a charter to a number of "adventurers," headed by Prince Rupert (see Vol. IV), the sole right to trade with the Indians on the shores of Hudson's Bay. The company had power to "establish laws and impose penalties, to erect forts, maintain ships of war, and to make peace and war with any prince or people not Christian." Thus the Hudson's Bay Company, as this organization was known, was practically a government in itself, though subject to England. For many years the company grew slowly. Conflicts with the French were almost continuous, and the difficulties of transportation were still considerable. The turning point in the history of the company was the conquest of New France by the English. When Canada became English the vast territory of the company could be reached from the south by land as well as from the sea. Trade increased enormously and profits jumped by leaps and bounds. But this monopoly was too profitable to be left to the Hudson's Bay Company. Competition, sometimes amounting to an actual warfare, sprang up. The principal rival was the famous Northwest Company, in which Lord Selkirk was one of the leaders. After Selkirk's death in 1820 the chief obstacle to combination was removed and a year later the Hudson's Bay Company absorbed its principal rival. After the union of the companies the management of the company's affairs was placed in the hands of an official known as the governor of Prince Rupert's Land. Sir George Simpson, a young Scotchman, was chosen for the position, and for forty years he guided the company's fortunes. Under his aggressive administration, Great Britain's control of the Pacific coast was made secure and British Columbia was occupied. Russia and the United States were thus prevented from shutting out Great Britain from the Pacific Ocean. The territory of the Hudson's Bay Company now included practically all of the northwest, reaching the Arctic Ocean on the north and the Pacific on the west. Under the control of the company the fur trade continued to increase. Trading stations and forts were built in every part of the country until the "fur trade," the "Northwest" and the "Hudson's Bay Company" became almost synonymous. In 1859 the trade monopoly of the company was abolished, and ten years later it surrendered its territorial rights for an indemnity of £300,000 and 7,000,000 acres of land. The trading stations and forts, all of which the company retained, dot the entire Northwest. From these various stations the furs are sent to posts on Hudson's Bay and in Labrador, or to Montreal, St. John or other Atlantic ports for shipment to England, where they are generally sold at auction. Though competition has increased in recent years the Hudson's Bay Company is still the greatest fur company in the world; it exports about one-half of all furs sent from the Dominion.



YORK FACTORY

The Trappers. By the beginning of November the fur-bearing animals have their winter coats and fur is *prime*. The ermine, for example, is snow white. The trapper now prepares for his winter tasks. His is generally a lonely and often a dangerous life. Moreover, it is a silent life, for a noisy hunter or trapper is likely to find that he is scaring away the game. When he observes the footprints of any game he unstraps his pack and starts to make his deadfalls and to set his traps. At regular intervals, say once a week, he visits each trap, gathers the furs, repairs broken traps and deadfalls and sets them again.

At the end of March or the beginning of April the trapper leaves his hunting grounds and journeys to the trading post with the furs he has accumulated during the winter. Most of these trappers are Indians or half-breeds. In the early days a band of Indian trappers was a picturesque sight—not only men, but women, children, dogs and horses. The braves marched in front, too proud and too lazy to carry anything but their guns. After them came the squaws, carrying loads or driving the sleds, loaded with meat, furs, household goods and children.

Generally peaceful, these Indians prided themselves upon their honesty. While a trader was visiting a neighboring post an Indian came to exchange his furs for flour and other goods. After waiting two days the Indian decided to break into the store. He took only such things as he needed and left what he considered a fair equivalent in furs. Six months later he came back to see if he had left enough furs. Much of the picturesqueness of the fur trade has disappeared in the course of time, but it will always appeal to the imagination.

Fur Money. A peculiarity of the fur trade is that money values were unknown for many years and even to-day are seldom heard of in many of the trading posts. Everything was measured in terms of skins, the beaver being the common standard. A barrel of flour, for example, might sell for ten *made-beavers*. A "made-beaver" is the skin of a full-grown beaver

FUR-BEARING ANIMALS OF NORTH AMERICA

1. Brown Bear
2. Squirrel
3. Lynx
4. Sable
5. Seal
6. Ermine
7. Otter
8. Beaver
9. Silver Fox
10. Mink

[illegible] season, properly cured and weighing [illegible] to twenty ounces. The beaver [illegible] course, did not actually change hands, [illegible] the unit or measure of value. Traders [illegible] had small sticks or counters, each [illegible] represented one beaver or fifty cents.

Fur Markets. Throughout the north[illegible] scattered the posts or forts of the [illegible] Bay and other companies. The furs [illegible] at these points are sent to central [illegible] points or markets. Places like York [illegible] Athabasca Landing and Fort Simpson [illegible] stations. Edmonton, the capital [illegible] vince of Alberta, as the center of the [illegible] in Canada, is one of the great fur [illegible] of the world. More than a million [illegible] worth of skins are shipped yearly from [illegible] It is the great center for the Hudson's [illegible] Company, and also for several smaller [illegible]. The greater part of the furs are [illegible] London, England.

[illegible] the Fur. To prepare fur skins [illegible] they will not be injured on this long [illegible] a simple matter. When stripped [illegible] animals they are carefully cleaned and [illegible] and fat are removed. The skins are [illegible] in a cool place and allowed to dry and [illegible] must be taken that the furs do [illegible] heated after packing and they should [illegible] to destroy worms. The [illegible] preserved by salting and packing [illegible] other raw furs are packed [illegible]

[illegible] dressing furs differs in its de[illegible] of the fur, but the gen[illegible]. For example, the seal [illegible] is stretched on frames [illegible] washed again and while the skin is still moist the long hairs are removed, leaving only the short soft fur. The skin [illegible] is scraped and shaved until it is smooth and even. When the skin has become dry it is placed in a tub filled with fine sawdust, and after being softened by treading with bare feet it is ready to be dyed. The dye is applied with a brush and spread by shaking the fur. It is then dried and brushed, sometimes as many as ten times.

The Color Plate. The color plate shows some of the most important fur-bearing animals of Canada. Each of these animals is described in its proper place in the first five volumes of THE NEW PRACTICAL REFERENCE LIBRARY. Many other fur-bearing animals are found in different parts of the Dominion. The student is advised to read articles on the separate provinces, as well as the general article on North America, for further information.

Questions on the Fur Trade

Who were the *coureurs de bois*? What kind of people were they?

Who organized the Hundred Associates? Why? Did the new company succeed?

What was the Montreal Fair? How often was it held?

When was the Hudson's Bay Company organized? By whom? For what purpose?

When is the trapping season? How often does a hunter visit his trap?

What is "fur money"?

Name some of the important stations at which furs are collected in Canada. Where are most of the furs sent?

How are furs prepared for the long journey?

Explain the process of dressing furs.

Name five fur-bearing animals found in Canada and tell in which sections they are found.

Transportation

Railroads

[illegible] railway mileage in [illegible] any country in the [illegible] vast extent means [illegible] communication play a [illegible] It is only necessary [illegible] growth in population [illegible] construction of railways, [illegible] of the Canadian [illegible] grain elevators and [illegible] building through[illegible] the railroads do [illegible] mere fact of transportation is an impulse beside which all other impulses toward growth become [illegible].

The following table will give some idea of the increase in steam railway mileage in Canada:

Year	Miles Operated	Increase	Per Cent of Increase
1846	16		
1856	1,414	[illegible]	[illegible]
1866	2,27[illegible]	[illegible]	61
1876	[illegible]	[illegible]	129
1886	11,[illegible]	[illegible]	126
1896	16,[illegible]	[illegible]	38
1906	[illegible]	[illegible]	31
1911	[illegible]	[illegible]	19

FUR BEARING ANIMALS OF NORTH AMERICA

1 Brown [illegible] 2 Squirr[illegible] 3 Lynx 4 Sable 5 Seal 6 Ermine [illegible]

killed in season, properly cured and weighing from sixteen to twenty ounces. The beaver skins, of course, did not actually change hands, but were the unit or measure of value. Traders sometimes had small sticks or counters, each of which represented one beaver or fifty cents.

The Fur Markets. Throughout the northwest are scattered the posts or forts of the Hudson's Bay and other companies. The furs collected at these points are sent to central shipping points or markets. Places like York Factory, Athabasca Landing and Fort Simpson are important stations. Edmonton, the capital of the province of Alberta, as the center of the fur trade in Canada, is one of the great fur markets of the world. More than a million dollars' worth of skins are shipped yearly from that city. It is the great center for the Hudson's Bay Company, and also for several smaller organizations. The greater part of the furs are sent to London, England.

Preparing the Fur. To prepare fur skins so that they will not be injured on this long journey is a simple matter. When stripped from the animals they are carefully cleaned and all flesh and fat are removed. The skins are then hung in a cool place and allowed to dry and harden. Care must be taken that the furs do not become heated after packing and they should be beaten occasionally to destroy worms. The fur-seal is best preserved by salting and packing in hogsheads, but all other raw furs are packed and sold in bales.

The process of dressing furs differs in its details with the character of the fur, but the general outlines are the same. For example, the seal fur, after being washed, is stretched on frames and dried. Then it is washed again and while the skin is still moist the long hairs are removed, leaving only the short soft fur. The skin side is scraped and shaved until it is smooth and even. When the skin has become dry it is placed in a tub filled with fine sawdust, and after being softened by treading with bare feet it is ready to be dyed. The dye is applied with a brush and spread by shaking the fur. It is then dried and brushed, sometimes as many as ten times.

The Color Plate. The color plate shows some of the most important fur-bearing animals of Canada. Each of these animals is described in its proper place in the first five volumes of THE NEW PRACTICAL REFERENCE LIBRARY. Many other fur-bearing animals are found in different parts of the Dominion. The student is advised to read articles on the separate provinces, as well as the general article on North America, for further information.

Questions on the Fur Trade

Who were the *coureurs de bois*? What kind of people were they?

Who organized the Hundred Associates? Why? Did the new company succeed?

What was the Montreal Fair? How often was it held?

When was the Hudson's Bay Company organized? By whom? For what purpose?

When is the trapping season? How often does a hunter visit his trap?

What is "fur money"?

Name some of the important stations at which furs are collected in Canada. Where are most of the furs sent?

How are furs prepared for the long journey?

Explain the process of dressing furs.

Name five fur-bearing animals found in Canada and tell in which sections they are found.

Transportation

Railroads

Canada has the greatest railway mileage in proportion to population of any country in the world. In a country of such vast extent means of transportation and communication play a great part in development. It is only necessary to point to the remarkable growth in population in the west after the introduction of railways, to the present irrigation projects of the Canadian Pacific in Alberta, to the grain elevators and hotels which the railroads are building throughout the country, to show that the railroads do more than haul traffic. The mere fact of transportation is an impulse beside which all other impulses toward growth become small.

The following table will give some idea of the increase in steam railway mileage in Canada:

YEAR	MILES OPERATED	INCREASE	PERCENT INCREASE
1846...........	16	....	....
1856...........	1,414	1,398	8737.5%
1866...........	2,278	864	61
1876...........	5,218	2,940	129
1886...........	11,793	6,575	126
1896...........	16,270	4,477	38
1906...........	21,429	5,159	31
1911...........	25,500	4,071	19

During the fiscal year 1911 the total railway expenditure by the government alone was $36,301,979, of which $24,760,029 was charged to capital. $23,488,000 of the total represented the expenditure for the new National Transcontinental Railway. Since Confederation the government has spent $261,414,694.87 for construction (including a subsidy of $25,000,000 to the Canadian Pacific), $214,073,844.19 for operating expenses and $42,735,008.32 for subsidies to other railroads, making a total expenditure of nearly $520,000,000. The total number of passengers carried on all the railroads in the Dominion is about 36,000,000 a year and the total tonnage of freight about 80,000,000. The largest single item of freight is coal and coke, about 20,000,000 tons; grain and lumber each represent about 8,000,000 tons. These figures represent an increase of thirty per cent in five years. During the same period the gross earnings of steam railways in the county increased from $125,000,000 to over $180,000,000. It is interesting to note that the number of employes changes slightly; except in 1908 it has varied by less than 1,000, being now about 125,000. These figures should give the reader an accurate idea of the extent of the railway system of the country.

In 1836 the first railway in Canada was built between Laprairie, near Montreal, and St. John. Ten years later another short line connected Montreal and Lachine. The railway system of Canada had its real beginning, however, in 1851, when Parliament passed a bill providing for the building of the Grand Trunk road from the western limit of Upper Canada to the city of Quebec and also a branch line to Portland, Maine. The Portland branch was completed in 1853, and the main line from Sarnia to Quebec three years later. To trace the development of all the railways in the Dominion is impossible, but below are given sketches of the five principal systems now in operation:

Grand Trunk. This is the oldest of the great railway systems of Canada. Since 1856, when the main line from Quebec to Sarnia was completed, the railroad has gradually increased its mileage to a total of 3,100 in Canada alone, besides numerous direct connections, owned or leased, to points in the United States. The main line now extends from Portland, Maine, through Quebec and Montreal, to Chicago; branches and leased lines afford direct connection with New York and Boston. Three parallel lines extend through that part of Ontario lying north of Lake Erie, and these are connected by numerous cross lines, one extending as far north as Lake Temiskaming. Another important line extends from Montreal to Parry Sound by way of Ottawa. The road is noted for its erection of the old suspension bridge over the Niagara River, for the Victoria tubular bridge across the St. Lawrence at Montreal, and for the magnificent steel structures which now occupy the sites of the original bridges. For a number of years the Grand Trunk sank into an unprosperous condition, but under the management of the late Charles M. Hays it again resumed its former position of importance.

Intercolonial Railway. This is the only large railway system in Canada owned and operated by the government. It was planned by the provinces of Quebec, Nova Scotia and New Brunswick, and after Confederation it was assumed by the Dominion government. It was opened to traffic in 1876. The main line extends from Moncton to Montreal by way of Levis and the south bank of the St. Lawrence River. It has branches which connect Point du Pictou, Halifax, St. John and Sydney. The total mileage is now 1,450 miles.

Canadian Pacific. The building of the first Canadian transcontinental was a serious problem presented to the early Dominion Parliaments, for it was one of the conditions of British Columbia's entrance into the Confederation. In 1872 Sir John A. Macdonald presented the question to Parliament, but political and other troubles interfered (see pages 400 and 401) so that it was not until 1878 that the contract between the government and the Canadian Pacific Railway Company, a syndicate of capitalists, was finally signed. Prominent members of the company were Mr. George Stephen, a Montreal merchant, and Mr. Donald A. Smith, an official of the Hudson's Bay Company, both now better known as Lord Mount Stephen and Lord Strathcona. The road was to be finished by 1890, but the work was pressed forward so energetically that the last spike was driven by Lord Strathcona in 1885.

The main line now extends from Montreal to Vancouver, British Columbia. In addition to the main line there is a line extending from Montreal to Toronto and Detroit, another, known as the Duluth, South Shore and Atlantic, along the south shore of Lake Superior, a third from Minneapolis to the Soo, and a fourth from Minneapolis to the main line at Moose Jaw, Saskatchewan. The total mileage of the system is about 10,200. In addition to its own lines the Canadian Pacific has leased or has traffic rights over several roads which give it direct connection with Boston and ports in Nova Scotia and New Brunswick. It owns two steamship lines, one, the Empress, running to China and Japan, the other, the Australian, to Honolulu, Fiji and Sydney. The western division of the road passes through a region famous for its scenery in the Selkirk and Cascade Mountains.

Canadian Northern Railway. This is a great trunk line projected to extend from the Atlantic to the Pacific coast. In 1896 the firm of Mackenzie, Mann & Company began building on its own account by completing 100 miles of line, known as the Lake Manitoba Railway and Coal Company. From this small beginning has grown the Canadian Northern System. The section of the line from Winnipeg to Edmonton has been completed; other partial sections east and west have already been constructed, so that the present mileage is about 4,000. When completed the system will include over 5,000 miles of track. Its present mileage is divided as follows: Quebec, 350; Ontario, 700; Manitoba, 1,540; Saskatchewan, 1,200; Alberta, 225. In the northwest provinces this line extends north of the Canadian Pacific and the Grand Trunk Pacific and passes through a fertile section which was practically inaccessible before its construction. The Canadian Northern offers every encouragement to the settler and investor. In consequence, towns are rapidly springing up along the line of the road. Land is gradually being broken to tillage and large quantities of wheat are already raised in districts recently opened.

Grand Trunk Pacific, or National Transcontinental Railway. The Grand Trunk Pacific Railway was incorporated by act of Parliament in 1903 and is under agreement with the Canadian government to construct a line of railway between Winnipeg and Prince Rupert, and to operate a line from Prince Rupert to Moncton, New Brunswick. The section of railway east of Winnipeg is being constructed by the government, the work being in charge of four commissioners, and on its completion will be leased to, maintained and operated by the Grand Trunk Pacific Railway Company. Technically only the line west of Winnipeg is the Grand Trunk Pacific, whereas the line east of Winnipeg is the National Transcontinental Railway. When completed the line will be about 3,600 miles long. Important branches to be constructed are as follows: (1) the Quebec extension, comprising four lines; (2) the Ontario extension; (3) the Manitoba, Alberta and Saskatchewan extensions, comprising eight lines; (5) the Dawson branch; (6) the Hudson's Bay Railway. This branch, to be built by the government, will run from Hudson's Bay Junction, about 120 miles northeast of Saskatoon, to Fort Churchill and Port Nelson, thus providing direct water and rail communication from the western provinces to Europe. These branches include a mileage of about 5,000, and with the main line will form the most magnificent railway system in the world. It is intended to run steamship lines from both the Atlantic and Pacific terminals to foreign ports. As Prince Rupert is several hundred miles nearer to the ports of the Orient than any other Pacific port in North America, the new railway should have a decided advantage in trans-Pacific trade.

Canals

The Canadian government is rapidly improving its system of inland waterways by the construction of canals around rapids in navigable streams and by connecting lakes and rivers so as to shorten the distance between points on the Great Lakes and Montreal, the head of ocean navigation. The St. Lawrence, with the system of canals and the various lakes, affords a direct line of water communication from the Straits of Belle Isle to Port Arthur or Fort William, at the head of Lake Superior, a distance of 2,233 statute miles. The distance to Duluth is 2,357 miles, and to Chicago, 2,289 miles. Ocean-going steamers may ascend the river as far as Montreal in the open season of navigation; from Montreal westward are nine canals—the Lachine, Soulanges, Cornwall, Farran's Point, Rapide Plat, Galops, Murray, Welland and Sault Ste. Marie, generally known as the Soo. The aggregate length of these canals is 73 miles; the total lockage (that is, the height directly overcome by locks) is 551 feet. The number of locks through which a vessel passes in its voyage from Montreal to Lake Superior is 48. These are the canals on what may be called the main line. Geographically the other canals, including the Murray, Trent, Rideau and Ottawa River, may be considered as branches; in operation, however, they serve fourth from Minneapolis to the main line at Moose Jaw, Saskatchewan. The total mileage of the system is about 10,200. In addition to its own lines the Canadian Pacific has leased or has traffic rights over several roads which give it direct connection with Boston and ports in Nova Scotia and New Brunswick. It owns two steamship lines, one, the Empress, running to China and Japan, the other, the Australian, to Honolulu, Fiji and Sydney. The western division of the road passes through a region famous for its scenery in the Selkirk and Cascade Mountains.

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Canals

The Canadian government is rapidly imdistinct traffic of a local nature. Improvements of various kinds are constantly being made. For example, during 1911, parts of the Lachine and Soulanges canals were lined with concrete walls, the Welland canal was widened and deepened, the upper entrance to the Soo canal was widened from 300 to 500 feet, and on the Trent canal work has been done on a direct extension to Lake Ontario. In addition to the canals now in use plans and surveys have been made for new canals. The largest of these is the Georgian Bay canal, to be constructed from the north-eastern corner of Georgian Bay to the Ottawa River, and then in the valley of that river to Montreal. When constructed, this canal will enable ocean-going vessels to pass directly from Montreal to Lake Huron. The total length of canal and canalized river will be over 400 miles, built at an estimated cost of $125,000,000. This canal will shorten the water route for through traffic by 282 miles.

PRINCIPAL CANALS OF CANADA

The importance of the canals as a means of transportation, especially for freight, is often underestimated. In the past they have played a great part in the development of the surrounding territories. For example, navigation of the St. Lawrence river would be impossible without the canals which enable boats to avoid the many rapids. The table below gives some idea of the traffic through existing canals:

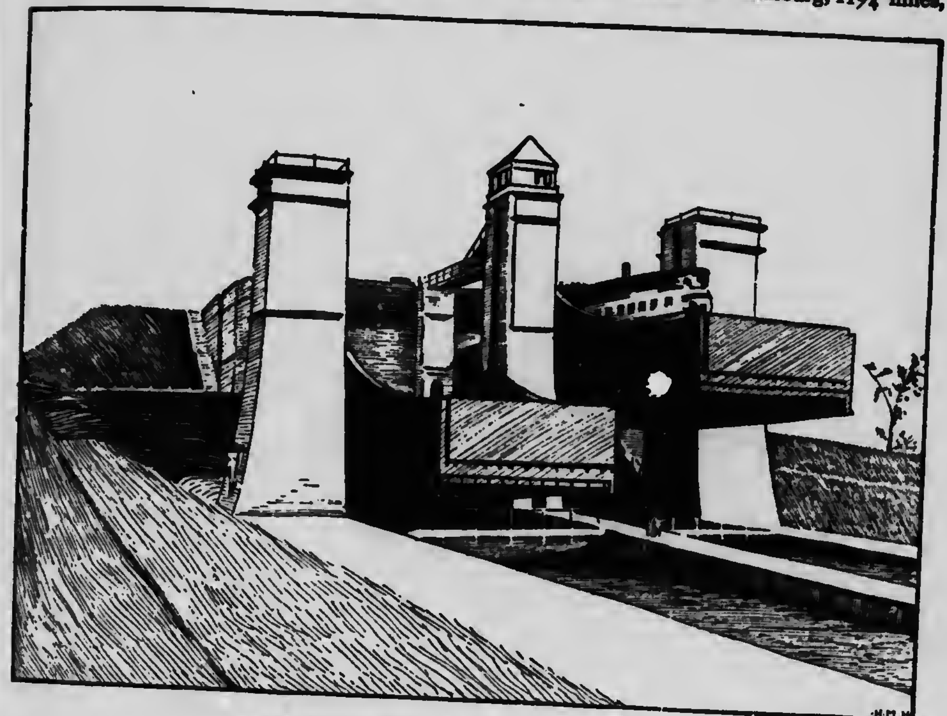
Canal	Number of Vessels		Tons of Freight	
	1910	1911	1910	1911
Sault Ste. Marie	6,331	7,972	21,861,245	36,395,687
Welland	2,433	2,544	2,055,951	2,326,290
St. Lawrence	9,271	10,220	2,410,629	2,760,752
Chambly	4,725	4,219	752,117	669,299
Ottawa-Rideau	4,417	5,416	428,713	520,142
Murray	957	1,308	102,291	177,941
St. Peter's	1,439	1,470	79,850	85,951
Trent	3,730	3,442	59,952	46,263
Total	33,303	36,591	27,750,748	42,982,325

A brief statement of the principal facts of interest in regard to each of the important canals is given below.

St. Lawrence Canals. *Lachine Canal* is the first of this group. Length of canal, 8½ miles; five locks, each 270 by 45 feet; two lock entrances at each end; average width, 150 feet; lockage, 45 feet; canal extends from Montreal to town of Lachine, thus avoiding the St. Louis rapids. *Soulanges Canal*, from Cascade Point to Coteau Landing, to avoid the Cascade, Cedar and Coteau rapids in the St. Lawrence. Length of canal, 14 miles; four locks, each 280 by 45 feet; total lockage, 84 feet; depth, 15 feet. *Cornwall Canal*, from Cornwall to Dickinson's Landing, avoiding the Long Sault Rapids. Eleven miles long; six locks, each 270 by 45 feet; total lockage, 48 feet; minimum depth, 14 feet. In the table above, these three canals, together with the Farran's Point, Rapide Plat and Galops canals, are grouped under the heading *St. Lawrence*.

Murray Canal, extending through the Isthmus of Murray, in Ontario. Length 5⅙ miles; width at bottom, 80 feet; width at water surface, 120 feet; depth below lowest known lake level, 11 feet; no locks.

Welland Canal, from Port Dalhousie, on Lake Ontario, to Port Colborne, Lake Erie. Twenty-seven miles long; 26 locks, each 270 by 45 feet; total lockage, 326 feet 9 inches; minimum depth, 14 feet. The old canal locks were smaller and the canal was about 3,500 feet longer. From Port Dalhousie to Allanburg, 11¾ miles, there are two distinct lines of canal; from Allanburg to Port Colborne the old channel has been enlarged.



HYDRAULIC LIFT LOCK AT PETERBOROUGH

Sault Ste. Marie Canal extends through St. Mary's Island, on the north side of the rapids in the St. Mary River, thus connecting Lakes Huron and Superior. Length, 7,472 feet; one lock, 900 by 60 feet; lowest known depth of water, 19 feet 3 inches; average lockage, 19 feet; width of canal, 150 feet; average time of passage through the lock, 22 minutes.

Ottawa-Rideau System. This includes the Rideau River and Canal, St. Anne's Lock and the Carillon and Grenville canals. This system extends from Montreal to Kingston by way of Ottawa, a total distance of 245⅝ miles. There are 41 locks ascending and 22 descending, the difference in the number of locks being only between Ottawa and Kingston; east of Ottawa the locks are 200 by 45 feet, but west of Ottawa only 134 by 33 feet.

Chambly-Lake Champlain System, from Sorel to Chambly, thence to St. Johns by the Chambly Canal and up the Richelieu River to Lake Champlain. From Sorel to the international boundary is a distance of 199 miles. The Chambly Canal is 12 miles long, has 9 locks of varied sizes and a total lockage of 74 feet.

Trent Canal is a term applied to a series of water stretches at present available only for local use. Improvements are being made and planned to make it a through route from Lake Ontario to Lake Huron. Two hydraulic lift locks have recently been installed, at Peterborough one with a lift of 65 feet, at Kirkfield another with a lift of 50 feet 5 inches. The Peterborough lock is the largest of its kind in the world.

St. Peter's Canal, connecting St. Peter's Bay, on the southern side of Cape Breton, with the Bras d'Or lakes. It is about 2,400 feet long and 55 feet wide, has one tidal lock 200 by 48, four pairs of gates, and a minimum depth of 18 feet.

Questions on Transportation

When was the first railway built in Canada?

What was the real beginning of the railway system of Canada?

When was the main line of the Grand Trunk Railway completed? Through what sections of the country does it run?

Name four other great systems.

Which of these is owned by the Canadian government?

When was the Canadian Pacific Railway finished? Who were some of the men prominent in organizing the company? What can you say of the importance of this railway?

Who were the builders of the Canadian Northern Railway?

Explain briefly the plan under which the Grand Trunk Pacific is being built.

What is the purpose of the Hudson's Bay Railway?

How many miles of railway are now in operation in Canada?

In what ways are the railways encouraging and helping settlers in the development of the country?

How many passengers are carried each year in the Dominion? How many tons of freight?

Name three of the canals which are used to avoid rapids in the St. Lawrence River.

Where is the Sault Ste. Marie Canal? How long is it? How many vessels pass through it in a year?

Where is the Lachine Canal? Welland Canal?

Why is the Peterborough lift dock noteworthy?

Explain briefly the Georgian Bay ship canal project.

Show how the existence of canals has helped the development of the country.

Trade and Commerce

Increase in Foreign Trade. The Commercial growth of Canada has kept pace with the development of agriculture, of mining and of manufacturing. An increase in the productivity of a country's industry always means, other things being equal, that trade with foreign nations must increase. The reader who desires to study the growth of domestic facilities for handling this trade should read the article on *Transportation*, on pages 447 to 452. There he will get an idea of the great increase in the traffic, especially on the railroads. Most of this traffic is due to the natural growth of Canada herself, to the demands of one part of the country on another part, but a constantly increasing share is due to the growth of Canada's trade with foreign nations. Canada's exports have increased about fifty per cent in ten years and her imports have doubled. The table below will give a satisfactory summary of the increase in the value of the foreign trade:

Aggregate Trade of Canada, 1870-1910

	Total Exports	Total Imports	Total
1870	$ 73,573,490	$ 74,814,339	$148,387,829
1880	87,911,458	86,489,747	174,401,205
1890	96,749,149	121,858,241	218,607,390
1900	191,894,723	189,622,513	381,517,236
1910	301,358,529	391,852,692	693,211,221

These figures show the great increase in value of foreign trade. Previous to 1890 there was a steady, but by no means rapid, growth, both in exports and imports; since 1890 the increase has been in great strides. The total value of the foreign trade in 1910 was over three times that of 1890, whereas in the first twenty years of the period the increase was less than fifty per cent. That imports should show a greater increase than exports is natural in a comparatively new country. Most of these imports are manufactured goods which are necessary to the development of the country, but are not produced by home industries.

Leading Exporters and Importers. The interesting question arises, "Which countries are the leading exporters to and importers from Canada?" Below are given the totals for Great Britain, all British colonies, ten leading foreign nations and the grand total for exports and imports in three typical years. Coin and bullion, shipments of which are generally the result of other trade movements, and foreign goods reëxported, are omitted, in order that the actual value of merchandise may be seen:

healthy growth. An interesting feature is the growth of trade with China and Japan. In 1900 trade with these countries was practically negligible, by 1910 it had reached a respectable figure, and it seems destined, with further improvements in transcontinental railroads and trans-Pacific steamship lines, to offer great opportunities for Canadian industry.

Principal Exports. Canadian exports are almost exclusively raw materials, agricultural, fisheries and mineral products. For example, in 1910 nearly one-third of the value of all exports was represented by agricultural products, wheat alone furnishing twenty per cent ($52,609,351). The other agricultural products of importance for export are flour, apples and flaxseed. Animal produce represents $53,926,515 or nineteen per cent; forest products are worth about seventeen per cent; minerals about fourteen per cent; manufacturers account for only eleven per cent and fisheries products constitute the remainder.

Countries	1906		1908		1910	
	Exports	Imports	Exports	Imports	Exports	Imports
Great Britain	$127,456,465	$69,183,915	$126,194,124	$94,417,314	$139,482,945	$95,336,427
All British colonies	10,964,751	14,605,519	12,978,666	16,280,235	15,454,512	16,445,645
Argentine	1,881,983	1,491,666	2,264,122	872,026	2,867,785	2,181,554
Belgium	1,187,950	2,610,072	2,248,747	2,380,649	1,840,156	3,239,888
China	839,468	543,950	954,262	727,554	1,249,189	799,708
France	2,110,444	7,667,697	1,762,832	9,901,909	2,601,097	10,109,544
Germany	1,690,907	6,907,314	1,959,891	8,163,047	2,065,760	7,935,230
Holland	636,943	1,179,892	732,409	1,426,335	1,376,807	2,009,990
Japan	492,275	1,673,542	734,868	2,176,369	659,118	2,179,936
Switzerland	29,809	2,012,405	16,414	2,734,779	6,185	2,603,850
United States	83,546,306	168,798,376	90,814,871	204,648,885	104,199,675	217,502,415
West Indies, including Cuba	1,767,368	711,996	1,937,391	633,768	2,229,838	1,558,866
All others	2,879,287	5,895,860	4,362,371	7,517,085	5,214,484	7,912,374
Total	$235,483,956	$283,282,204	$246,960,968	$351,879,955	$279,247,551	$369,815,427

This table shows the relative importance of Canada's commerce with the principal nations of the world. In the aggregate value of both exports and imports the United States stands first, with the British Empire a close second. It seems clear that Canada is importing largely from the United States, imports from the United States being more than double the exports to that country. The trade with France shows a

Principal Imports. Imports into Canada show a different state of affairs; sixty-eight per cent of the value of all imports results from manufactured products. Of this figure iron and steel products, including agricultural implements and machinery, pig iron, automobiles and iron wire, forms a fourth. Cotton and woolen goods, drugs, dyes and chemicals, sugar and syrup are the other chief manufactured imports.

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Countries	1906		1908		1910	
	Exports	Imports	Exports	Imports	Exports	Imports

Coal is two thirds of the value of mineral imports. Canada, it should be said, exports some coal, but it imports nearly six times as much for use in Canadian industry. The importation of large quantities of agricultural and animal products is a certain indication that Canada will yet be a greater producer of such articles. The vast areas of the Northwest, when properly farmed by a large population, will yield much greater crops than ever before. The present importation of agricultural products is chiefly of grains and fruits, for both of which there are always unlimited opportunities in Canada. The greatest development, however, is destined to come in manufacturing. With abundant water-power especially in Quebec, Ontario, and British Columbia, and with large supplies of many raw material the next decade will show even greater advances than the past. A special table showing imports into Canada for 1910 is added, in order that the reader may note the importance of each class of products:

Questions on Trade and Commerce

What is the relative value of the export and import trade? Which has increased the more rapidly?

Which decade since 1870 has brought the greatest increase in aggregate trade of Canada?

Which two countries have the greatest trade with Canada? Name several other nations with whom trade is increasing.

What kind of goods does Canada export? What kind does she import? What manufactured products are the most valuable class of imports?

What part of the total imports comes from Great Britain? From the United States? From other countries?

What is the character of Canada's foreign trade as a whole? What do you think it will be in the future?

Will the building of more railways increase foreign trade? Why?

Classes	Great Britain	United States	Other Countries	Total
Agricultural produce	$2,103,366	$21,233,419	$4,546,497	$27,883,282
Animal and their produce	4,386,139	11,836,463	6,982,725	23,205,327
Fisheries produce	148,902	610,063	1,013,740	1,772,705
Forest produce	32,785	8,050,772	48,406	8,131,963
Manufactures	82,302,756	131,691,421	31,358,503	251,352,680
Mineral products	1,346,498	34,798,366	2,106,345	38,251,209
Miscellaneous	5,015,981	9,281,911	4,920,369	19,218,261
	$95,336,427	$217,502,415	$50,976,585	$369,815,427

By Geraldine O'Grady, former Kindergarten Instructor in Philadelphia Normal School and Teachers' College, New York; and Alice O'Grady, Head of Kindergarten Department, Chicago Teachers' College.

Introduction. Interest in the education of young children is not of recent origin, and their vivid interest in life and the responsive quality of childhood has always made their training possess much possibility.

The Greeks planned for definite care of children under seven. The Romans invented methods of instruction which should tempt these beginners into paths of learning, and after the establishment of Church schools the children became proficient in many studies early in life.

Indeed, we learn of wonderful prodigies of learning during the years of the Renaissance, when three- and four-year-old children became experts in Greek and Latin and discoursed piously on many serious subjects. This, indeed, was the difficulty. The children were regarded as immature men and women and they were shoved into mental processes entirely unfitted for them.

In the seventeenth century Comenius, Bishop of Moravia, instituted a reform in supplying a reading book with pictures for little children and organizing what he called the "School of the Mother's Lap."

He was followed by Rousseau, Pestalozzi and many others, who all contributed to a clearer insight into the natures of young children, and to a sympathetic planning for their needs. But it remained for Friedrich Froebel to touch the heart of the mother in the establishment of the kindergarten, or education for young children according to principles of natural growth. His work has spread all over the world and has brought new life and insight wherever it has been established.

Froebel and the Kindergarten

Biographical. Friedrich Froebel was born in 1782, in the little village of Oberweissbach, in Thuringia, in Germany. His parents were in fair circumstances, his father being the village pastor, but his mother died soon after he was born and he was left to the care of servants and of his brothers.

His father married again when he was four years old, and his stepmother neglected the little Froebel. An uncle, however, adopted him, and while with him the boy received good education, affection and wise care. He needed these things very much, for he was a sensitive, affectionate, earnest boy, with a lanky, awkward body and a strong vigorous mind, with much constructive and imaginative power. Profiting by these years of good care he grew through boyhood, was then apprenticed to a forester for two years, and afterwards studied at the University of Jena. He fitted himself for work in an architect's office and was going to Frankfort to take a position of this nature, but lost his articles on the journey. Looking for other work, he was offered an opportunity to teach in the Frankfort Model School, under a fine leader, Dr. Grüner. Here he found his true vocation, and for the rest of his life devoted himself to education. He worked with Pestalozzi for two years, founded a boy's school which was most successful, lectured, taught, read, and constantly endeavored to arouse people to the necessity of a reform in education. He originated a school for young children called the kindergarten, and was working out a future development of this for the schools when he died.

He lived to be seventy-one years old, was married twice, both times to interesting, thoughtful and devoted women. His life was marked by many hardships and a constant struggle with opposing circumstances; but it was distinguished throughout by a single-hearted devotion to the cause of humanity and an earnest purpose faithfully followed.

Character of Froebel's Work. His works are remarkable in their insistence on requirements for hygienic conditions, that are wholly in harmony with modern knowledge, though written seventy-five years ago. He wrote and edited much during his long life, but his best-known works are "The Education of Man" and the "Mother-Play Book."

Froebel's educational work was first carried out with children beyond six years of age, but he gradually realized that he must begin at the beginning, and was just organizing the work for the first years, to be followed by related work for older children, when his life was closed. Therefore few people realized that the kindergarten was only the application of his principles to the beginning of education, and was to be a part of an educational procedure co-extensive with growth.

Educational Principles of Froebel

One of the First Principles. Development is one of the most important of these principles; it might be phrased as "Continuous Evolutionary Growth."

Froebel saw this as a basic principle of the world, and of man's life, bodily and mental. He applied it to method in education in every way he could. He believed that the child's activities and powers, physical, mental, spiritual, have, as plants have, a necessary and natural growth; that the tendency and rate of this growth depend on the kind of nurture supplied, as it does with plants; some being quicker, some slower, some stronger or weaker in certain qualities, so that right education means neither arbitrary control in forced directions, nor wild spontaneous growth. It means such cultivation, following what we observe of the child's needs and nature, as only patient and thoughtful people can give. He believed that such a method would give us a finer type of human beings, and would result in developing the best possibilities of which each child is capable.

Starting Point in Education. Another principle, that of Creative Activity, or Self-Activity, is a natural accompaniment of the first.

Froebel regarded the smallest active power in the child as important, as the starting point of education. Not only this, but as the spark of divine inheritance, the proof of our being God's children. "God," he says, "creates and works progressively in uninterrupted continuity." Again, "Think not, mother, that the almost infinitesimal powers of your child may be neglected. Out of least things, God created the greatest, therefore cherish and encourage your child's feeble efforts to use his power." He

FRIEDRICH FROEBEL

persistently urges that education means the drawing forth and training of the child's spontaneous energy and activity in all right and possible directions.

Preventive of Wrong Activity. Froebel says, "There is but one sure preventive of wrong activity, that is right activity; an activity as persistent as it is fit and lawful, and that is not of the head alone, but of the head, the heart, and the body." As Col. Parker once said, "The whole child goes to school," but under old-fashioned methods it was almost a crime for a child to be active in school, and teachers would no doubt have preferred, had it been possible, to have heads there alone.

It is the natural consequence of Froebel's principles, that manual training, gymnastics, art and music—in a word, everything that trains and develops the physical nature and the emotion as well as the intellect—should form part of education.

Value of Play. Play as a valuable agency in early education was a natural conclusion from this belief in self-activity, since it was the child's earliest form of expression.

Froebel believed play to be one of the highest, most wholesome forms of human activity; partly because it is the form of activity in which little children and ordinary people are best able to be spontaneous and creative. He thought the plays of children, if watched and studied, gave valuable hints for training them. He says, "I believe that whatever affords a child a pure (or wholesome) and persistent pleasure, is founded on a real need." In other words, that the native instincts and impulses give true information as to the powers and needs of children, though the need may often be to control and train the impulse, not to let it run wild.

It is a great mistake to suppose that Froebel thought everything which is spontaneous should be let alone. He says, "All true education should be double-sided, prescribing and following, active and passive—positive, yet giving scope." He believed that in guiding play it is possible to give a valuable social training in sympathy and co-operation, leadership and comradeship, as well as in originality.

Unity Contributes to Growth. Another principle of Froebel is generally spoken of as Organic Unity; by it is meant that as all the parts of a plant have their share in the activity which contributes to the whole growth, so should all humanity contribute, each to the benefit of all.

Froebel felt deeply the relation between all created things; he felt that men were dependent on nature, God and each other, and should be full of gratitude and helpfulness. The child should learn gladly and actively to do his share as what Froebel calls a "Member-Whole" in the world. He is to give care to animals and plants, sympathy and help to his family, neighbors and fellow-citizens, with loving obedience and gratitude to God.

In planning the kindergarten, the latest of his educational efforts, he strove to invent and suggest means for planting the germ of this idea in the minds of young children—mainly through action, for "Learn by doing" is his guiding rule. But Froebel's most urgent point is, that the child's life and education should be an organic unity, or natural whole.

As a plant or tree has root, stem, leaves, blossoms and fruit, each needing the rest for its perfect growth, so every part of life should help every other; and parents, teachers, ministers, playmates, neighbors, should have a necessary and helpful part in all children's development; as the plant grows from the moment the seed life stirs, so each day of a child's life belongs to the whole.

Froebel is most anxious that education and training for life should begin in the home; that parents should co-operate with the school, heartily, intelligently. He urges, "Come, let us live with our children," meaning, let us share their play and have them share our more serious pursuits, let us enter into the spirit of childhood, and so learn how to teach children.

Plan of the Kindergarten. In his kindergarten, or child-garden, he plans for something of the order and grouping of the community-action of the school; and with this, some of the training in language and manners, the play and exercise of the senses, the moral training, the free movement and the happiness of a good home.

The games are simply physical exercise, the preliminary to gymnastics; the hand work is the beginning of manual training; the songs, stories, verses and conversations are the beginnings of literature, nature study, civics, and moral teaching; the touch, ear, eye and mind are made more alert and ready for the work in reading and writing; the experiments with simple objects in contrasts of number, measurement and color are a basis for science and arithmetic; while the child's love for his home and his parents, and his duties to them as well as to teachers and playmates, are emphasized.

First Training in the Home. Training, that is, seeing that the right thing is done over and over again until it becomes a habit, is especially the office of the home; for the younger we are, the more plastic we are in forming habits. Every day that a garment lies folded makes the crease deeper; so every time we act a certain way, the habit gets more set, and every day a child is not forming good habits he is forming bad ones, for the wrong way becomes more set, if the right does not. (See James' *Talks on Psychology*, Chap. VIII.)

So a child should carry with him from home to kindergarten habits of obedience, cleanliness and politeness and the habit of attending when he is spoken to. Above all, he should have the habit of happiness and good humor. For this is habit, too, and can be made natural to a child, especially by example at home; for young children learn more by imitation than any other way. If in addition the child has become interested in observing what he sees, has heard some pleasant childish rhymes and stories, and has been given toys such as he can arrange, take apart and put together by himself, not mechanical ones, he will enter easily into kindergarten activities. One warning must be given; neither home nor kindergarten must push or overstimulate growth. It must never be hurried.

References. In the references given there is no attempt at a complete list of Froebel's statements on any point or principle of education; a few only of the most definite statements on each subject are mentioned, with a few similar or related views from other educators and psychologists.

See *Education of Man*, pp. 8, 17, 27, 29, 194, 328, 329, and *A Study of Child-Nature*, by Elizabeth Harrison, chapter on "The Training of the Intellect." Froebel's *Mottoes and Commentaries on Mother-Play*, pp. 106, 199, 201, 307.

See *Education of Man*, pp. 30, 34, 39, 71, 75, 90, 107.

Froebel's *Mottoes and Commentaries on Mother-Play*, pp. 27, 153, 213, 207.

See *Mottoes and Commentaries*, pp. 57, 59, 106, 127, 293, 294, 296.

Read *Education of Man*, pp. 29, 255, 60, 107, 114; *Mottoes and Commentaries of* Froebel's *Mother-Play*, pp. 26, 29, 250, 225, 297.

James' *Talks to Teachers*, Chapters VI, VII, X, XI, pp. 123, 146, 147, 235, 241. *Education and the Larger Life*, C. Hanford Henderson. *Essay on Child's Play*, R. L. Stevenson.

Love and Law in Child-Training, Emilie Poulson.

Froebel and Self-Activity, Chapter III; Bowen. *Psychology of Childhood;* Tracy.

The Relation of Child Training to Natural Impulses and to Habits

Habit. We are all, as Professor James says, bundles of habits; Americans prefer chairs to sit upon because it is their habit to do so; that is, they have done it every day of their lives since infancy and have done it thousands of times; their muscles and nervous system are set in the habit, which makes it a discomfort to sit on the floor, as the Japanese do. With the latter it is just the reverse; and in early childhood it is possible to make either habitual.

Going to bull-fights and seeing wounds and blood without distress has become habitual to many Spaniards; traveling on skates for long distances without fatigue has become habitual to Dutch peasant women; carrying baskets on the head, to West Indian women. Neglected children in the street get the habit of swearing; well-cared-for children get the habit of being shocked at bad language.

Instinct. Instincts are things which we do without being taught—laughing, crying, grasping things, using our senses and limbs. Every natural impulse and instinct has a stronger tendency to repeat itself each time it is used, if not checked by unpleasant consequences; "repetitions form habits, habits form character and character forms destiny." But the crucial point is that instincts can be trained; the grasping can be trained into right ways of handling knife and fork, the hearing into listening with attention to certain sounds and neglecting others, and so on through the whole range of instincts.

A mother taught her little girl to look away from the advertising posters of theaters, etc., fearing she might see harmful things, and the habit persisted all through life. A baby whose mother put his hand down from his mouth every time he tried to put buttons, etc., in it, had learned at nine months' old never to put anything in his mouth except food.

"Mother," says Froebel, "you can now by a slight effort do for your child what later all your powers will be insufficient to accomplish. How eagerly (young children) begin to share in what father and mother do. Be thoughtful, be cautious, O parents! You may destroy, at least for a long time, instincts of activity in children, if you repel their help. Their minor power is aroused, but they do not know what to do with it; it becomes a burden to them and they are fretful and indolent."

We have seen children of good ability constantly made to be quiet and inactive, because their parents disliked noise and the trouble of guiding and attending to them. They became in time dreary and lazy, so they could hardly concentrate on any effort; they were unskilful and awkward about household matters, lazy at school, uncouth in manners and afraid of social functions, because they had been restricted from, instead of trained in, the habits needed for these.

The Child's Natural Impulse. A child's natural impulse is toward activity of some kind; it depends largely on its surroundings, parents and playmates, which direction its activity in action, speech or thought shall take, and into what habits it will crystallize. A scolding mother, who allows her children to imitate her tone and words to brothers and sisters, trains them in the habit of scolding; a mother who caresses and speaks gently, and reminds her children to do so, forms gentle habits in them. A mother who insists that her children shall wash their hands and faces before meals trains them to the habit.

"We must make automatic, as early as possible, as many useful actions as we can, and as carefully guard children against growing into disadvantageous ways; we are bundles of habits, imitators and copiers of ourselves." (James.)

Tendency Towards Activity. Froebel is constantly urging in his "Mothers' Book," or *Mother-Play*, that children naturally tend toward activity, therefore we must show them wholesome actions and let them practice them; that they tend to imitate, so we must watch ourselves and teach them to imitate good things. They wonder, are curious; so we must give them interesting and worth-while things to notice; they like to handle, take apart, and put together; therefore give them materials and show them how to make things.

I will quote again on this subject from James, the great psychologist:

"Constructiveness is another great instinctive tendency. The more different kinds of things a child gets to know by treating and handling them, the more confident grows his sense of kinship with the world; the wise education from the kindergarten up takes the tide at the flood, and devotes the early years to training in construction and object teaching."

When to Develop Instincts. It is now known that certain instincts appear at certain times of life and if not used and trained then, may fade and become useless, or almost so. The child's tendency to handle and construct is one of these. One of Froebel's merits is that he seizes the right time to train the child's senses and instincts. It is found in training the blind that the finger tips seem to lose some of their sensitiveness after a person is six or seven years old, and that those taught later are not so quick to learn. Manual work, the sense for color, etc., are things to be begun early.

Description of the Kindergarten

Attractive and Pleasant. A kindergarten is so pleasant a place that at first one can hardly believe it is for anything but a play-room. The walls are generally of a soft tan, green or grey, with plenty of pictures; there are flowers in jars and plants in pots; there is a piano and a sand-table; and the furniture is just right in size for the small persons who use it. There is generally a globe of goldfish, and sometimes another with tad-poles, snails, or curious sea creatures in it; there may be a glass box, or a terrarium, where caterpillars and butterflies, or toads and beetles live; indeed, any pet which can properly be kept indoors may be found in a kindergarten, and wherever it is possible, there is something of a garden outside.

When the children come in, one sees that the small people have responsibility as well as pleasure; from four to six years old, they hang up their hats and wraps neatly, the hooks being well within reach; then, while some find playthings, and use them, others help in arranging the little chairs in a ring, or they dust the room, feed the fishes, and water the plants, unless some other time is appointed for this. Perhaps there are forty children in the room before nine o'clock, and they are free—no one is directing them; but they employ themselves happily and peacefully.

At nine, a chord struck on the piano is sufficient to bring all to their places in the ring. Songs of greeting are sung, the day of the week and month is told and marked on a calendar; bits of home news are given by one or another; then a conversation or a story is begun on some topic suggested by a picture, or by some experience which is important for the children, the teacher guiding the talk, yet allowing the children to express their ideas and ask questions. A few more songs are sung and then each child carries his chair to its right place at one of the tables.

Plan of Exercises. A short period of running, skipping, or other exercise follows, for the day is carefully planned to alternate quiet with active times; and then there is an orderly march to the tables. Here are balls, large and small and of different colors; at another table there will be blocks, simpler or more varied in combination, larger or smaller, according to the age of the children and the time they have been in kindergarten; or there may be sticks, seeds, shells, rings, etc., for making outline pictures. All must be taken out and put away in orderly fashion; but the work may vary in many ways; the material is adapted for experiments which bring to the children's notice contrasts in color, in shape, size, roughness and smoothness, in sound and weight, but the play of the children and what they suggest is either the starting point, or they are allowed to play freely with it after the teacher has guided the first half of the period. An important point is that each should notice what the others do, and so gain new ideas. Sometimes several children build or design together. Next comes half an hour of active games, where consideration for others and courtesy are emphasized, as well as fun. After this there may be a rest, or a little luncheon where the children are taught to give thanks and to be polite.

Half an hour of handwork succeeds, and then all come together to show what they have done and to say good-bye. On certain days, walks may be taken to the parks to notice birds, etc., or to see a market, a blacksmith shop, an engine-house; the conversation afterward helps the little ones to understand how other people work for their comfort and protection, though only the simplest of such experiences are used. Sometimes when pictures of the cow and the farmer are the topic, the children make a little butter in a toy churn or glass jar, so as to get a little way toward understanding some steps of the wonderful process in which nature's forces, man's labor, and Providence work together to provide food and convert it into our growth and strength. They learn to follow the course of the seasons; to notice the provision birds and animals, as well as human beings, make for their young and against the weather; and to trace all gifts and all power back to the love of their Heavenly Father. Of course, some of this can be done at home; but neither so systematically, nor, as a rule, with so much training in habits of attention, as when with other children. There are many interruptions at home, and too great attention is paid by the adults to the one or two children.

In kindergarten each must behave well, and attend, because it is the law for the whole group; the attitude is, "We are all partners, we can all make pretty things for the room, we must all do our share in taking care of things; we must take turns in talking, in choosing games or stories; no one must be too noisy, or too pushing, because it prevents others hearing or seeing, or having a good time." The discipline is on this basis; if anyone should spoil another's work, the children will tell you, he must put it right again or give his own piece of work to the other child; if anyone is unkind and makes his neighbors uncomfortable, he must sit by himself until he can be pleasant again. "There is one law of right for all, which both you and I must obey," is Froebel's principle.

Kindergarten Supplies. Froebel's boxes of blocks and other playthings and occupations for children are numbered in series, and the lists and descriptions of them may be found in the catalogues of the Milton Bradley Company or other kindergarten supply houses.

It is not advisable to buy them indiscriminately for home use, as they cannot be very much used without a regular course of instruction. A list of those which are most useful in the home follows. The catalogue numbers are those used by the Milton Bradley Company, Springfield, Mass.

Bradley's Kindergarten Supply-Houses are found in Boston, New York, Philadelphia, Atlanta, Chicago, Kansas City, San Francisco, Springfield, Mass., and Toronto, Ontario.

3-A, Third Gift } Blocks
4-A, Fourth Gift }

2-B, Second gift, blocks of three shapes in bulk, is desirable, but expensive. The price is $5.00. The Hennessy blocks are a useful set for the home.

Parquetry papers, for arranging and pasting in design.

2002—Assorted package to be used with paste.

3003—Gummed pieces, to be used with water.

Stodder design cards for sewing with silkaline; assorted.

Mrs. Kraus' booklet on *Sewing Without a Needle*. E. Steiger Co., New York.

Shoe-lace sewing cards for very young children. The laces are colored and sold with the cards.

Paper for folding forms;

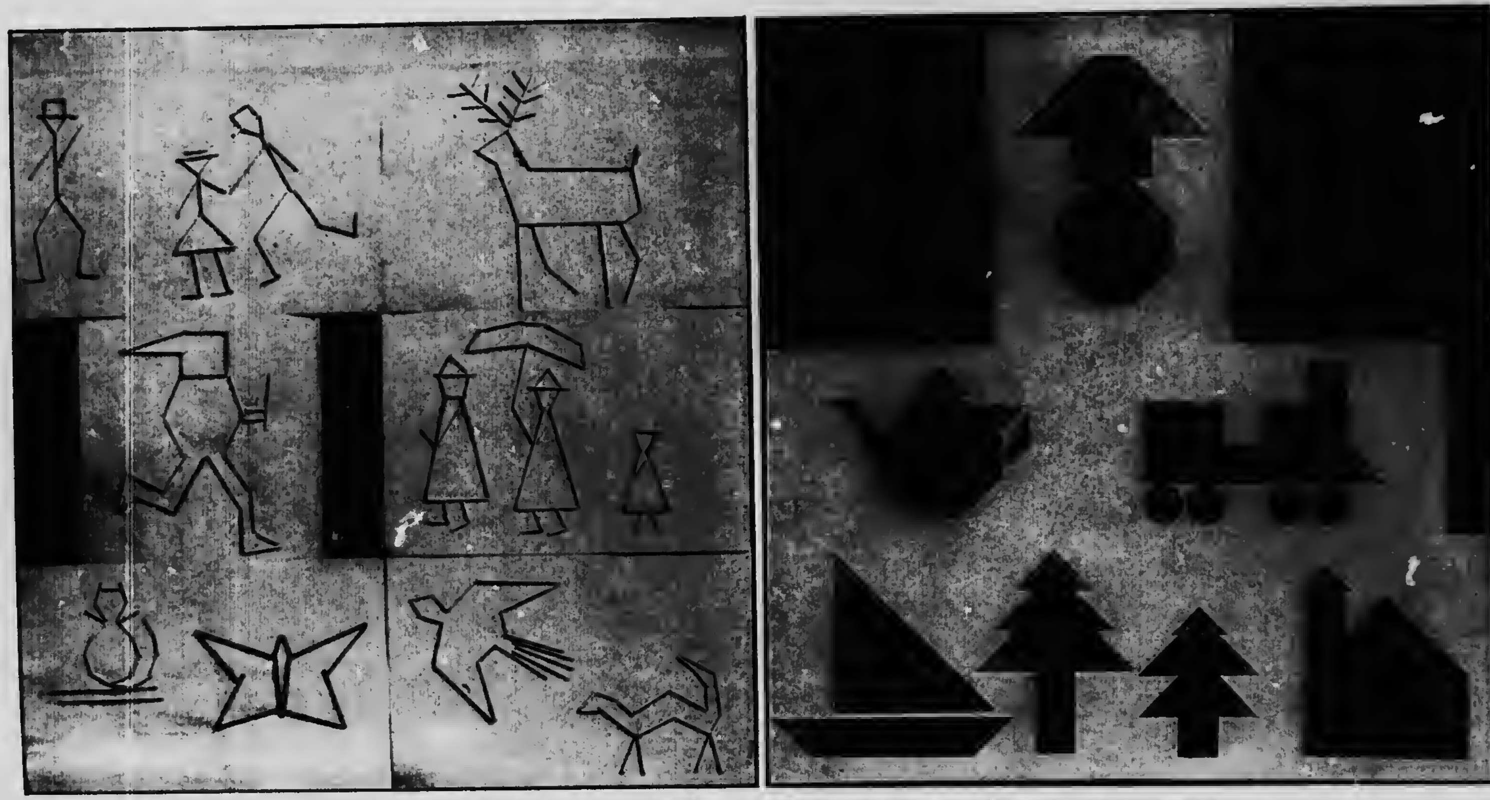
204, 210, 211X, 213E, 217X.

Blunt-pointed scissors.

Hailmann wooden beads for stringing on boot laces, Nos. 464 and 470. These are in six different colors, and there is a gross in a box. They give great pleasure to children.

Peg tile 474X, and pegs 472X. The peg tile is a board with rows of holes in it, into which pegs of different colors are stuck in patterns.

Boxes of word- and sentence-building tablets, number tablets, etc., are an amusement to chil-



TYPICAL ILLUSTRATION OF PICTURE MAKING, WITH COLORED STICKS AND CARD TABLETS.
These may be selected, repeated and varied to form groups and designs. (See text.)

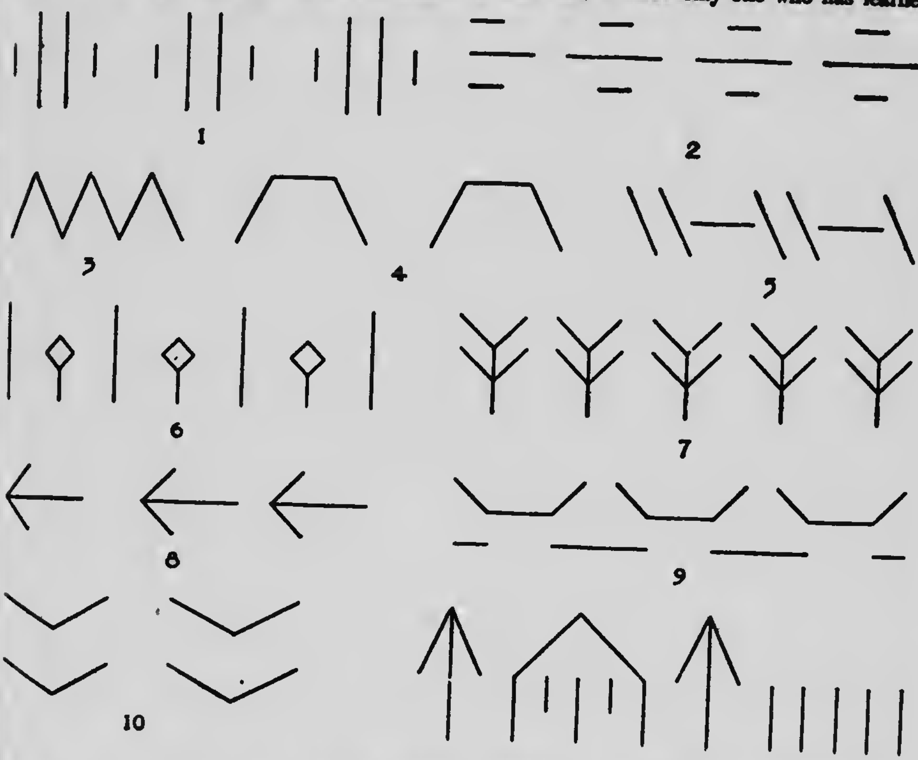
dren who have learned their letters. But they can also be made at home. These last are not Froebel's materials.

The Kindergarten Gifts

Power and Control. Froebel always claims that education should lead man to freedom. By freedom it is evident that he means the large and varied control of power, which is attained

"Did the trees look just the same as they did last week?" (In spring or fall.) In this way you contrive that his thought shall become definite, by limiting to a certain degree what he shall think about.

The kindergarten gifts are an example of this kind; and they cannot be successfully used by a mother or by a teacher who has not been trained in their use, because only one who has learned



PICTURE-MAKING MATERIAL

1—Rain; 2—Water; 3—Tents; 4—Mountains; 5—Necklace; 6—Postboxes and Telegraph Poles; 7—Trees; 8—Fishes; 9—Boats; 10—Birds; 11—House and Garden.

by acting under various conditions of limitation, until one has mastered each condition; for instance, as a gymnast gains power by training all parts of his body. How limitation helps a child may be seen in questioning. If you ask, "What did you see when you were out today?" there is no real thought demanded; something may come up which has no value. But ask, "What kind of animals did you see?"

"How many things on wheels did you see?"

"What were the people (or the birds) that you saw, doing?"

their various limitations intelligently and experimented under them, can help children to achieve the interesting results which are possible.

Of course, children will play with them, at any time, because they are first of all playthings, but the plays will be hap-hazard.

The Gifts. The first gift, soft woolen balls of six colors, is intended to bring out the contrasts of color and of movement; the children learn to roll, toss, bounce, and swing them (the balls having strings) rhythmically; and the colors are emphasized by opposite or alternate children having different colors. By-and-by, plays where the balls may represent fruit, flowers, etc., being sold, or where various colors are called for to be rolled in turn, test the children's certainty of color, as well as their certainty of aim and control. The little songs which describe the action may be found in kindergarten music-books, and will enable mothers to use some of the play.

After these, the ball games should be continued with rubber, celluloid and other balls, of different sizes and weights, for each gives a new test of skill and control. A good game for children who can aim well is tossing balls in turn, into an open box or basket; or rolling them to hit some object in the middle of the floor.

Froebel always plans that after each gift has been well mastered, the same plays shall be tried with other things, rather like them, but such as can be found among common objects about the house, and ordinary toys. In other words, the things he organized are meant to be a key to all sorts of possible use and mastery of other things in the world.

The soft balls are succeeded by hard balls, blocks of different sizes and shapes, and flat materials, suitable for making pictures and designing patterns; and after two successive kinds have been mastered separately, the two are used together, so as to give a larger quantity of material and new opportunities. At any time, two or more children may use their materials together, if they wish, either to make the object larger, or to complete something, as a house and barn, table and chairs, church and steeple, etc., or to carry out a pattern, which may extend all round the table.

Each gift has its own contrast, and is best suited to certain things; the children's discovery of these and their success in making new inventions is the test of the freedom they have gained by trying to achieve things in spite of the limitation.

The "picture-making" material can be used at home; not only the regular sticks, but pine twigs, stripped of needles, and leaf stalks may be arranged in very pretty pictures and designs. Leaves, also shells, grains of corn, beans of different colors, pebbles; seeds of pumpkins, water-melons, citron-melons; glass and china colored buttons are very pretty, used in this way. The page of material suggested for drawing designs will do for sticks or twigs also.

The outlines given are for suggestions, not for copies. Children's expression of this sort is much like the early picture-writing of savages, and is not meant to be perfect representation. By repetition with colored chalks along a strip of paper, or with strips of colored paper, pasted on patterns on white, this leads to the beginnings of design. The children should be encouraged to originate freely.

Stories may be illustrated in this way, but little children will not care to do connected things at first. Drawing of this kind may be followed by drawing "borders" with the colored chalks, on paper towels and paper napkins; drawing pictures for the doll's house, to be framed in folded paper; decorating paper plates and cups to be used for tea-parties; and making original pictures to illustrate the seasons and months of the year, fairy tales, dreams, etc.

Kindergarten Games

The Necessity for Play. Gross says that young creatures do not play because they are young, but they are young because they must play, in order to be well fitted for the energy and effort required in later life; so, mothers above all things, plan that your children may have place, time and companions for play—for it is a dismal thing to play all by one's self. I once talked with a woman who said: "There were seven of us at home, but we were never allowed to play in the house lest we should make disorder, and we had no place for it out-of-doors. We are now a set of wretched, nervous, morbid people, and we have no love for our home, nor wish to go to it. My mother cannot understand it. My youngest sister," she added, "told me that when she came from school on dark winter afternoons, she used to run around and around the block as hard as she could so as to be able to sit still when she got in."

Find a Place for Play. But how are we to find a play place if we live in cities and in small modern houses or flats? If it is not possible to give up a room to the children, have one room where there is as little unnecessary furniture as possible, and where what there is can be moved into corners and put out of the way, for at least part of the day. Have a straw rug to spread on the floor and a large cupboard where the playthings are kept. If there is a gallery or balcony which can be glassed in or screened in with canvas, for fine weather, or any place out of doors, where a playhouse can be put, it is better than having the children indoors; but if not, and if there is no yard, supplement the indoor rooms by walks and afternoons spent in the nearest park.

Because of the larger space for play and for company, children in kindergarten get experiences in games which are hardly possible at home.

Recommended Games. Froebel's games are of many kinds: Ball games, "sense-training" games, partner games, where the children skip or dance by twos; "courtesy" games, where bowing, or some other expression of pleasure in meeting is the point. Running, hopping, chasing, all kinds of childish activity—marching as soldiers, playing at "blacksmith" or some other of the many imitations of workmen which children love; and animal games, not only playing "horse," but any animal or bird in which the children are interested. All these are included. The triple value is, first, that the child's attitude towards his playmates must be just and fair, "taking turns" in leadership or in following; second, that a large and varied series of physical activities exercise his body and limbs, with the happy feeling of play rather than drill, and last, that the spirit, especially of the "representative" games, is one of loving, kindly recognition, of the helpful attitude of persons and things towards him, and a better understanding of them. However, most of these games require a large group of children; only the "finger games," ball games, and "sense" games can be well played at home or with very few children.

Finger-games have been played by mothers, with little ones, almost since history began.

"Here are Mother's knives and forks;
"Here is Mother's table;
"Here is Mother's looking-glass, and
"Here's the baby's cradle."

This teaches a child to separate his fingers and close his whole hand in different ways; thus getting control of it; while the little "story" of home life gives meaning to it.

"Pat-a-cake, baker's man," and "Pitty-patty polt, Shoe the wild colt," call the child's attention to activities of people about him.

The best series of finger-plays, with directions for playing, is by Miss Emilie Poulson.

Sense Games. These are easily played at home, and from one to any number of children can play them. They are used to exercise and make alert the five senses, and are extremely important for backward children

For Touch: The child shuts his eyes or is blindfolded, and something is put in his hands that he may guess the name by handling. If the guess is right, the playmates clap. The value of this game can be increased by giving things which contrast with each other in some point, successively or on different days; or several objects connected with some one occupation, or with some experience, such as a visit to the park.

For Hearing: As before, the child is blindfolded and listens to sounds, guessing them; the voice of someone behind him, the sound of metal, wood rapped, paper rustled, stamping on the floor, water being poured, a bell tinkled, etc.; the window may be opened and the child asked to tell a sound that he hears. Voices may be disguised by letting the children speak very high or low, sing, or imitate the cat, dog, etc.

Tasting: The tastes should be contrasted and given in connection with different occupations and interests. Froebel intended warnings against hurtful food and unripe or over-ripe fruit to be connected with this game.

Smelling: The scents of flowers, fruit, herbs, etc., are to be distinguished; with very young children, only two or three very familiar flowers should be used at first; when the mother takes her turn, she will be surprised to find how hard it is to recognize scents or tastes with eyes shut.

Seeing: The best form of this game is to choose some familiar object, such as a toy; then let the guesser turn his back or leave the room, while it is put in some unusual place, which his "sharp eyes" are to find, when he returns; some familiar thing may be hidden, and he must tell what is gone. This is too hard for very young children, until they have been used to see others play the game. Songs accompany the games in kindergarten and add to the interest.

Story-Telling

A Powerful Factor. Froebel makes stories a necessary part of education; and who that recalls his own childhood does not remember the delight of hearing stories?

It is a powerful means of influencing children, for the story seizes on the child's imagination, and the vividness with which he pictures it aids his memory in retaining it. Moreover, the happy recollection of the "Story-hours," by the natural process of association, lends an additional charm to the time, the place and the person to whom the memory is due. It is a means to strengthen the bond with home and with family affections and influences.

Story-books in plenty there are now, but the story read can seldom hold the attention of a young child as well as that where the eye and tone make a direct appeal to him.

If short stories are told at first, the child will be sure to ask for them over and over, and even if the story-teller has not a good memory, the practice and repetition will quickly improve it.

Nursery Rhymes. Children of three and four years old like nursery rhymes best, such as "Mother Goose", and the relation of simple incidents which have happened to themselves. The visit to grandmother's; the walk in the park; going to the zoo and seeing the animals; the birthday, etc. If courage is lacking to originate the composition of these, the "Arabelle and Araminta" stories, and the Reggie and Roggie stories, by Gertrude Smith, are excellent models, until confidence is gained. The recall of small details, which mean so much to the small person, in whose life the experience was a great event, must be practised.

After the first story has been told, and the story-teller has seen the bright eyes dance with pleasure and has heard the eager little voices say, "Tell it again," she or he will be glad to try it often.

With Dramatic Effect. The stories should be short, definite and bright; as far as possible they should be told dramatically; in *The Three Bears;* for instance, it is important to give the big, gruff voice of the Big Bear, and the tiny voice of the Little Bear, even with exaggeration of tone.

It is, of course, not desirable to emphasize ideas which are unwholesome for a child; but the occasional tragic death of the bad character in the old classic tales, or even a seeming tragedy for the good hero, who is sure to come out right in the end, is not to be eliminated. Virtue rewarded and vice rebuked, in strong contrast, are characteristic of primitive tales and primitive states of mind. It is the general result, not the particular feeling, which a child holds in mind.

Kinds of Stories. Children are generally ready for fairy tales when about five years old. Imagination is active and needs food; wonder is alive, and has a needful part to play in rousing thought and fancy. A child needs the contrast of the new and the familiar, the strange and the natural.

Animal stories are always loved and Bible stories never fail in their charm, if begun early and followed out continuously. Froebel warns us not to explain or urge the moral of a story, but rather to tell it so earnestly and often that it makes a deep impression, and the child will gradually realise the moral ideal.

It adds much pleasure when the incidents or characters can be reproduced by drawing or paper cutting, and they may also be dramatized by the children, at times; it is best to wait for this till they show inclination to do it. Stories should give good standard and ideals in language as well as in thought, and should not be too much simplified.

The Three Bears

Once upon a time there was a little girl named Goldilocks, who lived with her mother near a great wood. One morning Goldilocks ran out into the wood without asking leave from her mother, and she ran on and on and on, till she became very tired. At last she saw a little house. Now in this house three bears lived, a father bear, a mother bear, and a little boy bear. That morning the mother bear had made porridge for their breakfast, but it was too hot, and while it was cooling they went out for a walk in the wood. They left the door of their house open, for they were good bears, and never thought that anybody would touch what belonged to them.

Now, when Goldilocks saw the door open, she thought she would go in and rest for a while. So she went in, and on the table she saw the three bowls of porridge; a big bowl for the big father bear, a middle-sized bowl for the middle-sized mother bear, and a little tiny bowl for the little tiny boy bear. Goldilocks was very hungry, so she tasted the father bear's porridge, but it was too hot, and she burned her mouth. Then she tasted the mother bear's porridge, but that was too cold, and then she tasted the little boy bear's porridge, and that was so good that she ate it all up, and left none for the poor little bear.

Then she went into the parlor, and there she saw three chairs; a big chair for the big father bear, a middle-sized chair for the middle-sized mother bear, and a little tiny chair for the little tiny boy bear. First she sat down in the father bear's chair, but that was too high; so she got out of that and sat down in the mother bear's chair, but that was too low. Then she sat down in the little boy bear's chair, and that was just right. But she jumped up and down in it, so that at last she knocked the bottom out of it, and the poor little boy bear's chair was broken.

Then she went up stairs, and there she saw three beds; a big bed for the big father bear, a middle-sized bed for the middle-sized mother bear, and a little bed for the little boy bear. Goldilocks was very tired by this time, so she thought she would lie down and take a nap. First she climbed into the big father bear's bed,

"SOMEBODY HAS BEEN SLEEPING IN MY BED—AND THERE SHE IS!"

[illegible] was too hard; then she got into the [illegible] mother bear's bed, but that was too [illegible] last she got into the little boy bear's [illegible] that was so comfortable that she very [illegible] fast asleep.

[illegible] bears came home, and they went into [illegible] to eat their porridge.

"[illegible]body has been eating my porridge," [illegible] father bear in his big rough, gruff [illegible]

"[illegible]body has been eating my porridge," [illegible] middle-sized mother bear in her middle-[illegible]

"Somebody has been lying in my bed," said the big father bear in his big rough, gruff voice.

"Somebody has been lying in my bed," said the middle-sized mother bear in her middle-sized voice.

"Somebody has been lying in my bed," said the little tiny boy bear in his little tiny voice, "and here she is."

Now, when Goldilocks heard the voices of the three bears, she woke up. And when she saw them all by the side of her bed looking at her, and remembered how naughty she had been, she was very much frightened; she jumped out of

"[illegible]BODY HAS BEEN EATING MY PORRIDGE," SAID THE LITTLE TINY BOY BEAR

"[illegible] has been eating my porridge," [illegible] tiny boy bear in his little tiny [illegible] eaten it all up." And the poor [illegible] to cry.

[illegible] into the parlor next, and there [illegible] three chairs which were pushed [illegible]

"[illegible] has been sitting in my chair," [illegible] father bear in his big rough, gruff [illegible]

"[illegible] has been sitting in my chair," [illegible] mother bear in her middle-[illegible]

"[illegible] been sitting in my chair, and [illegible] and the poor little tiny boy bear [illegible]

[illegible] went upstairs.

bed and ran down the stairs as fast as ever she could, and she ran straight home to her mother. And after that she never went out into the woods without asking her mother first, and she never went into anybody's house, or used anybody's things, without asking leave.

The Three Tiny Pigs

Once upon a time there were three tiny pigs, and they went out to seek their fortune. The first little pig met a man with a bundle of fir-branches, and he said:

"Please, man, give me some firs to build a house with, because I have none to live in."

So the man gave him some firs, and he built a nice house. But presently the wolf came along, and he knocked at the door and said:

but that was too hard; then she got into the middle-sized mother bear's bed, but that was too soft; at last she got into the little boy bear's bed, and that was so comfortable that she very soon fell fast asleep.

Now the bears came home, and they went into the kitchen to eat their porridge.

"Somebody has been eating my porridge," said the big father bear in his big rough, gruff voice.

"Somebody has been eating my porridge," said the middle-sized mother bear in her middle-sized voice.

"Somebody has been lying in my bed," said the big father bear in his big rough, gruff voice.

"Somebody has been lying in my bed," said the middle-sized mother bear in her middle-sized voice.

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"Somebody has been eating my porridge," said the little tiny boy bear in his little tiny voice, "and has eaten it all up." And the poor little bear began to cry.

So they went into the parlor next, and there they saw the three chairs which were pushed out of their places.

"Somebody has been sitting in my chair," said the big father bear in his big rough, gruff voice.

"Somebody has been sitting in my chair," said the middle-sized mother bear in her middle-sized voice.

"Somebody has been sitting in my chair, and it's all broken," said the poor little tiny boy bear in his little tiny voice.

Then the bears went upstairs.

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So the man gave him some firs, and he built a nice house. But presently the wolf came along, and he knocked at the door, and said:

"Tiny pig, tiny pig, let me come in." But the pig said:

"No, no, by the hair on my chinny-chin-chin." Then said the wolf: "I'll huff and I'll puff and I'll blow your house in." So he huffed and he puffed and he blew the house in, and he ate up the tiny pig.

The next little pig met a man with a bundle of sticks, and he said: "Please, man, give me some sticks to build a house, for I have none to live in." So the man gave him some sticks and he built a house. Presently the wolf came along, and he knocked at the door and he said: "Tiny pig, tiny pig, let me come in." But the pig said: "No, no, by the hair on my chinny-chin-chin." Then the wolf said: "I'll huff and I'll puff and I'll blow your house in." So he huffed and he puffed and he blew the house in, and he ate up the tiny pig.

The third little pig met a man with a load of bricks, and he said: "Please, man, give me some bricks to build a house, for I have none to live in." So the man gave him some bricks, and the pig built a nice, strong house, with a door and a window and a chimney. Presently the wolf came along, and he said: "Tiny pig, tiny pig, let me come in."

But the pig said: "No, no, by the hair on my chinny-chin-chin." Then the wolf said: "I'll huff and I'll puff and I'll blow your house in." So he huffed and he puffed, and he huffed and he puffed, and he huffed and he puffed, but he couldn't blow the house in, for it was too strong. Then he said: "Tiny pig, I know where there is such a nice field of turnips, and if you like, I'll take you there to get some."

"Where is it?" said the pig.

"Down at Mr. Brown's farm," said the wolf. "I'll come for you tomorrow morning."

"What o'clock?" said the pig.

"At six o'clock," said the wolf.

So the pig got up very early, at five o'clock, and went to Mr. Brown's farm; he got a nice bag of turnips and carried them home. Then the wolf came along and said: "Tiny pig, are you ready?"

"TINY PIG, TINY PIG, LET ME COME IN"

"O," said the pig, "I went long ago and brought the turnips home." Then the wolf said: "Tiny pig, I know where there is such a nice pear-tree."

"Where is it?" said the pig.

"In Mr. Sweet's garden," said the wolf, "and if you like, I'll come and take you there tomorrow morning."

"At what o'clock?" said the pig.

"At five o'clock," said the wolf.

So the pig got up at four o'clock, and went down to the garden and gathered the pears. But they were so nice that he began to eat some while he was up in the tree, and presently he saw the wolf coming. He was very much frightened, but he called out to the wolf: "I'll throw you down some pears," and he threw them a very long way off. Then, while the wolf was running to get the pears, the pig scrambled down from the tree and ran home as fast as he could.

Then the wolf came back to the pig's house, and said: "Tiny pig, there is a fair at Merrytown tomorrow, and if you like I'll come and go with you."

"At what o'clock?" said the pig.

"At four o'clock," said the wolf.

So the pig got up early, at three o'clock, and went to the fair at Merrytown. There he bought a nice new churn, and he set out for home very soon, for fear of the wolf coming. Just as he got to the top of a long hill he saw the wolf at the bottom, so he got into the churn and it rolled over and over, down to the bottom of the hill. The wolf was so frightened when he saw it coming that he turned around and ran to the woods as fast as he could, and after that he never bothered the pig any more.

The Little Red Hen and the Grain of Wheat

Once upon a time there was a little red hen, who was scratching and scratching in the ground to get her living. And one day she found a grain of wheat, so she thought she would plant it and have more wheat.

"Who'll help me to plant it?" said the little red hen.

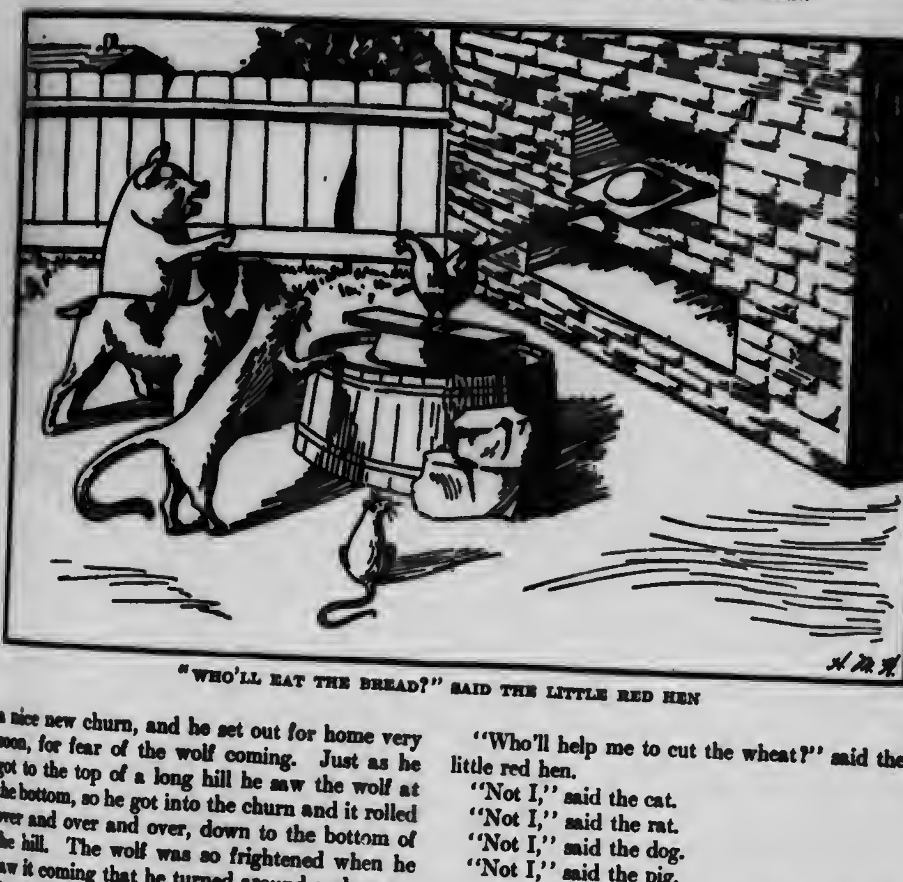
"Not I," said the cat.

"Not I," said the rat.

"Not I," said the dog.

"Not I," said the pig.

"Then I'll plant it myself," said the little red hen. So she planted it. Then she planted more. And by and by the wheat grew up. And then it was time to cut the wheat.



"WHO'LL EAT THE BREAD?" SAID THE LITTLE RED HEN

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"Not I," said the rat.

"Not I," said the dog.

"Not I," said the pig.

"Then I'll have to cut it myself," said the little red hen. So she cut it down, and then it was ready to be threshed

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"Not I," said the rat.

"Not I," said the dog.

"Not I," said the pig.

"Then I'll thresh it myself," said the little red hen. So she threshed the wheat. And then it had to be taken to the mill to be ground.

"Who'll help carry it to the mill?" said the little red hen.

"Not I," said the cat.

"Not I," said the rat

"Not I," said the dog.

"Not I," said the pig.

"Then I'll carry it myself," said the little red hen. So the wheat was ground into flour at the mill. And the little red hen carried it home. And then it was to be baked into bread.

"Who'll help make the bread?" said the little red hen.

"Not I," said the cat.

"Not I," said the rat

"Not I," said the dog.

"Not I," said the pig.

"Then I'll bake it myself," said the little red hen. And by and by a nice round, brown, crusty loaf came out of the oven.

"Who'll eat the bread?" said the little red hen.

"I will," said the cat.

"I will," said the rat.

"I will," said the dog.

"I will," said the pig.

"I will eat it myself," said the little red hen. So she carried the loaf down to the corner of the barnyard, where all the other little red hens were, and they all had a fine dinner. But the cat and the rat and the dog and the pig had none of it.

The Two Green and Glittering Gold-Chafers

A gold-chafer is a very bright beetle with a shiny back.

Once there were two green and glittering gold-chafers. They were very young, and they lived in a beautiful garden, full of sunshine and flowers. One day, as they played in the sunshine, the first green and glittering gold-chafer said to the second one:

"Let's play tag."

"Yes," said the second green and glittering gold-chafer, "you run and I'll tag you."

"No," said the first one; "you run and I'll tag you."

But they could not agree which should run first, and so they couldn't play tag.

"Let's play hide and seek," said the second green and glittering gold-chafer.

"Yes," said the first one; "I'll hide and you find me."

"No," said the second one; "I'll hide and you find me."

And they couldn't agree which should hide and which should find, and so they couldn't play hide and seek.

Then they saw two beautiful dragon-flies dancing over the pond in the garden. One was a green dragon-fly and one was a blue dragon-fly.

"Let's dance with the dragon-flies," said the first green and glittering gold-chafer.

"Yes," said the second one; "I'll dance with the green dragon-fly and you dance with the blue one."

"No," said the first green and glittering gold-chafer; "I'll dance with the green dragon-fly and you dance with the blue one."

And they couldn't agree which should dance with which dragon-fly, and so they couldn't dance.

And they were not having a good time, though the sun was shining and the flowers looked beautiful and everything else was having a good time.

Then a very old green and glittering gold-chafer came by, and he listened to what they were saying. He walked on, but he turned his head over his shoulder and looked back at them, and he said: "Silly, silly, silly. Don't you two young ones know that the only way to have fun is to take turns?" And they had never thought of that.

So the first green and glittering gold-chafer ran and the other one tagged him, and then the second green and glittering gold-chafer ran and the first one tagged *him*. And they had a lovely time. Then they played hide and seek. The second green and glittering gold-chafer hid and the first one found him, and then the first one hid and the second green and glittering gold-chafer found *him*. And they had a lovely time playing hide and seek. And then they danced. The first green and glittering gold-chafer danced with the green dragon-fly and the second one danced with the blue dragon-fly, and then the second green and glittering gold-chafer danced with the green dragon fly and the first one danced with the blue dragon-fly. And they had a lovely time dancing in the sunshine among the flowers. And always after that they remembered that the way to have a good time was to take turns.

The Pancake

Once there was a mother who was frying pancakes, and seven hungry children were waiting for the pancakes to be done.

"O, mother, please give me some pancake," said the first child. "O, dear mother, please give me some pancake," said the second child. "O, dear nice mother, please give me some pancake," said the third child. "O, dear nice sweet mother, please give me some pancake," said the fourth child. "O, dear nice sweet good mother, please give me some pancake," said the fifth child. "O, dear nice sweet good pretty mother, please give me some pancake," said the sixth child. "O, dear darling nice sweet good

SO THE FATHER AND THE MOTHER AND THE SEVEN HUNGRY CHILDREN RAN AFTER IT

pretty mother, please give me some pancake," said the seventh child.

"Yes, indeed, I will," said the mother, for they were such good children, and were asking so nicely.

Then the mother turned the pancake over, but just as she turned it, it got onto the edge of the pan, and in a minute it rolled down on the floor, and out of the open door, and down the road. So the father and the mother and the seven hungry children ran after it.

Then the pancake met a hen. "What are you running away for, pancake?" said the hen. "Stop and let me go with you." But the pancake said: "I've run away from a father and a mother and seven hungry children, and I'll run away from you-oo-oo."

Then the pancake met a turkey. "Where are you going, pancake?" said the turkey. "Stop and let me go with you." But the pancake said: "I've run away from a father and a mother and seven hungry children and a hen and I'll run away from you-oo-oo."

Then the pancake met a duck. "Where are you going, pancake," said the duck. "Stop and let me go with you." But the pancake said: "I've run away from a father and a mother and seven hungry children and a hen and a turkey, and I'll run away from you-oo-oo."

Then the pancake met a goose. "Where are you going, pancake?" said the goose. "Stop and let me go with you." But the pancake said: "I've run away from a father and a mother and seven hungry children and a hen and a turkey and a duck, and I'll run away from you-oo-oo."

Then the pancake met a pig, and the pig said: "Where are you going, pancake? You'd better stop and let me go with you, for you are coming to a stream of water, and you can't get over it alone." "How shall I get over?" said the pancake. "You may ride on my nose," said the pig. So the pancake got onto the pig's nose, to ride over the stream. And the pig made one bite and swallowed the pancake up. So the father and the mother and the children had to go back and wait for some more pancakes to be fried.

The Crane Express

Once upon a time there were six little fat fluffy friendly sparrows, sitting on the shore of the Mediterranean Sea. "Fat and fluffy friends," said the first little sparrow, "I have heard that the cold weather is coming. What shall we do?"

Said the second little sparrow: "Let us go to Africa."

"Why should we do that?" said the third little sparrow.

"Because," said the fourth little sparrow, "I have heard that the sun is always shining there, and that when you open your mouth the worms go walking into it."

"But it is across the sea, I have heard," said the fifth little sparrow. "And our wings are very short."

"We must get somebody to take us," said the sixth little sparrow.

Just then they saw a big sheep walking by.

"Dear sheep, will you carry us to Africa?" said the little sparrows. "O, no," said the sheep, "I must stay here with my little lambs, and I can't swim."

So then they went down to the waterside, and there they saw a big fish.

"Dear fish, you can swim," said the sparrows. "Will you carry us to Africa?" "I will carry you to the bottom of the sea," said the fish, and he turned and made a big dive down in the sea.

"Dear me," said the little sparrows. "It is a good thing we did not go with him." Then the sheep said: "You must get the cranes to carry you."

"What are the cranes?" said the little sparrows.

"Don't you know?" said the sheep. "The cranes are very big birds, with long necks and still longer legs, and every year they fly over the sea to Africa."

So the little sparrows watched until they saw some of these big cranes come along. "Will you carry us to Africa, dear cranes?" they said.

"My back is full," said the first crane, and indeed his back was covered with little birds. "But the fourth behind me has room," he said. So when the fourth crane came along, up went the little sparrows, hop, skip, flutter, scramble, and away they went to Africa.

Now, the cranes do really carry little birds with them to Africa, but as to the worms walking into their mouths when they open them, if I were you I would wait until I saw that before I believed it.

SIX LITTLE FAT FLUFFY FRIENDLY SPARROWS

The Musician and the Dancer

Down by the farmer's threshing floor some large black ants once settled and built their nest, because they wanted to be near good food, such as wheat, corn and barley.

They worked hard, and they prospered, and grew to be so many that by and by they had to have a king to govern them. The king was very wise and brave, and he wore a gold crown and a scepter. The crown was made of a tiny piece of gold wire, that the ants had found in the work-basket of a village maiden, on one of their excursions. The scepter was a tiny gold key which had dropped from the farmer's watch-chain, but as soon as it was in the king's hand it became a scepter. The king was now so old that he had to drive all the time in a carriage. He had his own carriage made of a nut-shell and drawn by two well-trained beetles. All his people loved him very much, but he was so old that he was now quite white, and he was very weary and feeble, so that he took no pleasure in anything.

One day there was a great tumult, for the ant soldiers had been out fighting, and they brought in some prisoners. The king came down to see them, and the soldiers saluted him as they brought forward their prisoners.

The first was a spider.

"What is your name," said the king, "and where were you born?"

"My name is Spider," she replied humbly, "and I was born in the dark cellar."

"What can you do?" said the king. (For the ants are always busy themselves, and they like to know what other people can do.)

"I know how to weave cloth, your Majesty," said the spider. "There is no one in the world who can weave better than I."

"Good," said the king. "You may show what you can do, and weave some hangings for my house. If you do well, you may be set free afterward."

Now the second prisoner was brought in.

"What is your name, and where were you born?" said the king.

"My name is Bee, your Majesty," she said, "and I was born in a hive, which is a large house for bees to live in."

"Do you know how to work at anything?" said the king.

"Certainly, your Majesty," she replied. "I can make a most delicious kind of food, which is called honey."

"Very good," replied the king. "You may make some sweet-meats for a grand festival that I am going to give to my people, and if you do it well, you may go free afterwards."

Then the king rapped on the floor with his scepter, and the soldiers took the bee and the spider away.

"Bring in the others quickly," said the king, "for I have business to attend to this morning."

These two prisoners were named cricket and grasshopper. One had been born in the field and the other under a bush.

"And what do you know how to do?" said the king.

"I know how to sing, your Majesty," said the cricket, "and the grasshopper knows how to dance."

"Tut, tut, tut," said the king angrily, so loud that he frightened the soldiers and courtiers. "Those things are of no use, I shall have your heads cut off, the pair of you."

"Please, your Majesty," said the cricket, "we really are of some use. We amuse all the other creatures, when the sun is hot and they are tired. I make music in the fields in the summer, and the grasshopper dances so merrily that everybody enjoys seeing her. Allow us to show you what we can do."

The king was not hard-hearted, so he said:

"I grant your request. If you can amuse me, I am sure you can amuse other people, for I am so tired that I never can laugh."

Then the cricket sang with all the skill she possessed, and the grasshopper danced and hopped as hard as she could. The king had never heard so sweet a voice or seen so graceful a dancer, and he laughed until he almost fell off his throne.

"Yes," he said, "I will set you free, and only ask that when you have time you will come and amuse us a little after our work is done. I will grant each of you whatever favor you like to ask."

"I ask that the poor spider may be released," said the cricket.

"And I that the bee may be set free," said the grasshopper.

"You have good hearts," said the king. "What you ask shall be granted."

So they went back to the fields with great happiness.

How Baby Ray Got Up in the Morning

The sun was up and the breeze was blowing, and the five chicks and four geese and three rabbits and two kitties and one little dog were just as noisy and lively as they knew how to be.

They were all watching for Baby Ray to appear at the window, but he was still fast asleep in his little white bed, while mamma was making ready the things he would need when he should wake up.

First, she went along the orchard path as far as the old wooden pump, and said: "Good Pump, will you give me some nice clear water for the baby's bath?"

And the pump was willing.

The good old pump by the orchard path
Gave nice, clear water for the baby's bath.

Then she went a little farther on the path, and stopped at the wood-pile, and said: "Good Chips, the pump has given me nice clear water for dear little Ray; will you come and warm the water and cook his food?"

And the chips were willing.

The good old pump by the orchard path
Gave nice, clear water for the baby's bath.
And the clean, white chips from the pile of wood
Were glad to warm it and cook his food.

So mamma went on till she came to the barn, and then said: "Good cow, the pump has given me nice, clear water, and the wood-pile has given me clean, white chips, for dear little Ray; will you give me warm, rich milk?"

And the cow was willing.

Then she said to the top-knot hen that was scratching in the straw: "Good Biddy, the pump has given me nice, clear water, and the wood-pile has given me clean, white chips, and the cow has given me warm, rich milk for dear little Ray; will you give me a new-laid egg?"

And the hen was willing.

The good old pump by the orchard path
Gave nice, clear water for the baby's bath.
The clean, white chips from the pile of wood
Were glad to warm it and cook his food.
The cow gave milk in the milk-pail bright
And the top-knot Biddy an egg new and white.

Then mamma went on till she came to the orchard, and said to a red June apple tree. "Good Tree, the pump has given me nice, clear water, and the wood-pile has given me clean, white chips, and the cow has given me warm, rich milk, and the hen has given me a new-laid egg for dear little Ray; will you give me a pretty red apple?"

And the tree was willing.

So mamma took the apple and the egg and the milk and the chips and the water to the house, and there was Baby Ray in his nightgown looking out of the window.

And she kissed him and bathed and dressed him, and while she brushed and curled his soft brown hair, she told him the Wake Up story that I am telling you:

The good old pump by the orchard path
Gave nice, clear water for the baby's bath.
The clean, white chips from the pile of wood
Were glad to warm it and cook his food.
The cow gave milk in the milk-pail bright,
And the top-knot Biddy an egg new and white;
And the tree gave an apple so round and so red
For dear little Ray who was just out of bed.

—From Eudora Bumstead's *Wake Up and Go Sleep Stories.*

Importance of Stories. The importance of stories and talks with children at bed-time can hardly be over-emphasized. It is the time when childish fears, troubles and wrong-doings can be drawn out, in confidence, and when help can best be given. The opportunity for winning confidence, and leaving the child with happy and affectionate feelings, as he goes to sleep, is most valuable. With nervous and sensitive children, to be left with something wholesome and interesting to think of prevents wakefulness and other bad habits.

The list of children's stories and other books, published by the Frederick A. Stokes Company, New York, is one of the best.

List of Story Books Suggested

For Very Young Children

Mother Goose Rhymes.
Nursery Finger-Plays.
Through the Farm-Yard Gate. } Emilie Poulsson
Father and Baby Plays.
Arabella and Araminta. } Gertrude Smith.
Reggie and Roggie. } Small, Maynard & Co., Boston.
The Three Tiny Pigs.
The Three Bears.
Little Black Sambo.
Peter Rabbit. } Beatrix Potter
Benjamin Bunny.

For Children from Five to Eight Years Old

Squirrel Nutkin (and other books by) Beatrix Potter.
The Child's Garden of Verses. R. L. Stevenson.
Mother Stories. Maud Lindsay.
Stories of East and West Red Children. Mara L. Pratt.
For the Children's Hour. Bailey.
The Story-Teller's Book. Throop and O'Grady
The Story-Hour. Wiggin and Smith.
In Story-Land. E. Harrison.
Songs for the Little Ones. Walker and Jenks.
Nature Songs for Children. Knowlton.
Small Songs for Small Singers. Neidlinger.
First Book of Birds. O. T. Miller. Houghton, Mifflin Company.

For Children from Eight to Twelve Years Old

Grimm's *Fairy Tales.*
Andersen's *Fairy Tales.*
Legends Every Child Should Know. } Mabie. Houghton, Mifflin Co.
Myths Every Child Should Know.
The Heroes. Kingsley.
Stories of Colonial Children. Mara L. Pratt.

Heidi. Johanna Spyri. Everyman's Library, Wanamaker, New York.

The "Little Cousin" Books. (*Life of children in foreign countries.*)

The Children's Book. H. E. Scudder.

Just So Stories. Kipling. Scribner's, New York.

Alice's Adventures in Wonderland. Carroll.

Plutarch's Lives. (Pocket Classic.)

The Song of Life. M. Morley.

Second Book of Birds. Miller. Houghton, Mifflin Co.

Stories of Plants and Animals. / *Stories of Earth and Sky.* / *Stories of Birds and Beasts.* (Heart of Nature Series.) — Wright. MacMillan Co.

Child's Book of Verses. E. V. Lucas.

The Posy Ring. / *The Fairy Ring.* — Wiggin & Smith. Doubleday, Page & Co.

All books whose publishers are not named may be obtained from the Milton Bradley Co., Toronto, Ontario, or New York, N. Y.

The stories suggested are not a complete list. A much larger one can be had for 10 cents, by addressing the chairman of the Literature Committee of the International Kindergarten Union, Miss G. Fulmer, Columbia University, New York City.

List of Home Occupations for Children

Paper tearing, cutting and pasting, paper and cardboard folding or modeling; stringing objects into chains; sewing, fancy work, dressing dolls, using tools, glue, passepartout, clay work, sand, plasticine, dough; scrap books; collecting of post-cards, stamps, coins, minerals, curiosities; blue prints; puzzles, bought and home-made; nature work out of doors.

Materials Needed or Desirable. All those named in the list of kindergarten materials, and also the following:

Clay or plasticine, with a book on clay work. *Clay-Modeling in the Schoolroom*, by E. S. Hildreth, is simple and practical, though not artistic.

A book on paper cutting. The catalogue of the Dennison Paper Co., New York City, gives many suggestions for using paper.

Books of "Finger-Plays" or simple songs. (A list will be found at the end of this section.)

The beads for stringing and the peg tiles, pegs and plasticine may be kept for "rainy day" playthings, to be used when the children cannot go out, and reserved for this only.

If home material, at very small expense, is desired, a job-carpenter will prepare one hundred oblong and one hundred cubical blocks for a small price. A good size for the oblongs is 2x4x1 inch and 2-inch diameter for the cubes. Boxes of blocks can be bought in stores, but generally contain too few. Plasticine, silkaline for sewing, and worsted needles may be bought at department stores. If beads are bought there, the largest size should be asked for.

Colored paper for folding and cutting can sometimes be bought cheaply at a printing office, which will cut a quantity into square pieces of any desired size; 5x5 or 6x6 inches is a good size. Prepared clay can sometimes be obtained at a pottery. Sand for a sand-box or for trays can be had from a builder, and if covered, can be used out of doors. A box of it may be kept in a covered porch or gallery.

Spools, cylinders on which ribbons are wound and cards which have had buttons on them, are all useful for making toy furniture; and the paper strips sometimes rolled with the ribbons may be cut in lengths, and some of them colored, for plaiting or making paper chains. Small pill and medicine boxes, match boxes and bits of wood, help to make furniture. Large sheets of ordinary wrapping paper may be cut in suitable sizes for drawing paper; and the children may save colored wrapping paper, to cut in strips or squares for themselves. Small brass tacks, and brass fasteners, such as are used for papers and note-books, are very useful.

The first necessity is a place for children to keep their materials; preferably a play-room or attic, with cupboards; if not that, a large cupboard where each child has a share of space with shelves and boxes which are his own; if that is impossible, at least a bookcase or wall cupboard where each may have a shelf for boxes, or at worst, a bureau drawer for his treasures. A child can have no joy in materials if he cannot preserve his results; for a time, anyway. A little girl, asked what she most wished for in the world, said: "A place to keep my things." What is trash to an adult is often dear to a child; but once a place is taken, tidiness may be the price paid for it, and this is a fine training; the child has rights, but he should not make life intolerable for the rest of the house. Shoe boxes and others of various sizes should be saved and the children's names put on them; no one to interfere with the contents. When they overflow bounds, the owner may choose what he will keep and what must be got rid of.

Develops Self-Expression. The keynotes of the kindergarten handwork are two: expression, or "self-expression" as it is generally called, and development, or step-by-step progress from easy to difficult, from simple to advanced, from familiar to new work. That is, the child has many sides of his nature which need other expression than words, and many ideas, especially the germs of artistic ones, which he could not put into words. He can, through his power of "creating," express them by materials. He has a chance to express, to clinch the perceptions of color, contrast, etc., which are awakened by the experiments with the gifts; and he expresses, besides, all his childish delight in nature and life, by trying to make the objects he sees about him. Froebel tried to provide a large range of materials, which covered many degrees of resistance, flexibility, or plasticity, so that a fairly complete set of life experiences might be expressed: string, clay, sand, chalk, seeds, worsted, paper, cardboard, peas with sticks, wooden slats, etc. A teacher uses these in a more systematic way than they can be used at home. The aim of home work is to use a variety of materials, so that the children can soon learn to employ themselves independently, and be happy in it; and to work, in some degree, from easier to more difficult things. For this reason, all the objects illustrated here for home use will be grouped so as to have three or four of each in connection.

1. **Stringing**. This is the simplest occupation; beads, which should be large enough to be threaded on a cord without a needle, or on a worsted-needle; buttons of all kinds: spools of all sorts (if many can be collected, some may be colored with Diamond Dye); clay beads made by the child (about ½ to 1 inch diameter) and pierced while soft; these also may be colored; nature materials, as seeds, acorns, sweet gum, seed-vessels, poppy-heads, are good for stringing.

Sand. The first sand-play for very young children is merely filling and emptying a pail; or a mug may be filled with a spoon, if the child plays with a small sand-box or sand-table in the house.

2. Making heaps; piling up mug-fulls, or making "sand-pies" with the hands.

3. Making rows of holes, with a smooth stick; the child will enjoy fitting his fingers into these, or sticking twigs into them, to play "garden."

4. Lines or "roads" drawn with a stick in the sand; children will enjoy making toy animals or little dolls walk along these and jump "ditches," etc.

5. Combining the heaps and lines, as a "house," with a "garden" round it, or a fort with a ditch, etc.

6. Impressions made in the sand with toys, the outline of the hand, etc.

7. Picture-tracing in the sand.

8. Molding the sand in definite shapes by using tin patty-pans, boxes, etc., to pack the moist sand in and turn it out; the children will call them cakes, pies, etc. These give them the idea that they can shape forms better, and they will try.

9. Castles, towers, or anything the children want to imitate or illustrate.

10. Illustration of stories, etc. Little Red Riding Hood going through the wood can be represented by sticking in twigs; the grandmother's and mother's houses at each end, and a small doll for the little girl, etc.

In sand and in clay, the suggestions are only intended to help out the children's ideas and to be interspersed with them, and should cover quite a long period of time, being repeated with slight differences.

Clay. If this is not bought ready for working, it will take a little practice in mixing, to get it of the right stiffness. It must then be kept moist, in an earthen crock, with a wet cloth over it.

"Plasticine," a sort of prepared modeling wax, may be bought at toy-stores or department stores. It is more expensive than clay, and is heavy to get by mail, but more convenient.

Any modeling material should be handled quickly and worked over as little as possible, since the heat of the hands dries it. When giving it to the children, it may be divided by drawing a string across it.

The only tool needed for home use is a small sharp stick or long pin, to make decorative lines or markings with, or to indicate the veins on leaves, the edge of the lid on a dish, or the eye or mouth of an animal.

Each child should have a square of kitchen oil-cloth, on which to put his material.

The children can, of course, play with it by themselves, and express their ideas, in a measure; but they will soon come to the end of their powers, from lack of technical skill and method.

It is better for an adult to work with them part of the time, giving definite suggestions or helping them out with their ideas; and then to leave them to invent other things.

It is better to work in solid masses, as much as possible; e. g. when a basket, cup, jug, etc., is made, to make it solid, not hollow; the a fast

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Objects prepared by Chicago Kindergarten College.

KINDERGARTEN OCCUPATIONS

1. Paper Folding—A, B, C, D, E, F, G. Construction Work—H, I, J, K, L, M, N, O, P, Q.
2. Strip Weaving, A, B, C, D, E. Free Weaving, F, G, H. Raffia Weaving, I, J, K. Sewing, L, M, N, O.

prepared by Chicago Kindergarten College.

KINDERGARTEN OCCUPATIONS

A. Poster Work. B. Clay Modeling. C. Sand Modeling.

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while soft; ap
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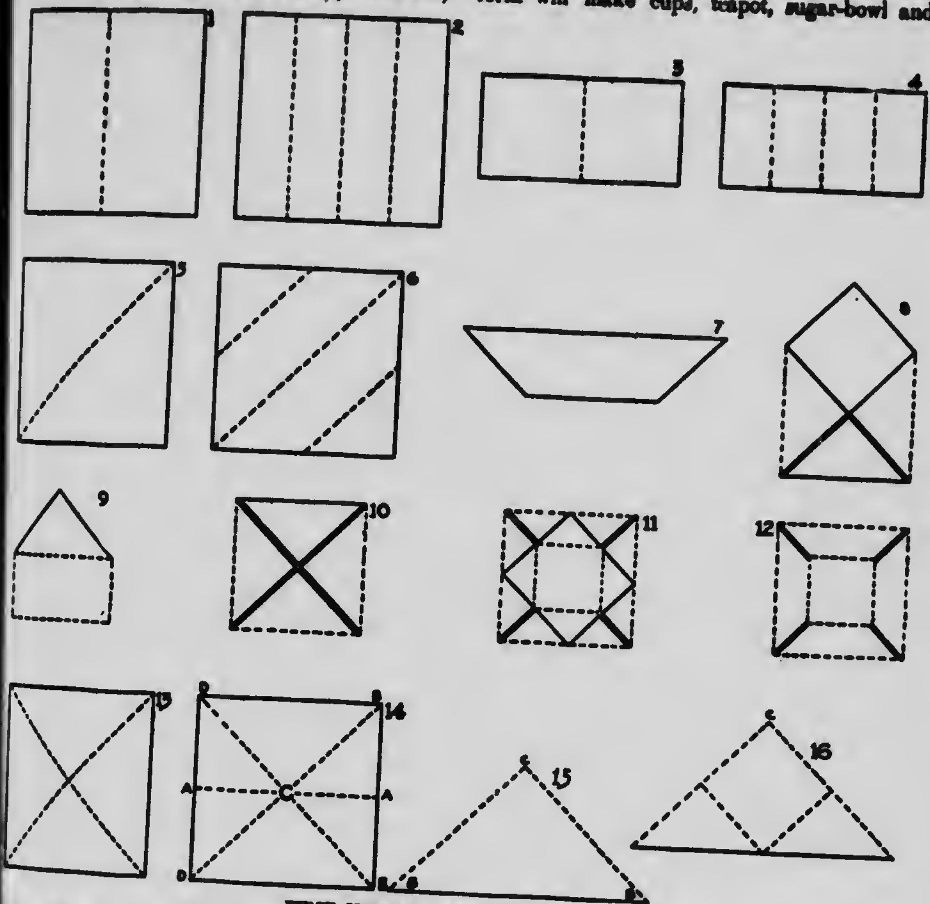
children can play that it is full of something if they wish. Plates, saucers and dishes should be made thick, as they keep shape better.

It is best to begin with round things, as a little gentle pressure and rolling in the palm will round a small mass into shape quickly. Marbles,

Extreme correctness of form must not be aimed at.

Much less handling is needed when simple mass forms are made, several alike, with only the detail varied. For instance, the same ball form will make cups, teapot, sugar-bowl and



FIRST SIMPLE PAPER FOLDING

1—Fold opposite edges together. 2—Fold edges to center line. 3—Fold No. 1, then fold ... again. 4—Fold No. 3, then fold ends to center line. 7—No. 6, doubled. 8—Three corners ... center. 9—No. 8, folded. 10—Envelope. 11—Frame; corners of No. 10 folded back. 12—...ame; corners turned inside. (13, 14, 15, 16, steps in making soldier cap). 13—Fold on diagonal; ... and fold opposite diagonal. 14—Open and fold across A-A, as shown. 15—Join (in 14) C-B ... C-B, C-D to C-D, so A-A is folded in between. 16—Turn (in 15) corners B-B under, so they ... Meet at C.

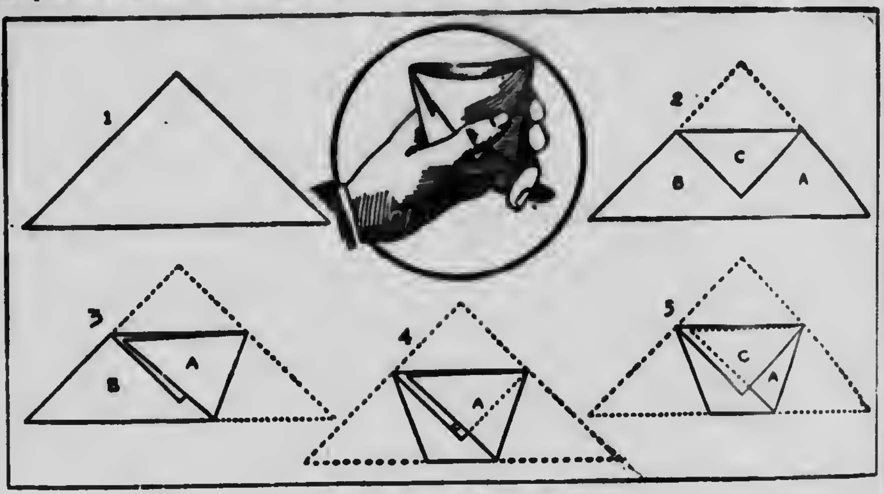
...d beads, which may be pierced or strung, ...le soft; apples, cherries, tomatoes, etc., are ...d to begin with; details added, such as the ...alks of fruit, the handle of a cup, the spout, ...andle and knob of a teapot, must be quickly ...t on, before the clay dries.

creamer for a tea-set; the cups need only to be flattened on the bottom, and pressed in slightly at the top; the same treatment forms the jug with one side pinched out for the spout; a tiny rolled piece makes the handle. The sugar-bowl and teapot have a line slightly pressed in, on the top, to show the edge of the lid, and a wee knob is put in the middle of it. In clay, as in other things, to try what can be made under a certain limitation really gives freedom. Another interesting group of objects is a set of loaves of bread, twists, rolls, buns, etc.; the children will invent doughnuts and cookies.

The roll form, such as a "jelly-roll" cake, may be adapted in various ways. Set on end with a handle added, it makes a mug, and a lip pressed out turns it into a straight jug. Rolls of butter, sausages, potatoes, ears of corn,—the grains marked with a tooth-pick—are other suggestions that will please the children. A rolling-pin, pail with lid, etc., may be invented.

cheerfully do this, if a different color of paper is supplied, and if they are allowed to play with what they have made; several different names for each thing will probably occur to them, according to the position it is in; for instance, a square or oblong piece of paper, doubled once, will be called a sofa when placed sideways; a door or screen when standing upright; a cradle when placed with the angle down, and rocked between the hands; a barn, reversed from this, with the angle up. Little children will much enjoy making this several times in red, blue and brown paper, playing "furniture shop," with sofas and screens to sell.

They should on no account be hurried from



HOW TO FOLD A DRINKING CUP

Many other fruits and vegetables can now be made; potatoes, bananas, pears (made by elongating and narrowing a ball-form), a bunch of grapes, carrots, radishes; eggs, bowls and dishes of several shapes, flower jars and vases of simple forms may be tried, for the doll-house. Animals are more difficult, but good directions for these, with illustrations, may be found in Mrs. Hildreth's little book, *Clay Modeling in the Schoolroom* (Milton Bradley Co.).

The children may also trace pictures, outlines of flowers, leaves, etc., on tiles or flat tablets of clay; but the raised work which really belongs to these is for a more advanced stage of work.

Simple Paper Folding. In working with very young children, remember that practice is to be given by letting them make each thing several times, perhaps many times over. They will

one thing to another, and in making the various forms illustrated in this article, remember that there is continuous progress from easier to harder forms, so that the easier should be made first, even though the others seem more attractive. If the children make mistakes at first, do not let them be discouraged, as the form made can generally be used for something else, and even a mistake may lead to a new invention.

Success depends only on having the edges straight, and folding or creasing neatly and firmly.

The first forms are for practice in folding, folds or creases being always dotted lines, while black lines are edges and cuts.

No. 1, page 490, is to be used for a door, book, screen, seat, barn, or roof.

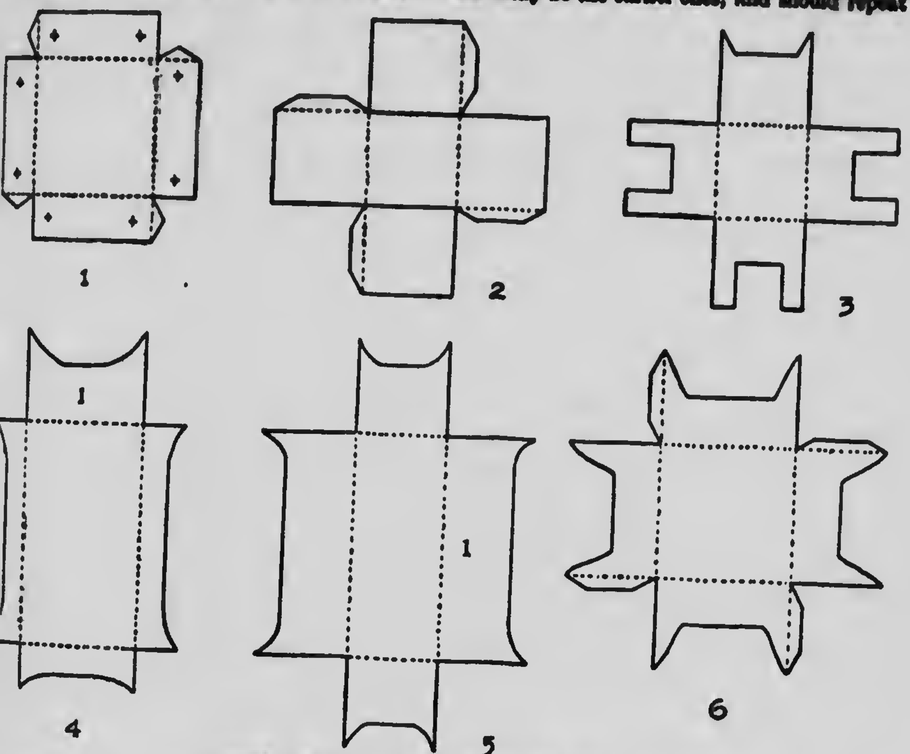
No. 2, after being folded in the middle, is a be opened and the sides folded to touch the center line. This the children will use for a cupboard with doors, when set on end. Laid flat, with the sides opened, it will serve for a "bed" or "cradle," and reversed, for a long table.

No. 3 is the same as No. 1, when folded, and is to be folded across again, making a small set. Sets of these should be made for a furniture shop.

No. 4 has the ends of No. 3 folded to the middle line, making a small cupboard, bed, or table. may be used for wall-pockets; No. 10 for letters or valentines to play "postman" with; Nos. 11 and 12 may have small pictures inserted in the frames.

Nos. 12-16 are the stages in making a soldier-cap. The cap may be made in large size in newspaper or wrapping-paper for the children to play "soldiers" with.

This page of simple forms gives material enough for two or three weeks' work, as the children should not go on to new folds until they can easily do the earlier ones, and should repeat



CARDBOARD FURNITURE FOR DOLL HOUSE

1—Box, or pin tray. 2—Box. 3—Chair; top section is to be bent up; the other pieces, bent ...n. 4—Bed; bend ends up, sides down. 5—Sofa; bend (1) up, others down. 6—Table.

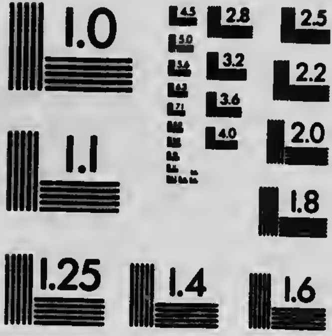
...lding bed can be made by making two of ... 4, and inserting the open ends of each into ... other, to close it up.

...o. 5 the children will call a shawl, or push it ... a "choo-choo"; No. 7 is No. 6 doubled at ... center line, for a boat. The children will ... to make a whole fleet of these in different ...s and sizes, giving names to them, and ...ling" them along the table. Nos. 8 and 9 each, in other sizes and colors, and play with them.

By folding the paper into 16 squares and cutting out an inch at the corners, another box may be made, by turning up the sides an inch in depth and pasting a small bit of paper across the corners. These boxes will give more pleasure if made in sets of several sizes, fitting in like Japanese boxes; and they may also be made in

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



twos, one serving as cover. By taking an oblong, instead of a square sheet of paper, and trying the same folds, different shapes of similar objects may be made. By cutting an inch in, on the slanting line at the corner, lapping this part over at the ends and pasting it, a water-trough and other forms may be made. The drinking cup illustrated, or any of the boxes, may become a "basket" by having a handle put on.

Directions for Cardboard Boxes and Furniture. The boxes are best to do first, because the other things are made on the same plan and when the children have learned to cut and modify the box form, they can change it in other ways, at pleasure. The dotted lines are creases. For No. 1, cut a piece of thin card, of stiff paper, 5 inches square. Crease it 1 inch in from each edge. Then cut the corners by aid of the creases, 1 inch in, except for the tabs, which are to be pasted over on the inside of the next piece. If it is hard for the children to paste neatly at first, the tabs may be omitted and the sides joined, by piercing holes where the little crosses are marked and tying with colored cord or baby ribbon. Made in colored cardboard, these are nice little pin-trays and may be decorated with stars or fancy stamps for Christmas gifts. See drawings on page 492.

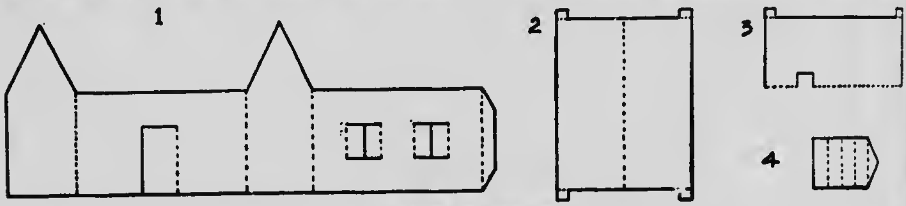
No. 2. This square box is made from a piece of cardboard 6 inches square, the sides being 2 inches deep, and the bottom the same. A lid can be made by cutting a similar box from a 3-inch piece and making the sides only half an inch deep.

No. 3. The chair is made like box No. 2, except that it is not pasted together. The back is bent up, and the three sides down. The cutting of open spaces in the sides is optional.

No. 4. The bed is made of a piece 8 inches long by 5 wide. The crease for the head is made 2 inches from the end, and this is bent up. The sides and other end are only 1 inch deep; as with the chair, the sides and ends may be cut straight instead of being curved in.

No. 5. The sofa is cut from a piece of cardboard 9 inches long by 6 wide, the seat being 5 inches long by 2 wide. The creases are made 2 inches from the edge on every side.

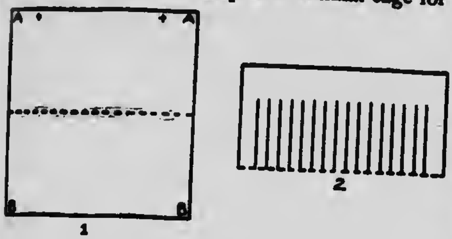
No. 6. The table is made like the first box, but from a piece 7 inches square, so that each side is 2 inches deep and the table top 3 x 3 inches; the flaps for pasting are optional. The children will soon learn that they can make the height and depth of each article what they please and this work becomes an excellent exercise in mensuration, when the articles are made in school. The children should be encouraged to notice the proportions of each article—whether the length is once-and-a-half, or twice, the width, etc.; they should also be allowed to invent new articles.

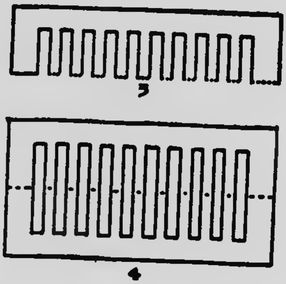


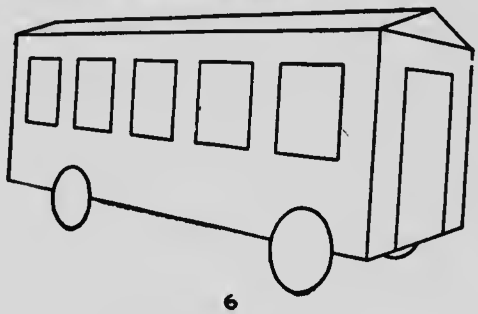
CARDBOARD HOUSE

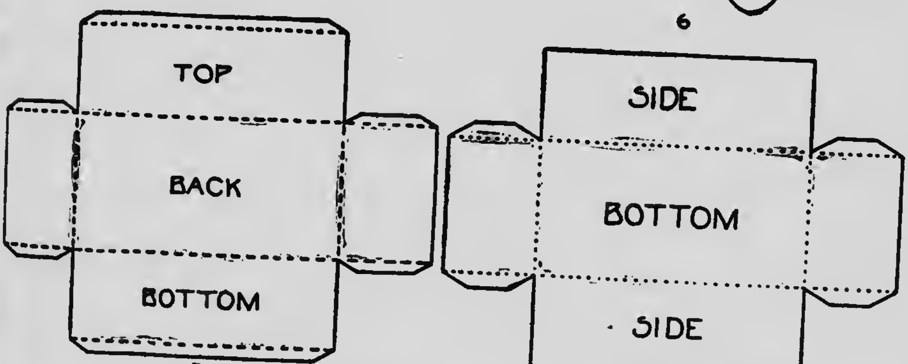
1—The dotted lines show where the paper is to be folded and bent; the solid lines show cut edges; the doors and window-shutters are to stand open. 2—Roof. 3—Roof, showing cut to insert chimney. 4—Square chimney. For this house, cut a piece of cardboard 14½ inches long, 3 inches deep at sides, and 5 inches at the gables. Paste overlapping pieces The roof is 5 x 2 inches inside of pasting pieces. Side walls are 5 inches, ends, 2 inches

Directions for Making Lantern, Cage, Etc. In all work of this kind, the children become more independent if the work leads gradually from the old to the new. It is best to begin by letting the children fringe paper towels for the doll-house, cutting the ends in parallel lines as evenly as they can. Next, they may fold a strip of paper doubled lengthwise, and cut it the same way; this will do for a ham-bone frill, when opened out and doubled the reverse way. For the lantern, take a piece of colored paper, 4 or 5 inches square; fold it double, according to the crease in No. 1. Then make straight cuts as in No. 2, one-fourth of an inch apart and an inch and a half deep. If the children cannot at first keep the cuts regular, the lines may be penciled Then open it and paste it together, A overlapping at A, and B at B, so as to make a cylindrical lantern, which will stand out a little at the middle crease. A strip of paper for a handle is pasted to the top, where marked with crosses. In colored paper these make a pretty decoration for a Christmas tree, or may be hung in the doll-house. The next step is an animal-cage for









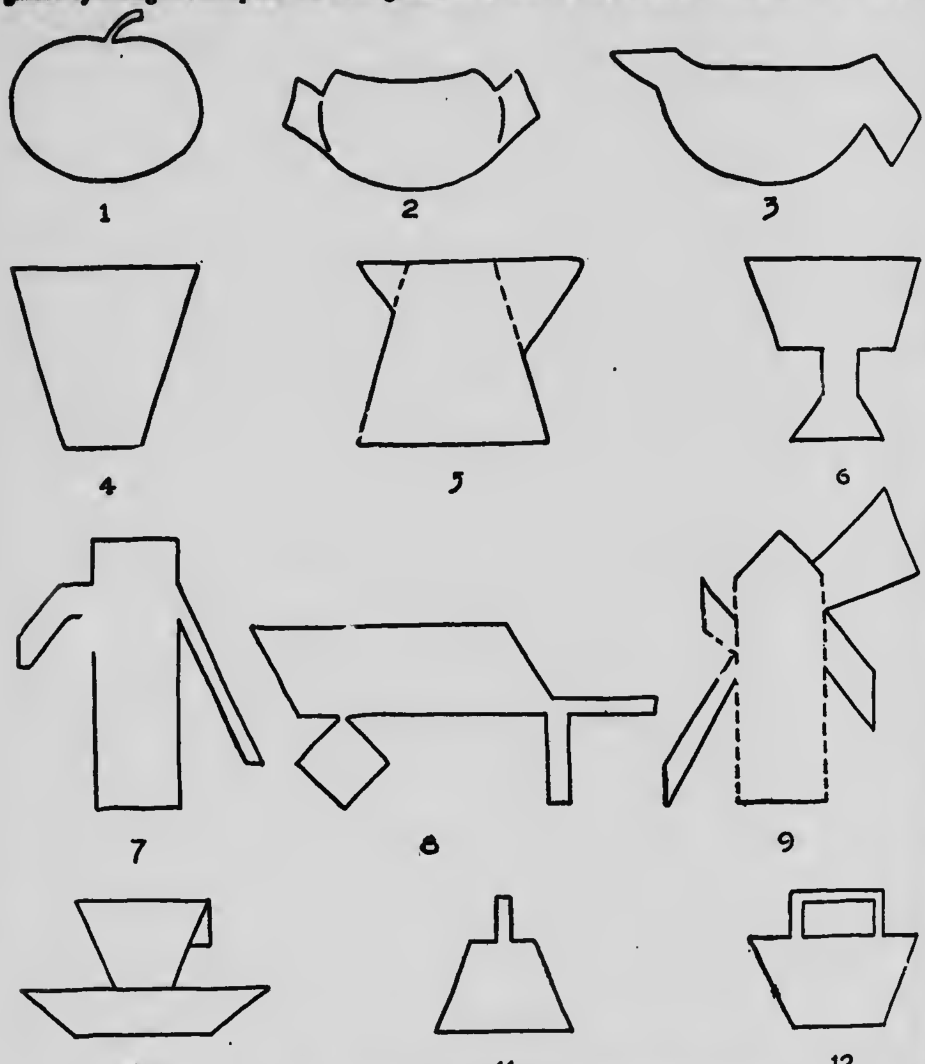
PAPER CUTTING

1—Lantern. 3—Front of cage, folded. 4—Body of cage (best if made of cardboard). 5—Front of cage, finished. 6—Street car; windows as in cage; roof may be added, as in cardboard house. 7—Wagon; add a long trip for tongue, and mount on wheels, like street car.

a menagerie. The front of the cage is made like the lantern; the strip of paper being 6 inches long and 3 wide, and the cuts one inch deep after it is folded lengthwise. Next, every alternate strip is to be cut out so as to leave the remaining strips for bars, as in No. 5.

The rest of the cage is in box-form, the main part of it being 7 inches and a half by 6, except where the ends, which are 2x3, project, making the center strip 10 inches long. After the creases are made along the dotted lines, the laps are to be pasted over on to the barred front piece. The ends need not be pasted but only tucked in. They serve as doors. The "cage" may be turned into a street car, or railroad car, by fixing gun-wads or circles of stiff card, such as milk-bottle stoppers, for wheels on the ends of two small sticks. Meat skewers, cut the right length, will serve. The car is then set on the sticks and may be held in place by strips of paper slipped under the sticks and pasted to the bottom of the car. A sloping roof can be added like that used for the house already mentioned.

Free Paper-Cutting. The children may begin by cutting paper in bits to stuff cretonne cushions for the play-room; this may be followed by cutting paper in short strips and tying it on sticks for toy brooms; square pieces for napkins and round pieces for plates for a "tea-party" will be the simplest things to do next, and all sorts of picture-cutting may follow. Practice in using the scissors to keep to an outline may be gained by taking a round piece and cutting round etc.; that is, if the same kind of picture is cut a number of times, the children will gain some "muscular impression" of the outline. This plan is part of the Montessori method; but there is



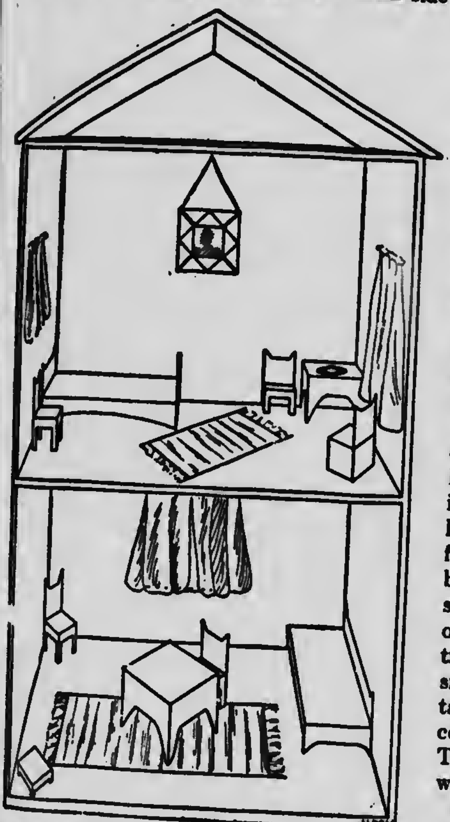
PAPER CUTTING

1—Apple. 2—Sugar Bowl. 3—Cream Jug. 4—Tumbler. o—Coffee Pot. 6—Berry Bowl. 7—Pump. 8—Wheelbarrow. 9—Windmill. 10—Cup and Saucer. 11—Bell. 12—Basket.

and round till the center is reached; this "snail-shell" will give pleasure, and the same thing may be done with a square piece. Dolls and animals can be more easily cut after the children have cut these out of advertisements, old toy-books, no reason why the children should not also originate freely. A page of examples is given here to show how the same sort of outline, with different details, may be modified to make several different pictures.

Paper dolls are not given here, because they can be better made by cutting out figures from fashion-magazines and pasting a piece of stiff cardboard at the back, with a free strip for a support; or they can be bought for a penny at any stationer's. Children seven or eight years old can make their own by imitating these.

A home-made doll-house is a never-ending delight to children. A soap-box makes a good one. It should have a piece of board fixed in the middle, so as to give either two rooms side



by side, or an upstairs and downstairs, if the box is on end. A roof may easily be added by forming a gable of two slanting pieces. On this, shingles cut out of brown paper may be tacked. The children can paint the sides of the house and design wall paper for the inside with paints or colored chalks. See illustration of a doll house on this page.

The toy furniture in boxes may be used, but it is far better to let the children make their own, either of paper and cardboard or of spools, bits of scrap-wood, etc. ... fringed and "cut fancy ways" will serve for curtains, table cloths, etc. Rugs can be sewed, braided or woven for the floors. Boys may prefer to furnish one room as a shop, and in any case the fittings may be changed from time to time. Of course, work like this should be done on Saturdays, or in the evening, and it will furnish a powerful incentive to the children to get up early and get lessons done in good time.

Suggestions for Sand-Table. A farm-yard, a ranch, a circus or menagerie, or a home-made Noah's Ark will give pleasure and occupation to children for a long time.

It can be arranged in the sand-table or sand pan, or on a small table with a strip of wood or cardboard tacked round it, to keep the things from falling off. (See page 502.)

The animals may be made from clay and colored; or may be cut out of magazines, such as *Outing, Country Life*, etc., pasted on thin cards and cut out again; a tiny support of cardboard must be pasted to the back so that they will stand up. The hunters, cowboys, farmers, etc., are to be made in the same way. A description of the way to make cages for the animals will be found on another page.

Dough is almost as useful and delightful for children to work with as clay, and keeps them happily employed under mother's eye, when she is making pies, bread, or cookies. Cottage loaves and twists, in miniature size, are a joy for children to make; a "snow-man," "cookie-boy," etc., with currents for eyes, and dots of sugar or chocolate for buttons; animals of various shapes; rows of cats and kittens, made by tracing out a large oval for the body, with a small one for ears, for the head, and a long tail; stars and moons, flowers, etc., cut out in cookie-dough, and ornamented in fanciful ways. These make a never-forgotten joy of childhood, when looking back on it.

Keeping Christmas. The German cakes, illustrating fairy tales, made for Christmas, are full of happy suggestions; and simple home-made things, both for Christmas-tree decorations and for gifts, are part of Froebel's plan for the ideal home Christmas or birthday. The essence of his thought is, that the tiniest, most trifling expression of the child's affection, through his own activity, is far beyond any purchased gift in value, and is important in strengthening his emotion, keeping it alive. "Even the child's love," he says, "will fade and die if it be not turned into active forms of expression." So, in the kindergarten, the children make the decorations for the tree, and make the gifts for their parents inviting them to come and receive them. The pleasure of preparation, and the joy in their own doing of it, is far greater than when they receive anything themselves.

The decorations may be "snow-balls" made of folded circles or squares of tissue paper strung as for shaving-balls; chains made of gold, silver and colored paper cut in strips and pasted into rings; lanterns, paper stars and snowflakes, colored paper baskets, etc. The gifts may be pieces of "picture-sewing," weaving, etc., with small calendars, or sand-paper for scratching matches, pasted on them; cardboard pin-trays or blotters decorated with parquetry paper circles, rings, stars, etc., or with little pictures or designs in colored crayon; court-plaster cases, also made of cardboard tied or pasted, napkin rings, made of a decorated strip of cardboard, tied with ribbon; or little picture frames of card, wound with colored raffia. Things of no value in themselves, they are beautiful to the child, because they are his own work, and should never be treated lightly.

Such Christmas keeping, with songs and stories to complete it, will be more enjoyed than if much money were spent. Froebel urges, too, that instead of loading the child with gifts, he should be shown the shops, but given a limited choice. The pleasure in seeing the things is not lessened by feeling that only a very few can be his possession; something is left for the future, and he does not wear out his powers of enjoyment, or get blase. This principle of enrichment by making the *most* of things under limitation, is a most important aid in moral training and runs all through Froebel's thought. Not the quantity of power or possession, but the way we use what we have, is what makes life rich.

Scrap Books. There is no end to the number of ways in which scrap books may be used. First of all, the older children may make picture books for the babies, or to give away to poor children, by fastening together leaves of glazed calico into a book and pasting pictures into them. These are practical because they will not tear. Flour paste with a little powdered alum in it is best, if you are not near enough to town to buy paste in tubes or jars. After the muslin scrap books come bought ones, which should not be used until the children can paste neatly. Old account books and scribblers with every second leaf cut out can be filled with pictures, and old copy books may also be used.

A great deal more interest will be found in these if the pictures are classified, i. e., animal scrap books, flower books, bird books, may be made by children old enough to have special tastes; when they can read well enough clippings on the subject from magazines or newspapers may be added.

Now that the periodicals of the day furnish so many illustrations, a boy fond of engines and machinery can put these in a special book, and the same way with ships, Indians, soldiers, etc. A girl interested in cooking can make a receipt book when she is old enough.

The pictures should be kept in envelopes of manila paper or wrapping paper labeled; and they may be collected from the advertisement pages of magazines, as well as the regular pages. A variety of books, which is interesting to children from seven to ten, is a doll-house book. The pages may be furnished as the rooms of a house with cut-out pictures, showing all the "comforts of home" and a family of paper people may live in the book, passing from room to room by doors cut through. In collecting flower pictures, or leaf pictures for a book of trees, blue prints will be an interesting addition. All that is needed is a frame for printing photographs and a package of blue print paper. The child can soon learn to arrange leaves or blossoms so as to make a clear image on the paper, fasten them in the frame, and leave them in the sun long enough to take the impression. No one who has not tried it can believe how much interest may be found in a neighborhood seemingly almost barren, when one begins to observe trees, birds, etc., closely.

For a Sick Child. The paper-work given here is excellent for a sick child, because it can be burnt and renewed easily. A small board may be fitted like a bath-tub seat, with hooks at the end to support it on a crib. A kindergarten toy called the gonigraph, made of slats jointed together, is easily handled by a sick child and may be twisted into many different "pictures." Paper scrap books may be made for a sick child by the other children, to be burnt after the child's recovery. A child may often be tempted to eat by having some little fancy decorations on its food tray, or bread in tiny loaves, or a paper napkin folded in a box form for its fruit, etc. A prism hung in the window, which makes dancing beams of light, is one of the kindergarten experiences which will please a little invalid. At places where builders' supplies are kept, the round pieces of colored glass which are used for ornaments in glass doors may be bought at so much per hundred. A child will delight in arranging these in patterns, on a tray or board.

Out-Door Amusements. Children are always interested in gathering and collecting blossoms, leaves, seeds, nuts, etc. In many places it is forbidden to pick flowers, but fallen leaves and seed-vessels may always be taken; chains, often very pretty, may be made of seeds and seed-vessels strung with a worsted needle and coarse thread; stoles or garlands may be made of leaves by pinning them together with leaf stalks; all sorts of funny objects may be made by sticking burrs together; perhaps the funniest is a "teddy-bear." Dollies may be made of corn husks, the end serving as head, part of the husk separated on each side for arms and the rest of it tied in with a sash forms the skirt.

Dolls may be made of marguerites; the white petals form a bonnet, being cut away at the bottom; a little face is traced on the yellow center, and a bunch of grass tied around the stem for a skirt.

Many kinds of blossoms may be made into chains; poppy heads make tea-pots, with twig stuck in for spout and handle. Milk-weed pods may be turned to parrots and other funny forms. However, the most interesting out-door occupation is making houses. A very small space of ground will allow of building mound-shaped houses and forts, with sand or clay, to which gardens, fields, etc., may be added; tent or wigwam houses may be made of branches (small branches are best, a foot long is quite enough); log houses may be made of crossed twigs, with leaves laid over sticks for the roof; small stones, bits of brick, shells, even bits of moss may be used to make ground plans of houses with one or more rooms, which the children find quite as satisfactory as more realistic ones. If space allows to lay out a toy village, colonial or Indian, a camp or even a farm or ranch, every addition will be a new pleasure, and a useful connection with history or literature may be made. Toy animals may be used if they can be made of clay, wood or paper. A stream, however small, will give endless joy in sailing boats and making miniature mills or dams; snow buildings are of equal interest in winter; and when a winter picnic can be held in a spot sheltered enough to light a fire and eat a meal, it is quite as enjoyable to healthy children as a summer one.

Gardening is, of course, a most wholesome occupation for children, and one constantly urged by Froebel. Even a window-box garden gives pleasure; but there are now so many garden magazines that advice on practical work is always to be had. Many state universities furnish information and even seeds free to boys and girls. Doubleday, Page & Company and many other publishers have a large assortment of books and magazines on nature work and gardening. It is a good plan to write for specimen copies of magazines.

Of course, clothes must not be a burden to children in out-door occupations. Simple rompers, overalls or pinafores, which can be soiled with impunity, are a necessity.

Walks with Children. Following is a list of things to be observed:

1. Flowers, leaves, berries or seed-vessels, trees, bushes, birds, insects, animals, bees, butterflies, ants, caterpillars, spiders, lizards, frogs, toads, snakes, cats, dogs, goats, chickens, horses, mules, fish, snails, turtles, beetles, dragon-flies.

Fruits, vegetables.

Snow, ice, frost, water, soil, dew; fountains and water-power.

Conveyances, buildings, trades, windows, doors.

Wheels, fences, gates, statues; other children, workmen, etc.

The provincial agricultural bureaus are very willing to supply information, and sometimes publications, on nature-study.

Home Discipline and Government

Busy Children Not "Naughty." Two things in Froebel's writings are little understood; first, his urgency that when children are considered "naughty" they are often misunderstood, and that the fault is with the adult; secondly, that freedom is the goal and object of education.

Froebel's ideas are expressed at so great length, and with so many digressions, that people often lose his main points.

He insists that when fully employed, with natural occupations and companionship, children are seldom wilful or cross, but that they must be active; if activity is stifled, they will be cross, unhappy and lazy; if it is not guided, it will be perverted to wrong forms, and they will be troublesome. But this is because the adults have not patience and knowledge enough to keep them employed.

It is common experience with kindergartens and other teachers that children who are said to [illegible] "very naughty" at home are contented, happy and helpful in school. A little child in a kindergarten who never wanted to go home, said, pathetically: "You see, I'm always good here, it's so easy; but I don't know why it is, I always seem to be naughty at home." The child had no companions at home, and no suitable employment.

"Plenty to do" is the usual solution of the trouble; but there is also another source of it. Froebel constantly reminds us that children are nothing if not imitative, "therefore be careful, parents, what you say and do in their sight." If we are selfish, cross, and untidy, it is unreasonable to expect children to be otherwise, merely because we *talk* of virtues which we do not practice. "Actions speak louder than words." On the other hand if love, cheerfulness and regular habits of order in meals, occupations, going to bed and rising are the rule of the home, the child imitates and forms habits on these lines.

Freedom, under Limitation. As to the freedom Froebel urges, it is, as in all other things, freedom under limitation, and only to be attained progressively, as we become able to use it. The children may have materials, but must keep them tidy and put them away. They may have pets, but must feed and take care of them. They may have romps with father when he comes home, but must be made clean and tidy before he comes. "Every normal child gladly fulfils duties, when he is rightly taught, but these must be clear, genuine and above all, *inexorable.*" So says Froebel in his *Mother-Play* book. That is, it is an injustice to the child if in teaching him habits and duties you do not keep him steadily and continually at them. "There must be no vacations" in forming habits. One point which solves many difficulties is to give a choice. "You may have this pleasure or privilege, may stay with us, if you are good-humored, but you must go away by yourself if you are not. Which will you do?"

Let us try always to remember that a little child is like a traveler who has arrived in a strange country; many of the words, ideas, customs and laws are unknown or puzzling to him, and if he offends against them it is quite often from ignorance and lack of habit in those directions. Let us form the practice of looking back to our own childhood, especially our childish blunders, fears and troubles, that so we may learn the things which cause these in children.

Train to Meet Difficulties. Froebel would not have children sheltered from difficulties, but trained to meet them. "Yonder," he says, "is a child gliding in a sledge over the snow. His eye is not sure; his hand not strong; he falls. What says his pain? Train your eye, exercise your strength, so that you may avoid a fall. Yonder is a boy skating. Heedlessly his eye wanders; he falls, but happily only grazes his hand. Collect your mind, fix your eye, rule your feet and legs that you may not fall. . . . As he grows older you, mother, will find many opportunities to show him that without watchful care, slips and falls may easily be serious. Through play, in which he is watched over by your love, and protected by your care, your baby increases *both his strength and his consciousness of strength.*

The consciousness of strength can come only by being helped over and over again to meet difficulties, both physical and spiritual.

"On a windy, almost stormy, day, the children go out with their mother . . . . Hark, how the weather vane creaks. . . . . . How the clothes flap and rustle on the line! This delights the children. . . . . A little girl is watching the waving handkerchief in her hand. . . . . . Out runs a little boy with his paper windmill. A third child is flying a kite." "Where does the wind come from, mother, that moves so many things?" "You would not understand if I were to explain to you now, but you can see many things great and small that it can do. Your hand moves, but you cannot see the power that moves it. . . . Hereafter, though [illegible] ver see it, you will understand better [illegible] ies."

Mothers keep [illegible] house, often from fear of colds and [illegible] to health; often from fear of the [illegible] bad habits and manners from other children; sometimes, I fear, because it is inconvenient to go out with them and they are too small to be alone.

Perils of Growing Up Alone. In reality, to a child the danger of growing up solitary is worse for mind and body than any of the perils mentioned. Such children generally become dreamy, and live in a inner world of their own; they often invent imaginary companions to satisfy the craving for real ones; and they frequently form dangerous physical habits, from lack of activity and the indolence of will which is apt to go with indolence of body. Froebel warns us against this.

The imaginary companions never make inconvenient demands; the ... may be as selfish, as masterful, as ill-tempered as he pleased, and the playmates of his inner world make no protest. Or these qualities may lie hidden in him and never come to the surface till he meets the real world. Many a failure in business or family life might be saved if mothers only saw in time the temper or tendency in their children which does not show except when drawn out by the actions of others; and many a natural power and capacity fades away because never aroused or assisted by imitation, competition or the good spirits and interest in life which come with companionship.

Comparisons Drawn from Play. More than one kindergarten teacher has said that in jumping, running, skipping, playing games of skill, etc., the poorest in power and slowest of the children are those who come from the wealthier homes, where they are waited upon, instead of having to help others and act for themselves; or they are only children, who have no stimulus from others at home. You do not know your own child's powers; invite other children to walk and play with him; watch them in games and in exercises or anything that requires effort, and see what are the impulses that need repressing, or the talents needing to be drawn out; whether timidity or hastiness is what prevents successful results.

One child will show timidity in jumping, or in playing with animals, which can be overcome by showing him that his playmate is not afraid. Another will be slow to perceive, and will learn much from what others notice. A third will be discouraged if he fails at first in throwing or catching and will want to give up. If he had no companions, he would never make an effort and would lose both vigor and will power, but the insistence of the others leads him to do more than he would alone. When children begin to help at home, which they love to do when very little, this is a great opportunity for training. Some mothers let them try things beyond their powers and scold or punish them when they drop or break things. A little one who carries breakables or dishes and glasses which may spill over needs to be warned: "Hold tight, open the door, before you carry the dish out; watch what you are carrying to see that it does not spill; walk slowly." These counsels need to be repeated, not once, but many times. "Many a loss comes from anxious care mated with weakness. Draw these pictures from life for your child, as need and occasions call for them."

So says Froebel. Of course, this needs love and patience, but what are mothers for but to show love and patience? A mother lamented that her delicate child did not gain strength and wished she would run more. She was asked whether the child did not run after her ball. "Oh, no," she said, "we always pick it up for her." Another child would not have done this; her adult playmates gave her no chance of exercise.

A strange lack of sympathy and understanding was shown by a mother whose little girl constantly talked to, and of, an imaginary child she called "Dora." The mother said, "I will not have this go on; I cannot stand having her talk as if there were someone here when there is not. I'll stop it." One day she threw down some heavy article with a crash in the room next to where her child was and ran in, saying to her, "Dora is dead; that box fell on her and killed her."

This was a real cruelty to the child, whose innocent fancy made her happy, and was no safeguard against the invention of another playmate. The real remedy would have been to invite other children constantly until the dream playmate was "crowded out," or at least, counteracted as to any morbid influence, by the commonplaces of ordinary child-life.

Harmless Animals as Companions. Animals are satisfactory companions because they, too, are generally active, and are nearer the child's level in motives and habits than most grown people, and they are, as a rule, most satisfactory out-of-doors, which is an incentive to the child to go out for fresh air and exercise. However, children in kindergartens keep, and delight in, a range of pets, including birds, fish, turtles, cats and kittens, chickens, white rats, white mice, guinea-pigs, snails, ants, caterpillars and butterflies, toads, frogs, wild bees and pigeons, with occasional visits from dogs. The last can only be properly kept, however, where there is ground for them to run in.

It is not easy at first to train a child to take good care of pets; but it is wrong to let him leave the responsibility to others. Froebel begs the mother to give her child both the pleasure and the training of caring for, "nurturing," the life of plants and dependent creatures. Nothing, says he, is so valuable and important an influence on the child's character as to be capable of this unselfish, patient nurture, and any mother who truly wishes her child to be his best self will not grudge the pains to train him.

List of Recommended Books

BOOKS FOR PARENTS

Beckonings of Little Hands. Du Bois Lippincott.
Children's Rights. K. D. Wiggin. Milton Bradley Co.
That Boy. Forbush. D. C. Heath & Co.
The Making of Character. MacCrum.
Misunderstood Children. E. Harrison. Sigma Publishing Co., Chicago.
Study of Child Nature. E. Harrison. Sigma Publishing Co.
Story of My Life. Helen Keller. Doubleday, Page & Co.
Mind and Work } Gulick. Doubleday, Page
The Efficient Life } & Co.
Froebel's Education of Man, and *'other-Play Book.* Appleton, New York.
The Study of Children. Warner. Macmillan.
The Care and Training of Children. S. G. Kerr, M. D. Funk & Wagnall's, New York.
Mentally Defective Children. Shuttleworth & Potts. Blakiston Pub. Co., Philadelphia.

Many other valuable articles and publications may be found, or names obtained in:

Kindergarten Review, Springfield, Mass.
Child-Welfare Magazine, Philadelphia, Pa.

ON NATURE AND OUT-DOORS

How to Know the Wild Flowers. Dana.
Familiar Trees. F. S. Matthews. Appleton.
The Cabins. Stewart E. White. Macmillan.
Bird Stories. Burroughs. John Lane Co.
When Mother Lets Us Keep Pets. Johnson. Moffat, Yard & Co.
How to Grow Vegetables. French. Macmillan.
Insect Life. Comstock. Appleton.
Citizen Bird. Wright. Macmillan.
Our Feathered Friends. Grinnell. D. C. Heath.
Garden Magazine. Doubleday, Page & Co.

FOR PRIMARY TEACHERS

Handwork for Kindergartens and Primary Schools. J. S. Hoxie.
Story-Telling with Scissors. M. H. Beckwith.
Holiday Songs. E. Poulsson.
Suggestions for Handwork in School and Home. Hoxie.
Arnold's *Rhythms for Home and School.*
Educational Gymnastic Play. Johnson & Colby.
Froebel's Educational Laws. Hughes.

All the above can be obtained from the Milton Bradley Co., Toronto, Ontario.

The Primary Department

Suggestions from the Kindergarten. Primary teachers will find certain suggestions from the kindergarten material valuable for seat work, especially if they have some very young or backward children. However, the regular material is too expensive for large classes, that is, if it is only to be used for seat work, though it is extremely helpful to have several boxes of "gifts" and beads, if real connecting class wor as Froebel called it, can be done.

For ordinary work, paper, cardboard, paste, colored chalks and scissors are needed. If possible, clay from a pottery, and paints made from Diamond Dyes should be used for modeling and coloring exercises about once a week.

For Seat Work. For school seat-work the same advertisement and picture pages of old magazines as for the home are useful; the children should cut out pictures of animals, farm work and farm implements, plants, trees, mountains and lakes, etc., anything that will connect with geography and nature study, for scrap-books or wall charts, which last are far better when made than when bought. Old school readers and large calendars, such as are distributed by business houses, are very valuable in school. The younger children may cut out the words from the readers and the separate letters and numbers from the calendars; they then mount them on small cards, using the words and numbers to make original sentences and examples.

Number Work. For number work, they can also cut the colored squares of paper into halves, fourths and other fractions. Some ran be cut into inch squares or thereabouts, are to be pasted on strips of paper tc number groupings; e. g., a class may show all the possible ways of picturing five, six, ten, etc. Number groupings may also be illustrated with paper chains; e. g., three, red; two, white, etc., and designs be made with the pieces cut.

A box of Milton Bradley's "gummed paper dots" is useful for the children to paste on cards, to make sets of dominoes; this is a good number exercise.

Boxes of toothpicks and shoe pegs may be colored with Diamond Dyes, and used both for number work and for toy furniture. The c house planned for the home is an equally valuable school training in manual work. Every object in it may be used as an exercise in mensuration, especially the wall-paper and rugs.

Scrap-Books. A scrap-book may be made on any school subject: nature study, history, civics, geography—a scrap-book of famous persons, either foreign or home celebrities, one on current events of importance, on invention and discovery, or on religious studies. There is really no limit to the possibilities in this way.

Pictures may be neatly mounted on cards and sliced into puzzles, or the stiff picture covers of old toy books may be used in the same way; while geometrical puzzles may be made of cardboard squares cut through in various directions. Sets of dominoes and geography card games may be made also.

Sand Table. A sand table for either school or home may be made, by having a wooden strip three or four inches deep nailed round a kitchen table, or any small table; it should be lined with kitchen oilcloth. The lining is needful because the sand must at times be moistened. The table must have the legs shortened so as to be of proper height for working. In school there is no limit to the use of the sand table. A house and yard, a village of cardboard houses and stores; a farm, with fields and orchards, may be worked out as a neighborhood study, the children collecting the material.

POSSIBILITIES OF THE SAND TABLE

Indian and Colonial Life. Indian life with paper wigwams, a piece of glass or tinfoil for a lake, paper boats and toy or clay people and animals makes a fascinating exercise which will last for weeks.

Colonial life should follow this, and the clearing of the forest, planting of fields and making roads will make pioneer life vivid. Other geographical and historical exercises will easily follow, and the children will eagerly collect bits of wood, stone and bricks, twigs, bark, etc., to fill in the scene. Clay is very helpful here, as most things, not otherwise at hand, can be easily represented with it; Eskimo huts, for instance; colored chalks and paints are useful in this, and also for designing the wall papers, rugs, etc., for the doll house or "Home," as it may be better to call it, for a school exercise.

Nature Study. Nature study on plants, flowers, fruits and birds of the locality should whenever possible be followed by an exercise in representing these in color on the sheets cut from wrapping paper; and large sheets with lists of the birds, plants, trees, etc., which are known should be hung on the wall, and added to from time to time.

Similar sheets with new words and sentences written large in colored chalk may be hung up for review work, and colored chalk is most useful for outlining the difficult elements in misspelled words.

Suggested Material. A cutting board and knife for papers and cardboard is most useful for either school or home, as home-made programs and menu cards, passepartout mountings, etc., can be prepared by its aid; the cost is from $2.00 to $5.00, according to size, at Milton Bradley's or stationers' supply houses.

Games for Primary Teachers to Use. All the sense-games suggested for the home may be used and should be carried further; e. g., with coverings of animals, shell, fur, wool, fish-scale, leather, for touch; with sounds of animals, birds, musical notes and instruments, for hearing; with tastes and smells of natural products, etc. These may be connected with geography and nature-study.

A good game to exercise observation is to choose some object of interest, while one child is sent out, and have her guess it from the answers to her questions. These may be made exercises in language.

A good game for language exercise, especially with foreign children, is "Little Travelers." The children leave the room in groups of three or four at a time, telling when they return that, "'We have come from 'snowy (or shivering) land,' where the snow was falling." "We have come from 'summer' or 'fanning' land, where people all were 'fanning.'" The action must be used with the word.

An imitation game is a pleasant change of position. The children rise from their seats, and standing in the aisles, imitate the action of a child who is chosen to stand in front of the room as leader. A song which may be sung as accompaniment to some simple air is:

"O, a merry band are we,
Standing here so quietly;
What one can do, we all can do!
Let {Susie / Willie} show us something new."

Another form of this is "Follow My Leader." The leader may either stand still and dramatize actions for imitation, or may walk, run, hop, march or creep around the room, the others imitating. Animal movements imitated, ponies, ducks, kangaroos, etc., are good gymnastic exercises.

Another good game is "I Went to Paris." The teacher asks "What did you do there?" or "What did you buy there?" and the child replies, dramatizing some action which all must imitate.

This may be played in rows, the first row saying, "I went to Paris, London, etc." The second row asks the question, and receives an answer, accompanied by some action with the right hand. The third row begins with the statement; the fourth row questions the third, and an action with the left hand follows, the children who began the game still continuing the action; the fifth row may add some action with the head or foot.

The old "Quaker" game—

"I put my right hand in,
I put my right hand out;
I give my right hand a shake, shake, shake,
And I turn myself about,"

is a good one for the first grade.

Another form of this is played by the rows of children.

1st Row: "Queen Anne's dead."
2nd Row: "How did she die?"
3rd Row: "With one hand going this way."

The fourth row again says, "Queen Anne's dead," and this is continued till hands, feet and head are all "going" as in the "Quaker Dance."

A simple gymnastic play is "See-saw." The children stand together in threes; the middle child stretches out his arms; the two on either side, facing each other, clasp their hands over the "board" he thus makes, then rise and fall by bending and straightening the knees alternately.

Another simple game is the "Swing." Stevenson's verse may be sung:

"How do you like to go up in a swing,
Up in the air so blue?
Oh, I do think it the pleasantest thing
Ever a child can do."

Singing is not necessary, but rythmic counting is desirable, or

"Swing-swong, the days grow long,"

may be sung.

The children stand in threes, around the room; two face with hands clasped; the third rests his hands upon theirs and pushes them back and forward, as if pushing a swing; after three, or six, swinging movements, each child pushes the "swing" high enough to run under it and goes on to the next one.

Another dramatic game is—

"What can you do?"

A child stands in front of the others, and the teacher asks:

"What can you do?"

He answers: "I can pull ropes, like a sailor," and stretches his arms up, with the action of pulling, the others imitating.

Other suggestions may be:

"I can drum, like a drummer."
"I can saw, like a carpenter."
"I can sew, like a dressmaker."
"I can skip with a rope."
"I can shoot, like an Indian."
"I can ride a bicycle."
"I can play, like a violinist," etc.

Bean-bags made by the children give opportunity for many games. They may be tossed between the children of opposite rows; picked up, when laid on the floor in rows, as in a "potato-race;" tossed by successive children of each row into a chalk circle or paste-board box placed in front of each row; the rows may face the back or front of the room, in whichever place there is most space.

The bags may also be passed up and down the rows; whichever row gets all to the end first, wins.

A similar game may be played with clothes-pins.

The dramatization of stories is a good exercise, but there should be an effort made to provide action for more than one or two children.

The Montessori Method

Those interested in Froebelian methods will probably wish to know something of the new methods for young children, originated by Dr. Maria Montessori, in Italy.

In 1898, Dr. Montessori became interested in the work of Dr. Seguin with defective children. Dr. Seguin did remarkable work first in France and afterwards in America, where his widow still carries on a successful school, in Orange, N. J. Dr. Montessori took charge of a school for defectives for two years, and her success in adapting and inventing methods for them was so great that she became anxious to try to improve the instruction of normal children. She made a further study of methods and psychology for several years, and since 1907 has supervised infant school work, in Children's Houses (Casa dei Bambini), under a model tenement association in Rome.

Dr. Montessori begins with training the senses, especially the sense of touch. This it true also of Froebel's work: but the latter uses playful methods and games, while the Montessori method is individual training. It is based on contrasts, which are also used by Froebel. The child is given rough and smooth articles, alternately, to handle, until he recognizes them well. The name of the quality is taught, but as few words as possible are used by the teacher, lest the child be confused. Similar exercises with colors are given, and after a time the child has exercises in sorting and grading the objects or colors. An immense emphasis is put on the personal action, or "self-activity," of the child;

Courtesy of McClure's Magazine

DR. MARIA MONTESSORI INSTRUCTING A DEFECTIVE ITALIAN CHILD and the teacher must never push him on nor give the new exercise or word until he seems eager for it. This, too, is the method Froebel advocates; but the large numbers of children gathered in our kindergartens under the American school system are not favorable to it. The Montessori work is done with very poor children; and the mothers are so eager to have them begin school early that they are taught to read and write when three or four years old. The child first gets to know squares, circles, etc., inset in hollow blocks, by touch; he then has large script letters, set in the same way, and fills in outlines with colored chalk. Italian being a phonetic language, the sound is acquired with the name. The children are allowed to choose the forms they wish, to outline, so there is no regular order used for the letters; but as they go from one to another, and make the successive sounds aloud they soon discover that they are the sounds made in pronouncing words, and begin to make new combinations. Their delight when they find out that they can re-arrange these at will, is great. A child will exclaim, "I can write, see, bread, meat," etc., sounding the successive elements of the Italian words for these, as he forms the letters. After this, reading is of course, only the discovery of the various ways in which sounds are combined in any words, and the children are eager to go on. (They use tablets on which familiar words and elements are written in large script.) The work is admirable as to method, though we question the value of reading and writing for children so young. Number is begun in a similar way.

The children also learn to tie bows and knots, and do all other simple actions concerned with dressing themselves, etc., relieving the mothers of this care and learning self-reliance.

The handwork Froebel planned to encourage creativeness, and artistic feeling or the germ of it, is not included; nor the social conversations, games and ideals, the stories, music or poetry of the kindergarten.

The Montessori method is in fact, one for developing a feeble or immature mentality, and takes heed that the physical growth is not injured or forced; it deals with immediate needs rather than with general ones.

The teaching is individual and the purpose entirely practical, i. e., to give the child useful knowledge as early as possible, by a natural method. The moral and spiritual training other than that of obedience and orderly habits, the feeling of relation to others, and the joy of play, seems lacking; nor does it seem to cultivate ideas or give the children any rich mental content of stories, songs and knowledge or love for nature.

(Accounts of this work may be found in *McClure's Magazine* for May, 1911, Dec., 1911, and Jan., 1912. It seems highly desirable for defectives, but one-sided for normal children.)

Outline

I. History
- (1) Origin
- (2) Froebel's ideal school
- (3) Recent development
  - (a) In the United States
    - (1) Kindergarten training schools
    - (2) Kindergarten department of the National Education Association
  - (b) In other countries

II. Purpose
- (1) Wise direction of the child's activity
  - (a) In self-expression
    - (1) Elementary knowledge of form, measurement, and motion gained through objects
    - (2) Skill in construction work acquired
  - (b) In relations to others
    - (1) Kindness and obedience developed

III. Methods
- (1) Songs and stories
  - (a) *Mother-Play Songs* (Froebel)
  - (b) Class singing
  - (c) The mother's or teacher's story
    - (1) Its purpose
      - (a) To call into play the imagination and feelings
      - (b) To develop the sense of right and wrong
    - (2) Its character
      - (a) Usually of the fanciful type, suggestive of simple truths
    - (3) How it should be told
  - (d) Conversations
- (2) Games
  - (a) Marching, guessing, and contest games
    - (1) Use
      - (a) Entertainment
      - (b) Development of imagination, reason, and social instinct
    - (2) Suggested games

(b) Gift-plays and games
(1) Purpose
(a) Self-expression
(b) Exercise of imagination and power of observation
(2) Character
(a) Representation of persons or objects of nature with their characteristic actions and feelings
(3) Gifts
(a) Classification
(1) The five groups
(a) Solids, (b) surfaces, (c) lines, (d) points, (e) construction material
(2) The eleven gifts
(a) Six colored balls, (b) ball, cylinder, and cube, (c) eight one-inch cubes, (d) eight brick-shaped blocks, (e) twenty-seven one-inch cubes, (f) twenty-seven brick-shaped blocks, (g) wooden tablets, (h) sticks or splints, (i) wire rings, half-rings, and quarter-rings, (j) pebbles, seeds, etc., (k) construction materials (wax pellets, cork cubes, etc.)
(b) Use as playthings
(1) Amusement
(2) Indirect instruction
(a) Ideas of form, measurement, and motion awakened
(b) Constructive power called into action
(4) Occupations
(a) Kinds
(1) Modeling in clay and sand
(2) Paper folding, cutting, pasting, weaving, and sewing
(3) Drawing and painting
(b) Purpose
(1) Development of constructive instinct

Introductory. The real purpose of language teaching is not to teach pupils to *talk;* it is to teach them to express their thoughts. The really fundamental thing, then, if successful work in language is to be done either in the home or in the school, is to interest the child in something, it matters comparatively little what, so that he will of his own accord be willing to make statements or ask questions. When he wants to use words, it is easy enough to teach him what words to use; if he is anxious to talk about a subject he is willing to be taught the best, most effective way to talk about it. From the first grade to the eighth, whether the work be the simple "language work" of the primary children, or the more advanced "grammar and composition," little is ever gained by forcing pupils to talk or write on subjects which are beyond their comprehension or outside their sphere of interest.

One of the greatest advances that has been made in recent years in the teaching of such subjects as language lies in this very fact; it is not so very long ago that pupils in grammar schools were assigned for their compositions such topics as "Perseverance," "Success"—abstract topics which could not, in their very nature, call up in the child any spontaneous, vigorous, individual thoughts. To a person who was trained on such composition topics, the subjects that are assigned to pupils now—such subjects as "My Happiest Christmas," "When Father Took Me Fishing"—seem almost too good to be true, just by reason of their relation to the child's life. Nor has this change sprung simply from a desire to cater to the child's likes, it has come from a real perception of the fact that only by allowing a child to talk and write of what is capable of interesting him can the school give to him that greatest of gifts in its power—the ability to use his own language easily and forcefully.

For the benefit of teachers and mothers a graded outline of work is given here, showing the development of the subject throughout the years of grammar school. With these lessons is closely connected the discussion of *Story-Telling,* which begins on page 682 of this volume. References to that discussion will be given in the course of the treatment of language. There are also many helpful suggestions to be found in the article on *Language, Methods of Teaching,* in THE NEW PRACTICAL REFERENCE LIBRARY.

First Year

Introduction. When a child starts to school he has command of a certain number of words—many more, probably, than the most of us imagine. Some of these he uses freely; some he is fairly well acquainted with, but uses seldom. Of course there is a very great difference observable in children from different types of homes; the child of intelligent, English-speaking parents will naturally have a much wider vocabulary than the child of foreign or uneducated parents. But to whichever class a child belongs, it is the object of the language work to enlarge and enrich the child's vocabulary and to make surer and more exact his use of those words he does know. Nor are these all the purposes of the language course in the early grades. Imagination should be strengthened, appreciation awakened for what he reads and hears, and a taste cultivated for what is good in literature.

In a sense, every lesson in any subject throughout the day should be a language lesson, for slovenly work in other classes may undo much that is done in the language class. An ungrammatical statement should not be allowed to pass in the number-work class nor a particularly burglesome expression in the reading class. But of course such things can be dealt with in the language class in a detailed way which is impossible in other classes.

At least the first half of the first year's work will of necessity be oral; not until the sixth month, perhaps, will the children be ready for written statements, which will then be of the very simplest. In connection with these simple written sentences the pupils may be taught the use of the capital letter at the beginning of the sentence and of the period and the question mark at the end. Farther than this formal language work cannot well go in this grade.

Conversation Exercises. The subjects which will suggest themselves to any teacher for the all-important oral exercises of the first grade are practically innumerable. The one great point to be remembered, of course, is that the topic must interest the children; and in connection with this the fact that the same thing does not interest all children. Suppose, for example, that the subject for conversation is the home—an excellent topic which might well furnish material for half a dozen or more discussions. The girls will naturally be more interested in the interior of the home; the way mother bakes cake or sets the table, or makes the bed or puts the baby to bed will lead them on to talk, once the first embarrassment is over, freely and willingly. The boys, on the other hand, will care more to discuss such subjects as a barn, r father's work, or why they do not like to take care of the lawn. At certain seasons of the year special facts of interest naturally come up in relation to the home which give variety. For instance, at Thanksgiving time both boys and girls will enjoy discussing the preparations which are being made at home, and the guests who are coming. Just before Christmas so many subjects of interest will come up that the pupils will be over-eager to discuss them; they will want to tell about the decorating that goes on at home, about the making and hiding of presents, about their suspicions as to where their own gifts are hidden, about the presents they are making for father and mother. And just such spontaneous subjects for conversation are the teacher's greatest opportunity. Of course the discussion must be kept within bounds; new words must be suggested to the children, wrong ones corrected, false grammatical forms made right. But if the teacher shows that she is interested in what the child is telling, and not just in the manner of the telling, she may slip in her corrections without making the child self-conscious.

Discussion of home affairs may easily be connected with nature study. In the fall the pupils may tell of the preparation for winter at home, of the laying in of food and fuel and warm clothing; and from that they may be led to the subject of the preparation animals make for winter. In the spring, talk of awakening life in the garden and the fields will be natural; wild flowers and tame flowers, the birds that may be seen in the home garden, the butterflies and insects that flit about the flowers are all topics about which the children will talk themselves and gladly hear the teacher talk.

Description by the pupils of places where they have been and of things they have seen stimulates imagination and trains powers of observation, and may also prove highly entertaining. Try, as far as possible, to teach the pupils to have some system in giving descriptions. Let them tell when they saw the object, where they saw it, how it looked and how it made them feel. By forming this habit, a pupil may tell a connected and comprehensive story without needless repetition and unnecessary words.

A conversational exercise in the form of a game may be effectively introduced, the teacher, as in all the conversational work, noting and correcting all faulty construction. One pupil may think of some object, and the pupils and teacher, by asking questions, may try to guess the object in question. All questions and answers should be in complete sentences. For instance, a pupil should ask, "Is it in this room?" or "Do I see it every day?" and the answer should be "No, it is not in this room," or "Yes, you see it every day."

The interweaving of stories and games is a helpful as well as an attractive feature of this work, and the following practical suggestions should prove of assistance to the teacher in this important branch of her work:

Read or tell the class simple but interesting stories, told in words of the pupils' vocabulary, and after they have become familiar with the story allow one to commence it, another taking it up where the first one stops, and continuing until several pupils have taken part in the exercise. Stories which may be effectively used in this way are to be found in the section on *Story-Telling*, beginning on page 682.

Another attractive form of language work is to let certain pupils take the parts of the different characters in the story and in original sentences tell their part. Such portions of the story as the child may not remember can be supplied by the teacher. In conducting these lessons any incorrect forms or sentences should be immediately corrected, but in such a way that the pupil will not feel self-conscious. *The Little Red Hen* and *The Three Bears* may be treated in this way.

Memory Work. The memorizing of simple poems comes under the head of language work, and can easily be made one of the most attractive parts of that work. Almost all children love the swing and rhythm of the nursery rhymes, and it is well to begin with the learning of a number of them, if the children have not already had them in kindergarten. The following selections should give teachers and mothers all of the Mother Goose rhymes they need:

Daffy-Down-Dilly has come up to town
In a yellow petticoat and a green gown.

Humpty Dumpty sat on a wall;
Humpty Dumpty had a great fall;
And all the King's horses and all the King's men
Can't put Humpty Dumpty together again.

Rock-a-bye, baby, in the tree top;
When the wind blows, the cradle will rock;
When the bough breaks, the cradle will fall;
Down will come baby, cradle and all.

Little Boy Blue, come, blow your horn;
The sheep's in the meadow, the cow's in the corn.
"Where's the little boy that looks after the sheep?"
"He's under the haystack, fast asleep."

Ding, dong, bell,
Pussy's in the well!
Who put her in?
Little Tommy Linn.
Who pulled her out?
Big John Stout.

There was an old woman who lived in a shoe;
She had so many children she didn't know what to do;
She gave them some broth without any bread;
She whipped them all soundly and put them to bed.

Little Miss Muffet
Sat on a tuffet,
Eating her curds and whey;
Along came a spider,
And sat down beside her,
And frightened Miss Muffet away.

"Pussy-cat, pussy-cat, where have you been?"
"I've been up to London to look at the queen."
"Pussy-cat, pussy-cat, what did you there?"
"I frightened a little mouse under the chair."

Little Bo-Peep has lost her sheep,
And can't tell where to find them;
Leave them alone, and they'll come home,
Wagging their tails behind them.

The north wind doth blow,
And we shall have snow,
And what will poor Robin do then?
Poor thing!
He'll sit in a barn,
And to keep himself warm
Will hide his head under his wing,
Poor thing!

Three little kittens
Lost their mittens;
And they began to cry,
"Oh! mother dear,
We really fear
That we have lost our mittens."

"Lost your mittens!
You naughty kittens!
Then you shall have no pie."

"Mee-ow, mee-ow, mee-ow."
"No; you shall have no pie."
"Mee-ow, mee-ow, mee-ow,
Mee-ow."

There was a man of our town,
And he was wondrous wise:
He jumped into a bramble bush,
And scratched out both his eyes.
And when he found his eyes were out,
With all his might and main
He jumped into another bush,
And scratched them in again.

There was an old woman, and what do you think?
She lived upon nothing but victuals and drink;
Victuals and drink were the chief of her diet,
Yet this grumbling old woman could never keep quiet.

When I was a bachelor I lived by myself,
And all the bread and cheese I got, I put upon a shelf;
The rats and the mice did lead me such a life,
That I went to London to get myself a wife.

The streets were so broad and the lanes were so narrow,
I could not get my wife home without a wheelbarrow;
The wheelbarrow broke, my wife got a fall;
Down tumbled wheelbarrow, little wife, and all.

Simple Simon met a pieman,
  Going to the fair;
Says Simple Simon to the pieman,
  "Let me taste your ware."
Says the pieman to Simple Simon,
  "Show me first your penny."
Says Simple Simon to the pieman,
  "Indeed, I have not any."
Simple Simon went a-fishing
  For to catch a whale;
All the water he had got
  Was in his mother's pail!

Old King Cole
Was a merry old soul,
And a merry old soul was he;
He called for his pipe,
And he called for his bowl,
And he called for his fiddlers three.
Every fiddler he had a fiddle,
And a very fine fiddle had he;
Twee, tweedle dee, tweedle dee,
Went the fiddlers three.
O! there's none so rare as can compare
With King Cole and his fiddlers three.

There was a crooked man, and he went a crooked mile;
He found a crooked sixpence against a crooked stile;
He bought a crooked cat, which caught a crooked mouse,
And they all lived together in a little crooked house.

I had a pony, his name was Dapple Gray;
  I lent him to a lady to ride a mile away.
She whipped him, she lashed him,
  She rode him through the mire;
I would not lend my pony now,
  For all the lady's hire.

Twinkle, twinkle, little star:
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky.

When the glorious sun is set,
When the grass with dew is wet,
Then you show your little light,
Twinkle, twinkle, all the night.

In the dark-blue sky you keep,
And often through my curtains peep;
For you never shut your eye
Till the sun is in the sky.

As your bright and tiny spark
Lights the traveler in the dark,
Though I know not what you are,
Twinkle, twinkle, little star!

After the children have learned one of these rhymes, various uses may be made of it. The simpler ones, the children may be allowed to illustrate on the board; the others they may give in prose, in their own language. This is a valuable exercise, but it should not be carried too far. For instance, in the case of a poem which has real beauty, like some of those which follow, no attempt should be made to translate into prose. The children should memorize them and should not be asked to spoil them by changing them from the beautiful form in which they were written. Of course the list of poems that follows is merely for the teacher to choose from; no first-year class could be expected to learn all of them, or even to take up all of them for study and discussion in class. Other poems may be read aloud by the teacher.

October's Bright Blue Weather

HELEN HUNT JACKSON

O suns and skies and clouds of June,
  And flowers of June together,
Ye cannot rival for one hour
  October's bright blue weather,

When loud the bumble-bee makes haste,
  Belated, thriftless vagrant,
And goldenrod is dying fast,
  And lanes with grapes are fragrant:

When gentians roll their fringes tight,
  To save them for the morning,
And chestnuts fall from satin burrs
  Without a sound of warning:

When on the ground red apples lie
In piles like jewels shining,
And redder still on old stone walls
Are leaves of woodbine twining:

When all the lovely wayside things
Their white-winged seeds are sowing,
And in the fields still green and fair,
Late aftermaths are growing:

When springs run low, and on the brooks,
In idle golden freighting,
Bright leaves sink noiseless in the hush
Of woods, for winter waiting;

O suns and skies and flowers of June,
Count all your boasts together,
Love loveth best of all the year
October's bright blue weather.

A Visit From St. Nicholas

CLEMENT C. MOORE

'Twas the night before Christmas, when all through the house
Not a creature was stirring, not even a mouse.
The stockings were hung by the chimney with care,
In hopes that St. Nicholas soon would be there.
The children were nestled all snug in their beds.
While visions of sugar-plums danced in their heads;
And Mamma in her kerchief, and I in my cap,
Had just settled our brains for a long winter's nap—
When out on the lawn there arose such a clatter
I sprang from my bed to see what was the matter,
Away to the window I flew like a flash,
Tore open the shutter, and threw up the sash
The moon on the breast of the new-fallen snow
Gave a lustre of mid-day to objects below;
When what to my wondering eyes should appear
But a miniature sleigh and eight tiny reindeer,
With a little old driver, so lively and quick,
I knew in a moment it must be St. Nick!
More rapid than eagles his coursers they came,
And he whistled and shouted and called them by name:
"Now, Dasher! now, Dancer! now, Prancer and Vixen!
On, Comet! on, Cupid! on, Donner and Blitzen!
To the top of the porch, to the top of the wall,
Now, dash away, dash away, dash away all!"
As dry leaves that before the wild hurricane fly,
When they met with an obstacle, mount to the sky.
So. up to the housetop the coursers they flew,
With a sleigh full of toys and St. Nicholas, too.
And then, in a twinkling, I heard on the roof
The prancing and pawing of each little hoof.
As I drew in my head, and was turning around,
Down the chimney St. Nicholas came with a bound:
He was dressed all in fur from his head to his foot,
And his clothes were all tarnished with ashes and soot:
A bundle of toys he had flung on his back,
And he looked like a peddler just opening his pack.
His eyes, how they twinkled! his dimples, how merry!
His cheeks were like roses, his nose like a cherry;
His droll little mouth was drawn up like a bow,
And the beard on his chin was as white as the snow.
The stump of a pipe he held tight in his teeth,
And the smoke, it encircled his head like a wreath.
He had a broad face and a little round belly
That shook, when he laughed, like a bowl full of jelly.
He was chubby and plump—a right jolly old elf,
And I laughed when I saw him, in spite of myself;
A wink of his eye, and a twist of his head,
Soon gave me to know I had nothing to dread.
He spoke not a word, but went straight to his work,
And filled all the stockings; then turned with a jerk,
And laying his finger aside of his nose,
And giving a nod, up the chimney he rose.
He sprang to his sleigh, to his team gave a whistle,
And away they all flew like the down of a thistle.
But I heard him exclaim, ere they drove out of sight,
"Happy Christmas to all, and to all a good-night."

The Wind

ROBERT LOUIS STEVENSON

I saw you toss the kites on high
And blow the birds about the sky;
And all around I heard you pass,
Like ladies' skirts across the grass—
O wind, a-blowing all day long.
O wind, that sings so loud a song!

I saw the different things you did,
But always you yourself you hid.

I felt you push, I heard you call,
I could not see yourself at all—
O wind, a-blowing all day long,
O wind, that sings so loud a song!

O you that are so strong and cold,
O blower, are you young or old?
Are you a beast of field and tree,
Or just a stronger child than me?
O wind, a-blowing all day long,
O wind, that sings so loud a song.

The Tree

BJORNSTJERNE BJORNSON

The Tree's early leaf-buds were bursting their brown:
"Shall I take them away?" said the Frost, sweeping down.
"No, leave them alone
Till the blossoms have grown,"
Prayed the Tree, while he trembled from rootlet to crown.

The Tree bore his blossoms, and all the birds sung:
"Shall I take them away?" said the Wind, as he swung.
"No, leave them alone
Till the berries have grown,"
Said the Tree, while his leaflets all quivering hung.

The Tree bore his fruit in the midsummer glow:
Said the girl, "May I gather thy berries now?"
"Yes, all thou canst see:
Take them: all are for thee,"
Said the Tree, while he bent down his laden boughs low.

Rain

ROBERT LOUIS STEVENSON

The rain is raining all around,
It falls on field and tree,
It rains on the umbrellas here,
And on the ships at sea.

The Swing

ROBERT LOUIS STEVENSON

How do you like to go up in a swing,
Up in the air so blue?
Oh, I do think it the pleasantest thing
Ever a child can do!

Up in the air and over the wall,
Till I can see so wide,
Rivers and trees and cattle and all
Over the countryside—

Till I look down on the garden green,
Down on the roof so brown—
Up in the air I go flying again,
Up in the air and down!

What Does Little Birdie Say?

ALFRED TENNYSON

What does little birdie say,
In her nest at peep of day?
"Let me fly," says little birdie,
"Mother, let me fly away."
Birdie, rest a little longer,
Till the little wings are stronger.
So she rests a little longer,
Then she flies away.

What does little baby say,
In her bed at peep of day?
Baby says, like little birdie,
"Let me rise and fly away."
Baby, sleep a little longer,
Till the little limbs are stronger.
If she sleeps a little longer
Baby, too, shall fly away.

Seven Times One

JEAN INGELOW

There's no dew left on the daisies and clover,
There's no rain left in heaven:
I've said my "seven ti[illegible]s" over and over,
Seven times one are [illegible]en.

I am old, so old I can write a letter;
My birthday lessons are done;
The lambs play always, they know no better;
They are only one times one.

O moon! in the night I have seen you sailing
And shining so round and low;
You were bright! ah, bright! but your light is failing—
You are nothing now but a bow.

You moon, have you done something wrong in heaven
That God has hidden your face?
I hope if you have you will soon be forgiven,
And shine again in your place.

O velvet bee, you're a dusty fellow,
You've powdered your legs with gold!
O brave marsh marybuds, rich and yellow,
Give me your money to hold!

O columbine, open your folded wrapper,
Where two twin turtle-doves dwell!
O cuckoopint, toll me the purple clapper
That hangs in your clear green bell!

And show me your nest with the young ones in it;
I will not steal them away;
I am old! you may trust me, linnet, linnet—
I am seven times one today.

Study of a Poem. As with the nursery rhymes, the children may find much interest in illustrating the poems. Let each child choose a line from some poem, as, for example, *October's Bright Blue Weather*, and draw on the board his idea of the picture the line gives. This little poem is full of pictures.

Of course it is absolutely necessary when children are learning or studying a poem that they shall understand it thoroughly. This does not mean that they must grasp the thought entire; a poem which will appeal very strongly to children may have shades of meaning which they cannot possibly grasp. But they should know the meaning of every word and such facts as will serve to make the poem clearer. Let us take, once more, the poem referred to in the last paragraph—*October's Bright Blue Weather*. Before the children even attempt to learn it the teacher should be sure that they can answer the following questions:

Who wrote this poem? (Information for use in reply to this question may be found by the teacher in THE NEW PRACTICAL REFERENCE LIBRARY.)

What does "rival" mean?

Which does the author like better, October or June?

What does "belated" mean? "thriftless"? "vagrant"?

Why is the bumble-bee called a "thriftless vagrant"?

What are gentians? What does the author mean by speaking of their "fringes"? Why does she speak of the fringes as "rolled tight"?

Why are chestnut-burrs called "satin"?

What is woodbine?

What are the "lovely wayside things," and what are "white-winged" seeds?

What are "aftermaths"?

What is meant by "In idle golden freighting"?

The children should be encouraged to ask questions about the poem, for often children get and keep misconceptions about some point in a poem which the teacher could never suspect.

Nonsense Verses. There are few children to whom nonsense rhymes do not appeal. The following from Edward Lear is almost certain to be a great favorite:

THE OWL AND THE PUSSY-CAT

The Owl and the Pussy-Cat went to sea
In a beautiful pea-green boat;
They took some honey, and plenty of money
Wrapped up in a five-pound note.
The Owl looked up to the stars above,
And sang to a small guitar,
"Oh, lovely Pussy! Oh, Pussy, my love!
What a beautiful Pussy you are!"

Pussy said to the Owl, "You elegant fowl!
How charmingly sweet you sing!
Oh. let us be married—too long we have tarried—
But what shall we do for a ring?"
They sailed away for a year and a day
To the land where the Bong-tree grows,
And there in a wood a piggy-wig stood
With a ring in the end of his nose.

"Dear Pig, are you willing to sell for one shilling
Your ring?" Said the piggy, "I will."
So they took it away, and were married next day
By the turkey who lives on the hill.
They dined upon mince and slices of quince,
Which they ate with a runcible spoon,
And hand in hand on the edge of the sand
They danced by the light of the moon.

Nature Studies. The teacher may find interesting material for nature stories in the department of NATURE STUDY in this volume. The articles on the *Dog*, the *Squirrel*, *Ants*, *Trees*, *Flowers*, *Birds*, have facts which may be used as the bases of the nature stories which are so fascinating to children. Many points, too, in the departments of BOTANY and ZOOLOGY may be so used.

Fables. It is perfectly natural for children to personify animals and inanimate objects, and to endow them with all sorts of human qualities. A four-year-old child had two Teddy-bears, one a small dilapidated animal, the other a beautiful big new one. The new one was neglected and the old one was carried everywhere, and when the child's mother asked the reason for his preference, he replied without hesitation, "The big Teddy never says 'Thank you,' no matter where I take him; but the little Teddy always says 'Thank you, Charles,' just as *nice*." The two playthings had to their owner characters as distinct as two human beings could have. And with this faculty so strongly developed it is natural that children should thoroughly enjoy fables. After the following fables have been read the children may be asked to reproduce them in their own language or they may be allowed to illustrate them or to act them out. Frequently children show a surprising amount of dramatic instinct in acting out these simple little stories.

The Fox and the Crow

A Fox once saw a Crow fly off with a piece of cheese in its beak and settle on a branch of a tree.

"That's for me, as I am a Fox," said Master Renard, and he walked up to the foot of the tree.

"Good-day, Mistress Crow," he cried. "How well you are looking today; how glossy your feathers; how bright your eye. I feel sure your voice must surpass that of other birds, just as your figure does; let me hear you sing, that I may call you queen of birds."

The Crow lifted up her head and began to caw her best, but the moment she opened her mouth the piece of cheese fell to the ground, only to be snapped up by Master Fox.

"That will do," said he. "That was all I wanted. For your cheese I will give you a piece of advice: Do not trust flatterers."

The Hare and the Tortoise

"O you slow one, you clumsy one, your ugly shape and plodding motions make me roar with laughter," said the Hare to the Tortoise one day as they met in the road.

"Perhaps I am ugly and do move slowly," replied the Tortoise, "but I can beat you in a race to the next river."

This made the Hare laugh more loudly than ever, and a Fox coming along stopped to see what caused the uproar. The Hare explained the joke and finally asked the Fox to hold the stakes and judge the race.

Off started the rivals, and almost in the twinkling of an eye the Hare was out of sight. Only a little cloud of dust remained to show where he had gone. The day was hot and sultry, and soon be was choking with dust.

"Pshaw!" said he; "I can rest here an hour—can even take a nap—and beat that lazy Tortoise to the brook. Suppose he does pass me, I can overtake him quickly enough."

Meanwhile the Tortoise plodded slowly along, kicking up no dust, feeling no heat. When he came up to the Hare the latter was sleeping soundly, and the Tortoise passed on slowly but surely, moving steadily, never resting a minute.

It was late afternoon when the Hare awoke and looked up and down the road. "I declare," he said; "that slow-poke has not come along yet. I'll take a few nibbles at this clover and then run back and meet him."

The clover was sweet and juicy, and it was some time before the Hare again remembered his race. When he did, he turned to the road and examined the dust. Think how surprised he was to see the trail of the Tortoise leading by him toward the brook. There was no more nibbling of lunches, no more sleeping or resting, for off down the road he ran, covering the ground in long leaps that brought him quickly to the brook, where, sitting lazily at the edge of the water, was the Tortoise, calmly waiting.

"Here, take your money," said the Fox to the Tortoise; adding as he turned to the Hare, "Steady going wins the race."

The Lion and the Mouse

Do you know the story of the Lion and the Mouse? It runs like this:

One day a huge Lion lay sleeping soundly in the shade of a great tree. His strong legs were stretched out limply on the ground, and his shaggy head and powerful jaws looked very beautiful in repose, for the wicked teeth were covered and the fierce eyes closed. Two little Mice, seeing him there, began to play about him, and finally one of them, much braver than the other, ran over the Lion's head, through his tawny mane and beneath his great fore paw.

The Lion's rest was nearly over, and the little feet of the Mouse tickled the huge beast into wakefulness. Opening one eye, he spied the Mouse under his paw, and closed his big toes over his trembling prisoner.

"What are you doing here, you miserable little Mouse?" said the Lion in a terrible roar. "Why do you disturb my noonday nap in the shade? I'll break every bone in your ugly little body."

Down came the big toes, out sprang the awful claws, just as they do on the cat's foot when she dreams of hunting. The Mouse thought surely his last hour had come, and he cried as loud as he could in his weak, trembling voice:

"O Mr. Lion, spare me! spare me! I didn't mean to disturb you, truly I didn't. You see, I was just playing, and your mane was so soft and beautiful, I couldn't keep out of it, and under your paw was just the place to hide, so here I came. I didn't mean any harm—I didn't think you'd care, Mr. Lion. Don't kill me this time. I'll never, never do it again."

"Well, see that you don't," growled the Lion. "Killing you would be small business for me, anyhow."

It was not many days after this that the Lion, while hunting near by, was caught in a net which some hunters had spread for him. He struggled fiercely and roared in anger, but the more he rolled about and the harder he kicked and pawed, the more closely the net clung to him, till at last, weary with fighting, he lay bound and helpless, an easy prey for the hunters when they should return.

The Mouse which the Lion had spared lived in a little round nest of grass not far from where the Lion was caught. He heard the noise of the struggle and sat at home with a beating heart, afraid to venture out of doors while such a furious combat was going on. When the Lion grew quiet, however, the Mouse stole out, and soon saw what was the matter.

"O Mr. Lion," he said, "you are the very Mr. Lion that let me go that other day, aren't you? And now the hunters will kill you if you can't get away, won't they? I'll help you."

"What can you do, you little mite?" growled the Lion. "Better run away yourself, or when the hunters come for me they'll step on you."

"O, I can help. I can gnaw the ropes in two. I'd like to do it," said the mouse. "Just you keep still till I tell you to move."

So the Mouse began to gnaw on the big ropes. It was a hard task, and his lips grew sore and his sharp teeth ached, but he kept on bravely till one after another the ropes gave way and the King of the Woods was almost free."

"Wait just a few minutes more," said the Mouse, as he paused to rest his little jaws. "Don't jump up till I get out of the way. I'll tell you when."

In a little while the last rope was cut in two, and the Mouse, scrambling down from the Lion's big head, called out:

"Now jump up, Mr. Lion; you're free. Aren't you glad you didn't kill me the other day?"

The big fellow stood up on his feet, shook himself a few times, stretched his aching limbs washed his face and walked away. But just as he was going he looked back over his shoulder and sang out, "Little friends are great friends."

The Mice and the Cat

A gentleman once owned a Cat that was a very fine mouser. She hunted so much that after a time she had caught and killed nearly all the Mice in the gentleman's house. The remaining Mice were very much frightened and called a council to see what could be done. They met secretly in their hall behind the coal-bin and locked the doors carefully before they began to talk. Many plans were proposed and discussed, but the Mice could agree on nothing.

Finally a dapper young Mouse arose and said: "Mr. President, I wish to propose a plan. It is so novel and so excellent that I am certain every one of you will approve it. A little silver bell must be hung about the Cat's neck. Then every step she takes will make the bell tinkle, and we shall have warning in time to run to our holes before she comes too close! Isn't that a perfect plan? We can then live in safety and happiness in spite of this wonderful Cat."

The young Mouse took his seat, smiling with an air of complacent pride, and from the other Mice came the sound of lively applause.

"Mr. President and Fellow Mice," interrupted an old gray-whiskered Mouse who rose from the back of the hall and looked his companions over with a merry twinkle in his eye, "the plan proposed by the last speaker is indeed an admirable one, but I fear there is one slight drawback to it. The honorable gentleman has not told us who is to hang the bell around the Cat's neck."

Pictures. Children of the first grade are not too young to begin to take an interest in pictures. Murillo's *Melon Eaters*, opposite page 636 of this volume, is a picture which will appeal to children; use this and others, and have the children tell stories about what they see in the pictures. Such exercises strengthen the mental faculties.

Second Year

Introduction. The work of the second grade is much like that of the first, of which it really forms but a continuation. There is, however, a little more emphasis placed on written work than was possible in the first grade. But it must not be forgotten that the chief thing is still the oral work, and the teacher should always be certain that the pupils can tell things before they are allowed to write them.

Written Work. As an illustration of the way in which written work may be presented in this class, let us take a simple subject—the orange, for example. Let each child, after the topic has been discussed in class, hand in a paper on which are written five or six sentences describing the appearance of the orange. These sentences may be somewhat as follows:

The orange is pretty.
The orange is round.
The orange is yellow.
The skin of the orange is rough.
The skin of the orange is shiny.

The arrangement, form and spelling of the words are criticized, and the papers are handed back for rewriting. After further discussion of the orange, its taste, its uses, the places it grows, other papers similar to the first may be written, dealing with these other points. After all the groups have been corrected, they may be combined, but no attempt should be made in this grade to have the children produce anything like formal compositions.

Formal Language Work. Then, too, a little more attention is given in this grade to the formal side of language work, though perhaps the work is even yet too elementary to deserve that name. Let the pupils, after reading a paragraph in their readers, pick out words with "a" before them, and words with "an" before them. Explain to them the difference and write on the board exercises like the following, asking the children to fill in the blanks:

I have ...... apple.
John has ...... dog.
Have you ...... aunt?
I have ...... book and ...... ink well.
Mary got...... doll and Frank got........engine.

The use of capital letters to begin sentences and of the simplest marks of punctuation, begun in the first grade, should be continued in this, so that the pupils feel perfectly acquainted with the rules.

The use of the singular and plural forms of verbs and of nouns may be introduced in this grade. The children will readily grasp the difference between singular and plural in the regular forms, and irregular forms should not be introduced until later.

Nature Study. The language work can again be combined profitably with the nature-study work, and flowers which are brought to school by the pupils can well be used as a basis. Of course the early lessons should deal with the simpler flowers—the violet, the wild rose, the buttercup, the daisy. Point out the various parts of the flower and describe their uses, in so far as the pupils may be expected to understand them. When the children have become familiar with the flowers, see how many sentences they can write descriptive of each one.

Conversation Exercises. As in the first grade, the emphasis is still on the oral expression of ideas, but the topics should of course be varied. Interesting lessons, for example, may be drawn from the lives of different races of people. The teacher, of course, will have to give most of this material to the children, they being called on to reproduce parts of it for her. THE NEW PRACTICAL REFERENCE LIBRARY contains many articles of which the teacher may make excellent use in preparing such material. One lesson could be given on the *Cave Dwellers*, while the articles on *Cliff Dwellers*, *Eskimo* and *Indians* should form the basis for several lessons each. After the pupils have become familiar with several of these topics, call on some child to say or to write on the board sentences descriptive of some one of them, the other children to guess of what he is thinking. If, for instance, the child chosen says, "I live in a hut. I eat fat food. I wear fur clothes. I ride on a sled," the other children should have no difficulty in guessing "Eskimo."

Acting Stories. In this grade, as in the first, much good work may be done on the basis of stories told by the teacher. A story is read or told and the children are asked to reproduce it as nearly as possible. When they have gone over it often enough so that they are fairly familiar with it, but not so often that it has lost its charm for them, they should be allowed to dramatize it. The teacher should offer them as little help as possible in this dramatization; the children themselves should arrange the dialogue and work out the scenes. The result may not be as attractive as it would be if the teacher managed the affair, but it will be far more helpful to the children. There are a number of stories in the department of *Story-Telling* which will lend themselves very well to this treatment. *The Ugly Duckling*, for instance, has about all the good points that any story could have. It is absorbingly interesting to children; it has a good moral which is not too plainly pointed out; it has plenty of dialogue, and offers opportunity for the making up of more; it has a large number of characters, all of whom have distinct, interesting personalities; it divides itself readily into scenes.

The first scene might be the farmyard, with the mother duck, the family of little ducks, the old Spanish duck, the turkey-cock, and other fowls. In the second scene, that in the marsh, will appear the ugly duckling, the wild ducks, the two wild geese, the hunters and the dog. The old woman's cottage will give the third scene, a very interesting one, in which appear the duckling, the old woman, the hen and the cat. Some of the children will have a chance to show any real dramatic instinct which they may possess in this scene. In the fourth scene, the last one, will appear the swan-duckling, the other swans, and the children. The teacher should have talked the story over with the children before it is acted out so that she feels certain they appreciate the outstanding features of each character.

The Wolf and the Seven Kids will also be a good story for the children to play. *Rhoecus*, while a good story to tell, is not quite so well adapted to dramatization, as it has few characters and little action.

Hiawatha. Much of the work of this year may well deal with *Hiawatha*; there is no poem or story which the children enjoy more if it is presented rightly. The reproduction of the story by the children, the dramatization of certain scenes, the memorizing of specially fine passages should all form part of the work. The poem should not, of course, simply be taken up from beginning to end in its order; some parts are obviously more simple than others, and should be taken first. The story of Hiawatha's childhood, given in Chapter III, verse 64 to the end, is the best portion with which to begin. As in all lessons on *Hiawatha*, the teacher should first tell the story simply but fully in prose; then she should read the passage as understandingly and as musically as possible. After they have got the swing of the lines, the children will be glad to learn parts of the passage. By dividing the work up, each child learning a part, the whole passage may be memorized and given, each child speaking in his turn.

For the dramatic part of the work on this passage, a dialogue may be arranged between Hiawatha and Nokomis about all the wonderful things the child sees about him. The dialogue will be about as follows:

Hiawatha sits and sings:

"Wah-wah-taysee, little fire-fly,
Little, flitting, white-fire insect,
Little, dancing, white-fire creature,
Light me with your little candle
Ere upon my bed I lay me,
Ere in sleep I close my eyelids!"

Hiawatha (glancing over his shoulder at the moon): What is that, Nokomis—what are all those flecks and shadows on the brightness?

Nokomis:

"Once a warrior, very angry,
Seized his grandmother, and threw her
Up into the sky at midnight;
Right against the moon he threw her;
'Tis her body that you see there."

Hiawatha (pointing to the rainbow in the east): What is that, Nokomis? What are all those colors stretched across the heaven?

Nokomis:

"'Tis the heaven of flowers you see there.
All the wild flowers of the forest,
All the lilies of the prairie,
When on earth they fade and perish,
Blossom in that heaven above us."

Hiawatha (listening in fright to the owls): What, O what is that, Nokomis?

Nokomis:

"That is but the owl and owlet,
Talking in their native language,
Talking, scolding at each other."

The owl loves the owlet and takes good care of it; when I sang you to sleep when you were a fretful baby in your linden cradle, did I not sing

"Ewa-yea! my little owlet!
Who is this, that lights the wigwam?
With his great eyes lights the wigwam?
Ewa-yea! my little owlet!"

The lines which deal with little Hiawatha's hunting may also be acted out, one child being Hiawatha and the others the various wild animals.

The poem of *Hiawatha* is too long to be given here. Probably there are few schoolrooms where a copy of it is not to be found; in case, however, the school library does not contain the poem, it may be secured in very cheap but satisfactory form from any dealer in school books.

Memory Poems. The children in this grade may of course be expected to do more work in memorizing than those of the first grade. In every school there will be found children who are eager to "learn by heart" and who do it very easily; others seem to have to be driven to it. But there is nothing that so helps the memory as learning things that are worth while and may be reviewed occasionally, and no child should be permitted to shirk all work of memorizing poems. Those who wish to, of course, may be allowed to learn more than the required number. The following selections will be found well adapted to second-year children:

Where Go The Boats?

ROBERT LOUIS STEVENSON

Dark brown is the river,
Golden is the sand.
It flows along forever,
With trees on either hand.

Green leaves a-floating,
Castles of the foam,
Boats of mine a-boating—
Where will all come home?

On goes the river
And out past the mill,
Away down the valley,
Away down the hill.

Away down the river,
A hundred miles or more,
Other little children
Shall bring my boats ashore.

Autumn Fires

ROBERT LOUIS STEVENSON

In the other gardens
And all up the vale,
From the autumn bonfires
See the smoke trail!

Pleasant summer over
And all the summer flowers,
The red fire blazes,
And the grey smoke towers.

Sing a song of seasons!
Something bright in all!
Flowers in the summer,
Fires in the fall!

While Shepherds Watched

While shepherds watched their flocks by night,
All seated on the ground,
The angel of the Lord came down
And glory shone around.

"Fear not!" said he, for mighty dread
Had seized their troubled mind;
"Glad tidings of great joy I bring
To you and all mankind:

"To you in David's town this day
Is born of David's line
A Savior who is Christ the Lord,
And this shall be the sign:

"The heavenly babe ye there shall find
To human view displayed
All meanly wrapped in swathing-bands
And in a manger laid."

Thus spake the seraph; and forthwith
Appeared a shining throng
Of angels praising Christ the Lord,
Who thus addressed their song:

"All glory be to God on high,
And to the earth be peace;
Goodwill henceforth from heaven to men
Begin and never cease."

The Day Is Done

HENRY W. LONGFELLOW

The day is done, and the darkness
Falls from the wings of Night,
As a feather is wafted downward
From an eagle in his flight.

I see the lights of the village
Gleam through the rain and the mist,
And a feeling of sadness comes o'er me
That my soul cannot resist:

A feeling of sadness and longing,
That is not akin to pain,
And resembles sorrow only
As the mist resembles rain.

Come, read to me some poem,
Some simple and heartfelt lay,
That shall soothe this restless feeling,
And banish the thoughts of day.

Not from the grand old masters,
Not from the bards sublime,
Whose distant footsteps echo
Through the corridors of Time.

For, like strains of martial music,
Their mighty thoughts suggest
Life's endless toil and endeavor;
And tonight I long for rest.

Read from some humbler poet,
Whose songs gushed from his heart,
As showers from the clouds of summer,
Or tears from the eyelids start;

Who, through long days of labor,
And nights devoid of ease,

Still heard in his soul the music
    Of wonderful melodies.

Such songs have power to quiet
    The restless pulse of care,
And come like the benediction
    That follows after prayer.

Then read from the treasured volume
    The poem of thy choice,
And lend to the rhyme of the poet
    The beauty of thy voice.

And the night shall be filled with music,
    And the cares that infest the day
Shall fold their tents, like the Arabs,
    And as silently steal away.

Windy Nights
ROBERT LOUIS STEVENSON

Whenever the moon and stars are set,
Whenever the wind is high,
All night long, through the dark and wet,
A man goes riding by.
Late at night when the fires are out,
Why does he gallop and gallop about?

Whenever the trees are crying aloud
And ships are tossed at sea,
By on the highway, low and loud,
By at the gallop goes he.
By at the gallop he goes, and then
By he come back at a gallop again.

The Brown Thrush
LUCY LARCOM

There's a merry brown thrush sitting up in a tree;
    "He's singing to me! He's singing to me!"
And what does he say, little girl, little boy?
    "Oh, the world's running over with joy!
        Don't you hear? Don't you see?
        Hush! look! In my tree
        I'm as happy as happy can be!"

And the brown thrush keeps singing, "A nest do
        you see,
    And five eggs hid by me in the juniper tree?
Don't meddle! don't touch! little girl, little boy,
    Or the world will lose some of its joy!
        Now I'm glad! now I'm free!
        And I always shall be,
        If you never bring sorrow to me."

So the merry brown thrush sings away in the tree,
    To you and to me, to you and to me;

And he sings all the day, little girl, little boy,
    "Oh, the world's running over with joy!
        But long it won't be,
        Don't you know? Don't you see?
        Unless we're as good as can be."

Robert of Lincoln
WILLIAM CULLEN BRYANT

Merrily swinging on brier and weed,
    Near to the nest of his little dame,
Over the mountain-side or mead,
    Robert of Lincoln is telling his name:
        Bob-o'-link, bob-o'-link,
        Spink, spank, spink;
Snug and safe in this nest of ours,
Hidden among the summer flowers.
            Chee, chee, chee.

Robert of Lincoln is gayly drest,
    Wearing a bright black wedding-coat;
White are his shoulders and white his crest,
    Hear him call in his merry note:
        Bob-o'-link, bob-o'-link,
        Spink, spank, spink;
Look, what a nice new coat is mine,
Sure there was never a bird so fine.
            Chee, chee, chee.

Robert of Lincoln's Quaker wife,
    Pretty and quiet, with plain brown wings,
Passing at home a patient life,
    Broods in the grass while her husband sings:
        Bob-o'-link, bob-o'-link,
        Spink, spank, spink;
Brood, kind creature; you need not fear
Thieves and robbers while I am here.
            Chee, chee, chee.

Modest and shy as a nun is she;
    One weak chirp is her only note.
Braggart and prince of braggarts is he,
    Pouring boasts from his little throat:
        Bob-o'-link, bob-o'-link,
        Spink, spank, spink;
Never was I afraid of man:
Catch me, cowardly knaves, if you can!
            Chee, chee, chee.

Six white eggs on a bed of hay,
    Flecked with purple, a pretty sight!
There as the mother sits all day,
    Robert is singing with all his might:
        Bob-o'-link, bob-o'-link,
        Spink, spank, spink;
Nice good wife, that never goes out,

Keeping house while I frolic about.
Chee, chee, chee.

Soon as the little ones chip the shell
Six little mouths are open for food;
Robert of Lincoln bestirs him well,
Gathering seed for the hungry brood.
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
This new life is likely to be
Hard for a gay young fellow like me.
Chee, chee, chee.

Robert of Lincoln at length is made
Sober with work, and silent with care;
Off is his holiday garment laid,
Half forgotten that merry air:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Nobody knows but my mate and I
Where our nest and our nestlings lie.
Chee, chee, chee.

Summer wanes; the children are grown;
Fun and frolic no more he knows;
Robert of Lincoln's a humdrum crone;
Off he flies, and we sing as he goes:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
When you can pipe that merry old strain,
Robert of Lincoln, come back again.
Chee, chee, chee.

Old Gaelic Lullaby

Hush! the waves are rolling in,
White with foam, white with foam;
Father toils amid the din;
But baby sleeps at home.

Hush! the winds roar hoarse and deep—
On they come, on they come!
Brother seeks the wandering sheep;
But baby sleeps at home.

Hush! the rain sweeps o'er the knowes,
Where they roam, where they roam;
Sister goes to seek the cows;
But baby sleeps at home.

A good nonsense poem for the children of this grade is from *Through the Looking Glass*, by Lewis Carroll.

The Walrus and the Carpenter

The sun was shining on the sea,
Shining with all his might:
He did his very best to make
The billows smooth and bright—
And this was odd, because it was
The middle of the night.

The moon was shining sulkily,
Because she thought the sun
Had got no business to be there
After the day was done—
"It's very rude of him," she said,
"To come and spoil the fun!"

The sea was wet as wet could be,
The sands were dry as dry.
You could not see a cloud, because
No cloud was in the sky:
No birds were flying overhead—
There were no birds to fly.

The Walrus and the Carpenter
Were walking close at hand;
They wept like anything to see
Such quantities of sand:
"If this were only cleared away,"
They said, "it would be grand!"

"If seven maids with seven mops
Swept it for half a year,
Do you suppose," the Walrus said,
"That they could get it clear?"
"I doubt it," said the Carpenter,
And shed a bitter tear.

"O Oysters, come and walk with us!"
The Walrus did beseech.
"A pleasant walk, a pleasant talk,
Along the briny beach;
We cannot do with more than four,
To give a hand to each."

The eldest Oyster looked at him,
But never a word he said:
The eldest Oyster winked his eye,
And shook his heavy head—
Meaning to say he did not choose
To leave the oyster bed.

But four young Oysters hurried up,
All eager for the treat:
Their coats were brushed, their faces washed,
Their shoes were clean and neat—

And this was odd, because, you know,
They hadn't any feet.

Four other Oysters followed them,
And yet another four;
And thick and fast they came at last,
And more, and more, and more—
All hopping through the frothy waves,
And scrambling to the shore.

The Walrus and the Carpenter
Walked on a mile or so,
And then they rested on a rock,
Conveniently low:
And all the little Oysters stood
And waited in a row.

"The time has come," the Walrus said,
"To talk of many things;
Of shoes—and ships—and sealing wax—
Of cabbages—and kings—
And why the sea is boiling hot—
And whether pigs have wings."

"But wait a bit," the Oysters cried,
"Before we have our chat;
For some of us are out of breath,
And all of us are fat!"
"No hurry!" said the Carpenter.
They thanked him much for that.

"A loaf of bread," the Walrus said,
"Is what we chiefly need:
Pepper and vinegar besides
Are very good indeed—
Now if you're ready, Oysters dear,
We can begin to feed."

"But not on us!" the Oysters cried,
Turning a little blue.
"After such kindness, that would be
A dismal thing to do!"
"The night is fine," the Walrus said,
"Do you admit the view?

"It was so kind of you to come!
And you are very nice!"
The Carpenter said nothing but
"Cut us another slice:
I wish you were not quite so deaf—
I've had to ask you twice!"

"It seems a shame," the Walrus said,
"To play them such a trick,
After we've brought them out so far,
And made them trot so quick!"

The Carpenter said nothing but
"The butter's spread too thick!"

"I weep for you," the Walrus said:
"I deeply sympathize."
With sobs and tears he sorted out
Those of the largest size,
Holding his pocket-handkerchief
Before his streaming eyes.

'Oh, Oysters," said the Carpenter,
"You've had a pleasant run!
Shall we be trotting home again?"
But answer came there none—
And this was scarcely odd, because
They'd eaten every one.

Almost all of the poems which are given here and in the first-year work are by very well-known poets, sketches of whom appear in THE NEW PRACTICAL REFERENCE LIBRARY. Children will have more interest in a poem if they are taught just a little, the very simplest facts, about its author, and a teacher can readily provide herself with such facts by reference to the other volumes of this set.

Type Study of a Poem. As a type of the way a poem may be studied in this year, let us take Bryant's *Robert of Lincoln.* Of course all that is given here cannot be given to the children in one lesson, or in two; the teacher is the best judge of the way in which the material should be divided. When there is a possibility that the children may be able to answer, questions should be asked, even, in some instances, questions which suggest the answers. Much of the information, however, the teacher will have to give the pupils.

After reading the poem aloud, the teacher may ask the children, "Don't you think you would like to know something about a man who could write such a bright, lively poem about a little bird?" and she may give them, in as interesting a manner as possible, some such brief biography as follows:

The man who wrote this poem was born in a little log house, over a hundred years ago. Children in those days did not always have things made as pleasant for them as children do now, their fathers and mothers loved them just as much, but they did not show it in the same way. They were more strict and stern, and seldom thought of playing with the children or planning games for them. And they were very ready to punish, taking down the hundle of birch sticks that hung behind the stove. Little William Cullen Bryant must often have been punished in this way, though he was by no means a bad boy. He was rather a quiet child, but I think we should have liked him, for he tells, as if he really enjoyed it, about the exciting times they used to have building snow forts and fighting over them. His accounts of their battles, with their heaps of snowballs and their attacks and retreats, sound very much like the stories boys of these days might tell their fathers and mothers when they go home after a winter day's play.

But Bryant did other things besides playing. He studied hard, and before he got to the age when most boys stop playing he had written some poems that grown people were very glad to read. When he grew up he wrote many, many poems, most of which you will have to wait until you are older to enjoy. This little poem, however, you can understand now; and if you hear the grown people talking of William Cullen Bryant you may feel that you know him, too.

The name of the bird that Bryant is talking about is the bobolink, but the poet pretends that "bobolink" is just the bird's nickname for itself, and that its real name is Robert of Lincoln.

Did you ever see a bobolink? What color is he? If you do not know, listen while I read the second stanza again.

Did you ever see a Quaker in the plain drab clothes that the Quakers wear? What does the poet mean by speaking of the bobolink's "Quaker wife"? Are the mother-birds usually as brightly dressed as the father-birds?

Do you think the bobolink is good to his mate? Does he fly away to have a good time, or does he stay by the nest? Is the nest built in a tree or on the ground? How do you know?

How many eggs are in the nest? What color are they? Who are the "thieves and robbers" from whom Robert of Lincoln promises to protect his mate? Do you think perhaps they may be thoughtless boys and girls? Do you think he could really protect her? Is this why the poet calls him "prince of braggarts"?

When the little birds come is Robert of Lincoln a good father? Why does Bryant say that his "holiday garment" is laid off and his song "half forgotten"? (The bird loses its brilliant plumage after the nesting season is over, and like most birds, rarely sings in the autumn.)

The bobolink flies to the southland, as do so many of our summer birds, before the coming of winter, and the poet begs him to come back when he can sing his cheerful song again.

Let us see whether there are words in this poem which we do not understand or which we should not be likely to use. I think we shall find very few. What does "dame" mean in the first stanza? What does "mead" mean? "crest"? "brood"? "braggart"? "flecked"? "bestirs"? "wanes"? "humdrum crone"?

Sometimes poets use many words in their poems which are not often used in ordinary every-day talk; but our poet has used very few such, and that is one reason why this is a good poem for children.

If you ever hear a bobolink, listen to him carefully and see whether he really says:

"Bob-o'-link, bob-o'-link,
Spink, spank, spink."

Fables. A child never really gets too old to enjoy a fable; as soon as he has outgrown liking it for one reason he begins to like it for another. But a second-grade child is still at the point when he likes it in the most childish way—just as an imaginative story. The teacher should take care not to point out the moral too specifically; if the tale is well told, the child will catch the moral, never fear.

The Goose That Laid the Golden Eggs

Once upon a time there lived a man who had a handsome Goose that every day laid a large golden egg. The man thought the Goose must have much gold inside of her, and so one day he wrung her neck, and found that she was just like any other Goose. Thinking to find wealth, he lost the little he had.

The Shepherd Boy and the Wolves

In the summer time the shepherds used to drive their sheep out into the mountains some distance away from their homes, where the grass was green and tender and the sheep fattened rapidly.

But there was always some danger in this, for the wolves hid in the mountains and often came down and carried off the little lambs, and even killed the old sheep themselves. So the shepherds never thought it was safe to leave the flocks alone, and some young lad was always chosen to watch them during the day, while the shepherds worked on the little fields they cultivated near at hand. It wasn't a hard task for the boy unless the wolves came in sight, and then he was so near that by calling loudly he could bring the shepherds to his aid.

One lad they sent out to do this work was a mischievous little chap, who thought it would be great sport to bring the shepherds about him even if no wolf was in sight. Accordingly, he ran up the side of a high rock, shouting at the top of his voice "Wolf! Wolf!" and swinging his arms wildly about.

The shepherds saw and heard him and came running to the spot, where they found nothing but the lively boy, laughing merrily. They reproved him for his mischief and went back to their work.

In a few days they had forgotten all about his pranks, and when they saw him again upon the rock, swinging his arms and calling "Wolf! Wolf!" they ran a second time, with their hoes and spades in their hands to beat off the attack. Once more they found that the sheep were perfectly safe, and that no wolves were in sight, and the boy laughed noisily at their surprise. This time they were very angry and scolded the boy roundly for his deception.

More days passed, and nothing happened; but then, as the boy was lying idly in the warm sun, he saw the sheep huddle together in alarm and finally scamper off over the hill with wolves in close pursuit.

Frightened almost out of his wits at the very real danger, the boy climbed again upon the rock, shrieking "Wolf! Wolf!" at the top of his voice, waving his hands, stamping, and swinging his hat as though his very life depended on it.

The shepherds looked up and saw the boy, but returned to their work. They had been twice fooled and were not going to risk the chance again. No matter how loudly the boy called or how much he wept, they continued with their work, paying no further attention to what the lad said, even when he ran to them and assured them that he was telling the truth.

When the sheep did not return that night, the shepherds went out to find them, but though they hunted long and earnestly they could discover nothing but torn and bleeding bodies, for every sheep had been killed.

Naturally they laid all the blame on the shoulders of the boy.

The Wolf and the Lamb

As a Wolf was lapping at the head of a running brook, he spied a stray Lamb paddling at some distance down the stream. Having made up his mind to seize her, he bethought himself how he might justify his violence.

"Villain," said he, running up to her, "how dare you muddle the water that I am drinking?"

"Indeed," said the Lamb humbly, "I do not see how I can disturb the water, since it runs from you to me, not from me to you."

"Be that as it may," replied the Wolf, "it was but a year ago that you called me names."

"Oh, Sir!" said the Lamb, trembling, "a year ago I was not born."

"Well," replied the Wolf, "if it was not you, it was your father, and that is all the same; but it is no use trying to argue with me." And he fell upon the Lamb and tore her to pieces.

Picture Study. Every schoolroom should have pictures, good pictures, even if cheap, for its walls, or at least in an unframed state for use in classes. Types of the pictures which may be studied with a class of this age are to be found opposite page 626 of this volume. Such pictures may be treated so that the children will feel no interest in them and will actually dislike them, or they may be treated so that the children will love them all their lives and find in them beautiful lessons.

Third Year

Introduction. There is a little more of a change between the third year and the second year than there was between the second and the first. Much of the second-year work is continued, but increased emphasis is placed on certain points that were passed over lightly in the earlier years. The children have reached the point when they can really read for their own pleasure, and where they see that writing is something more than an exercise in the full-arm movement. Composition work thus becomes very much more important and will be dealt with more fully in the outline for this year's work.

Correction of Errors. Of course even in the lower grades the teacher corrects errors in the speech or the written work of the pupils; but the emphasis must be so strong on the securing of spontaneous expression of thought by the children that the work of correcting errors can be at the best but incidental. Each correction made stands by itself—little attempt can be made at enforcing rules of speech. But in the third grade conditions are a little different. The children, if their work and the teacher's work has been well done in the lower grades, have learned to express themselves with some degree of freedom, and there is less danger of frightening a shy child into not-to-be-broken silence by the correction of a verbal error. This does not mean that rules can be taught to children at this time; that generalizations may be made to which they must make their speech conform. But it does mean that right forms can be held up before them so persistently that they will themselves make the generalizations.

Every teacher has perhaps wondered whether if children never heard mistakes in grammar their own speech would be free from them. This is a question which will probably never be settled; but it is certain that the kind of speech they hear at home and at school and on the street has everything to do with what a child's language is to be. Thus some children speak comparatively correctly, while others seem scarcely able to utter a sentence without making some mistake. Moreover, common mistakes differ in different parts of the country and in different parts of the city, so that the teacher has always to adapt her work of this nature to her own pupils.

There are a few general rules which may be laid down in regard to this work. First, it should be systematic. Attention should not shift rapidly from one mistake to another but should center on one point until it is certain that the children have that point clearly in mind. One or more common errors should be covered each month.

Second, pupils should first of all be made to see that they do commit the error before they are asked to spend time in correcting it.

Third, technical rules should not be brought into the discussion; third-year pupils are too young to feel strongly the force of a grammatical rule. Moreover, they will easily establish the rule for themselves if they are thoroughly drilled in specific instances.

Fourth, attention should not often be called to the wrong form. It is not wise with children of the third grade to write on the board such a sentence as "I done it," and ask what is wrong with it. The mere seeing of the wrong form has a tendency to impress it on their minds.

Perhaps the simplest way to deal with the matter is for the teacher to write on the board sentences, leaving blanks for the doubtful forms. These blanks the pupils may be asked to fill in. The sentences should be numerous enough for the children to perceive from them that the right form does not vary. Later, the children may be asked to write independently sentences containing the correct forms.

A good example with which to begin drill in the correction of errors is the distinction between *teach* and *learn*. Most pupils may be trusted to confound them. Let the first sentences be as simple as possible:

1. I .... my lesson.
2. My sister .... school.
3. John .... to skate.
4. His older brother .... him.
5. I .... my lesson and .... it to my little sister.
6. If my teacher did not .... me, I could not .... so well.
7. I must .... to read before I can .... anybody else.

These are merely samples; many more sentences will be needed in a typical drill. Nor is it enough that the children's eyes be led to see the difference between the correct and the incorrect forms; their ears must recognize it too. That is, the sentences should all be read aloud, both by the teacher and by the pupils.

The use of *their* and *there*, and of *to*, *too* and *two* furnishes material for some good work. Such sentences as the following may be used:

1. The book is .... on the table.
2. Who put it ....?
3. John and Frank lost .... hats.
4. .... mothers may scold them.
5. All the children may put .... books .... on the table.
6. .... is a flower in my vase.
7. Do you know where .... house is?
8. No, I have never been ....
9. I have .... apples.
10. I will give them .... you.
11. It is .... hot in this room.
12. This candy is .... sweet.
13. .... boys have gone .... the store.
14. What have they gone .... get?
15. They have gone .... get .... loaves of bread.
16. Will .... verses be .... much for you .... learn?
17. No, it will not be .... much.

Saw and *seen* and *did* and *done* trouble many children. A child is almost as likely to say "I *seen* it" as "I *saw* it," so that opportunity for introducing the drill will not be difficult to find.

Of course, the correction should not be made so that it will embarrass unnecessarily any child. *Sit* and *set* are also stumbling-blocks—and sometimes for others than children. It may be necessary in this instance for the teacher to write on the board a number of correct sentences so that the children may perceive the distinction:

1. I *set* my doll in the chair.
2. She *sits* there quietly.
3. The farmer *sets* the hen on the eggs.
4. The hen *sits* on the eggs.
5. The dress *sits* well.

Lay and *lie* cannot very well be taken up at this time, since the fact that *lay* is the past tense of *lie* complicates matters.

The personal pronouns offer opportunity for very helpful drill; the correct form and the proper position may both be emphasized. Of course the difficulty as to the proper form comes largely when the pronoun is used with a noun, so that the *case* force is not felt. If simple sentences in which the pronoun stands alone are given first, there will be less danger of error.

First person:

1. .... am going skating.
2. Tom and .... went skating.
3. She gave .... an apple.
4. She gave Mary and .... an apple.
5. Father wrote a letter to ....
6. Father wrote letters to Tom and ....
7. Jane and .... were sent home.
8. He sent Jane and .... home.

Third person (masculine or feminine):

1. .... and I are friends.
2. I gave the apple to ....
3. They asked .... and me.
4. John's teacher likes ....
5. Our teacher likes .... and me.

If children are taught when they are young that *awful* has a distinct meaning of its own, and has none of the sense of *very*, the use of it for *very* will not be so much a matter of course to them when they grow up. Make them feel the bigness of the word, and the fact that at times it is the only word which will express an idea, and show them how it is wasted by being made to do duty for *very*.

The above will show the kind of work that may be done in the third grade toward the correction of common errors. Every teacher will encounter in her own schoolroom others that may serve as the basis for similar exercises.

Composition Work. Besides such exercises as those outlined above, and the conversational exercises similar to those in the two lower grades which should be continued in this, composition work of a more or less formal character is now taken up. This work should be based on the subjects discussed in the oral lessons, for children in the third grade should not be asked to write on any subject until the teacher is sure that they have a thorough understanding of it. And this knowledge should extend not only to the content, but in a measure to the form as well. That is, the statements of which the composition is composed should not be set down hit or miss, with no obvious connection with what precedes or follows. Related sentences should be together. To accomplish this, an outline should be drawn up before the pupils begin to write. Of course the teacher may make the outline and put it on the board, allowing the children to fill it out, but this is not a particularly helpful method. A far more valuable exercise is to have the pupils give suggestions as to points that should be treated, which the teacher may then arrange in proper order.

Suppose, for instance, that the subject chosen for a composition is "My Last Birthday." When the children are asked to talk on the subject, such statements as the following will probably be forthcoming:

"It was in the summer." "I got a doll." "I had a party." "I got a bicycle." "We had a picnic." "I had on a new pink dress." "There were candles on my cake." "Ten children came to my party." "I was eight years old." "We had pink and white candies and frosted cookies." "The children brought me presents." "There were red roses on the table." "I was nine years old." "I went to my grandmother's house."

After this jumble of statements has been set down, the teacher may put them in order before the pupils' eyes. First will come the "when" statements, then the "where" statements, then the "what" statements, until the outline appears in the form of a series of questions, somewhat as follows:

When was your birthday? Where did you spend it? Who was with you? What presents did you get? What did you do? What did you have to eat?

If the children write on some such outline, they will simply have the feeling that they are answering in a natural way natural questions. The unpleasantness that always attaches to a formal "composition" will be absent.

Every teacher will find constantly in her work excellent topics for compositions, but a few suggestions as to subjects suited to children of this grade may not come amiss:

1. Tell what month of the year you like best, and why.
2. Tell about some game you can play, in winter but not in summer.
3. How to trim a Christmas tree.
4. Making presents for father and mother.
5. Why you like the snow.
6. Helping mother.
7. A letter to a good friend.
8. The tree and the flower you like best.
9. Why you are glad you learned to read.
10. The happiest day of your vacation.

Often children can express themselves more easily in a letter than in any other form of composition. They can all imagine themselves wanting some day to write a letter, and having something to say, whereas it is a little hard for them to imagine themselves ever voluntarily writing a "composition."

There are a number of things which are closely related to the composition work and which may be taken up in preparation for it or in connection with it. First, stress must be laid again on the beginning of sentences, and on the simplest punctuation points, the period and the question mark. Then the subject of margins may be taken up, and in connection with that, paragraph indenting and the nature of a paragraph. Before a letter is written, the chief points of form in letter-writing should be made clear—the dating, the address of the writer, the salutation, the body, the ending and the signature. A good method to pursue in taking up the subject of letter-writing is to have the pupils copy from the board a letter written in proper form. This letter should be such as to interest them by its contents. The following will serve as an example:

417 Metcalfe Street,
Ottawa, Ontario,
September 14, 1912.

My dear Frances:

It was very good of you to ask me to come to see you during my vacation. I was afraid my mother would not let me go, but she said "yes" without my having to coax her. My sister Blanche is at home, so that my mother and father will not be lonesome.

I have never been on a farm, and I suppose I'll see many, many things I know nothing about. You will have to promise that your brothers will not laugh at me if I make mistakes or ask foolish questions.

A week will not be so very long to wait, will it? And I am glad, because you know I want to see you and your family and your home.

Your happy friend,
GRACE WALKER.

The use of the hyphen to divide words at the end of a line; the simplest use of the comma, that is, to divide the terms in a series; and the use of capital letters to begin names of persons and places will of necessity have to be taken up in connection with composition work. The use of quotation marks may be called to the attention of the children by having them copy brief conversations from their readers.

Poems. The work on poems begun in the first and second grades is continued in this, but the study here is a little more detailed. The study should never, however, be carried so far that the beauty of the poem is spoiled for the pupils, for after all, poems should be regarded first of all as literature, and only secondarily as a basis for language work. It is impossible to give here enough poems for use throughout the entire third year, but those given here will serve as examples. In addition Wordsworth's *The Kitten and the Falling Leaves*, Helen Hunt Jackson's *Down to Sleep*, Celia Thaxter's *Spring*, and parts of *Hiawatha* may be used.

THE CHILDREN'S HOUR

HENRY W. LONGFELLOW

Between the dark and the daylight,
When the night is beginning to lower,
Comes a pause in the day's occupations
That is known as the Children's Hour.

I hear in the chamber above me
The patter of little feet,
The sound of a door that is opened,
And voices soft and sweet.

From my study I see in the lamplight,
Descending the broad hall stair,
Grave Alice, and laughing Allegra,
And Edith with golden hair.

A whisper, and then a silence:
Yet I know by their merry eyes
They are plotting and planning together
To take me by surprise.

A sudden rush from the stairway,
A sudden raid from the hall!
By three doors left unguarded
They enter my castle wall!

They climb up into my turret,
O'er the arms and back of my chair;
If I try to escape, they surround me;
They seem to be everywhere.

They almost devour me with kisses,
Their arms about me entwine
Till I think of the Bishop of Bingen
In his Mouse-Tower on the Rhine!

Do you think, O blue-eyed banditti,
Because you have scaled the wall,
Such an old mustache as I am
Is not a match for you all?

I have you fast in my fortress,
And will not let you depart,
But put you down into the dungeon
In the round-tower of my heart.

And there will I keep you forever,
Yes, forever and a day,
Till the walls shall crumble to ruin,
And moulder in dust away!

The Corn Song

JOHN GREENLEAF WHITTIER

Heap high the farmer's wintry hoard!
Heap high the golden corn!
No richer gift has Autumn poured
From out her lavish horn!

Let other lands, exulting, glean
The apple from the pine,
The orange from its glossy green,
The cluster from the vine.

We better love the hardy gift
Our rugged vales bestow,
To cheer us when the storm shall drift
Our harvest-fields with snow.

Through vales of grass and meads of flowers,
Our ploughs their furrows made,
While on the hills the sun and showers
Of changeful April played.

We dropped the seed o'er hill and plain,
Beneath the sun of May,
And frightened from our sprouting grain
The robber crows away.

All through the long, bright days of June
Its leaves grew green and fair,
And waved in hot midsummer's noon
Its soft and yellow hair.

And now, with autumn's moonlit eves,
Its harvest-time has come,
We pluck away the frosted leaves,
And bear the treasure home.

There, richer than the fabled gift
Apollo showered of old,
Fair hands the broken grain shall sift,
And knead its meal of gold.

Let vapid idlers loll in silk
Around their costly board;
Give us the bowl of samp and milk,
By homespun beauty poured!

Where'er the wide old kitchen hearth
Sends up its smoky curls,
Who will not thank the kindly earth,
And bless our farmer girls!

Then shame on all the proud and vain,
Whose folly laughs to scorn
The blessing of our hardy grain,
Our wealth of golden corn!

Let earth withhold her goodly root,
Let mildew blight the rye,
Give to the worm the orchard's fruit,
The wheat-field to the fly:

But let the good old crop adorn
The hills our fathers trod;
Still let us, for his golden corn,
Send up our thanks to God!

A Boy's Song

JAMES HOGG

Where the pools are bright and deep,
Where the great trout lies asleep,
Up the river, and o'er the lea,
That's the way for Billy and me.

Where the blackbird sings the latest,
Where the hawthorn blooms the sweetest,
Where the nestlings chirp and flee,
That's the way for Billy and me.

Where the mowers mow the cleanest,
Where the hay lies thick and greenest,
There to trace the homeward bee,
That's the way for Billy and me.

Where the hazel bank is steepest,
Where the shadow falls the deepest,
Where the clustering nuts fall free,
That's the way for Billy and me.

WINTER

ALFRED TENNYSON

The frost is here,
And fuel is dear,
And woods are sear,
And fires burn clear,
And frost is here
And has bitten the heel of the going year.

Bite, frost, bite!
You roll away from the light
The blue wood-louse, and the plump dormouse,
And the bees are still'd, and the flies are kill'd,
And you bite far into the heart of the house,
But not into mine.

Bite, frost, bite!
The woods are all the searer,
The fuel is all the dearer,
The fires are all the clearer,
My spring is all the nearer.
You have bitten into the heart of the earth,
But not into mine.

During the month of October take up with the language class Whittier's *Corn Song*. By way of biographical introduction, tell them that Whittier gave very good pictures of his childhood days in some of his own poems; and then read to them *The Barefoot Boy* and parts of *Snow-Bound*. They will get the idea from these that Whittier was a poet of the country rather than of the town, and will realize that in this poem he is talking of something which he really knows about. A series of questions and statements like the following will bring out the points of the poem and help the children to appreciate it before they begin to learn it:

First let us see whether there are any words which we may look up. What does "hoard" mean? "lavish"? Is "lavish" a word which you would use? What does "exulting" mean? "glean"? "hardy"? "rugged"? "meads"? "pluck"? "knead"? "vapid"? "loll"? What is "samp"? Did you ever taste it?

Did you ever hear of a cornucopia, or horn of plenty? The poet imagines Autumn as a beautiful, generous woman, pouring gifts out of such a horn on to the earth. What are some of the gifts that Autumn pours out of her horn of plenty? Lead the children to mention such things as grapes, apples, pumpkins, beautiful bright days, gorgeously colored leaves, nuts. What does the poet think is the best of all these gifts? Does he mention any of the other things that we have talked of?

Is there anything in the second stanza which you do not understand? Did you ever hear of gathering apples from a pine? That sounds strange to us until we see that it is only the poet's way of talking of pineapples. He says "other lands," because he lived up in New England where such things as pineapples and oranges, which love the hot weather, never grow.

Think of some way in which corn can cheer us "when the storm shall drift our harvest-fields with snow." Did you ever sit before a glowing fire on a winter night and pop popcorn?

Does the poet seem to know when corn is planted and how it is cared for? How do you suppose he found out these things? What do you think he meant by frightening the "robber crows away"? Some of the children will have seen scarecrows, others will not. Let some of those who have seen them describe them for the benefit of the rest.

Tell briefly of Apollo (an account of the god is found in its alphabetical order in these volumes) and his gift of gold. Ask the pupils whether they have ever seen anything made from corn which is almost as bright and yellow as gold.

Corn, or maize, as it is more correctly called, was not known to civilized people until after America was discovered. The Indians had cultivated it for centuries, and it was known as Indian corn. This fact, as well as the fact that even now four-fifths of the corn used in the world is raised in the United States, makes it really a very important national grain, and that is why the poet Whittier can sing of it with so much enthusiasm.

Stories. Children in this grade are able to read easy stories to themselves, and will frequently read stories and books which are so difficult that they can really do little but get an idea here and there. And while it is a good plan to allow them to read, the teacher should still read to them occasionally, as she should, indeed, to the children in the higher grades. Animal stories will still be found prime favorites, and of these few are more attractive than Kipling's *Jungle Book*.

Picture Study. Guido Reni's *Aurora*, on page 639, with the study on page 638, will show the kind of work with pictures that may be done in this grade.

Fourth Year

Correction of Errors. The drill on this is continued from the third grade, a brief review of the work done in that year forming the introduction to the work. Suggestive sentences on the various possible errors which it is wise to guard against in this grade are here given; in no case, however, are there enough sentences here.

Distinction between *guess* and *think:*

1. I ...... my mother will let me go.
2. I can .... the riddle.
3. You must .... until you know the answer; do not try to ....
4. It will do me no good to .... the answer to that problem.
5. Will you go to the party? I .... so.

The children will hear the colloquial use of *guess* for *think* so frequently from persons whose opinion they trust, that it is well to explain to them that it is not absolutely wrong, like "I done it" or "I seen it."

Correct use of *come* and *came:*

1. I .... to school every day.
2. I .... to school yesterday.
3. I have .... every day this week.
4. I should have .... if I had known.
5. Who .... in just now?
6. Where did he .... from?
7. Have the children all ....?
8. Spring .... early this year.
9. I wish it would .... early every year.
10. He .... to ask us to .... to his party.

The children by this time are ready for rules of some sort on such subjects as this. These should be, however, of the simplest form, and not technical. That is, do not say "*Came* is the past tense of *come,* and *come* is the perfect tense." To fourth-year children *come* and *came* are two different words. But if they are told that *come* is used after *have* and *had,* it has the effect of a rule without making use of technicalities.

The proper use of *like:*

1. He looks *like* you.
2. He looks .... a sachem.
3. He acted .... a man.
4. He acted .... a man should.

The fact may be impressed upon the children, if the examples given are numerous enough, that *like* is never used before a statement; that *as* and *as if* are the correct terms.

The correct use of *in* and *into* will not be difficult to impress upon the children.

1. We are *in* a room; we go *into* a room.
2. Mary's mother was .... the kitchen, when Mary ran ...... the room.
3. You will find it .... the yard.
4. He ran .... and out. (Show that when no word follows to show the place toward which motion is directed, *in* may be used. Of course the distinction between adverb and preposition cannot be made here.)

The correct use of the word *got* may be taken up somewhat as follows, the teacher asking the questions:

"If I say 'I *have* five dollars' or 'I have *got* five dollars,' is there any difference in my meaning?"

"Which form do you like better?"

"Is it better always to use as many words as possible to express our thought, or as few words?"

Then write on the board a list of sentences, such as the following, directing the children to read them without putting in *got* unless they feel that it is really needed.

1. The Dominion has .... a number of large cities.
2. This little boy has .... no brothers or sisters.
3. He has .... his money by hard work.
4. Everybody has .... some work to do.
5. Have you .... all your work done?
6. I might have .... that for you while I was in town.
7. I wish I had .... better marks this week.

After this exercise is finished, have the children pick out the sentences in which *got* is really necessary, and find some other word which might take its place. For instance, in the third sentence the word *earned* might be used. Show them that such definite, specific words are better than the general word *got,* which is called on to mean so many things.

The use of two negatives is common with children, just as it was common with the language in its early stages. If the fact that "I haven't done *nothing*" means "I have done *something*" can be impressed upon them, they will be interested enough to try to correct this error in their speech. Let them write two sets of sentences, showing the two ways in which a negative thought may be expressed, as—

I haven't any candy *or* I have no candy.
I do .... want .... books. I want ...... books.
I am .... doing anything. I am doing ......
I have .... seen .... one. I have seen ...... one.

Compositions. Letter-writing is an excellent form of composition work for children in this grade. Let each pupil write a letter to some other child in the class, folding it correctly and addressing the envelope. Then one pupil may act as postman, collecting the letters and distributing them as directed. Each pupil in turn reads the letter he has received, omitting the name, and criticisms on the construction and language forms are made by the teacher and by the class. At the close of the recitation all letters are handed to the teacher. If no names are read, criticisms can be made freely without causing any child embarrassment.

Topics should still be discussed in class and outlines drawn up before formal compositions are called for. Correctness of form, as to margins, headings, paragraphing, and so forth, should be insisted upon, but the teacher should be careful not to criticize too severely the thought expressed, or the manner in which it is expressed, provided that it is grammatical. The main point is to lead the child to express himself freely, and if he is hurt in the least by a criticism he is likely to draw back and keep his thoughts to himself.

Suitable subjects for compositions in this grade will be found in connection with the daily work, but a number of suggestions may not come amiss. Such topics as "A Nutting Trip," "Berrying," "An Afternoon in a Hayfield," "Thanksgiving at Our House," "What I Like Best to Do in Winter," "What I Like Best to Do in Summer," "How We Play My Favorite Game," "How Hiawatha Built His Canoe," cannot fail to interest the children. It will not always be possible to have all the children write on the same subject; some of them may never have gone nutting, some may never have seen a hayfield. But the assigning of different topics will merely add interest.

Related Topics. Further work on paragraphing should be done in this grade. If the subject of "Nutting" is chosen for a composition, have a simple outline worked out by the children and put on the board. The outline will take some such form as the following:

1. Who went. When we went. Where we went. Why we went.
2. The trip to the woods.
3. What we did while there.
4. The trip home.

The pupils should then be instructed that each numbered topic in the outline must have a paragraph. This, it should be made clear, is not just for form's sake, but because every paragraph should have one central thought which it is built around, and each central thought should have a paragraph.

The use of the apostrophe to show possession and to show that a letter has been dropped out should be taken up in this year, together with further work on capitalization.

The work on synonyms can be made very interesting to children in this grade. It is well to take as a starting-point some poem, for instance, Bryant's "Planting of the Apple-Tree."

THE PLANTING OF THE APPLE-TREE

Come, let us plant the apple-tree.
Cleave the tough greensward with the spade;
Wide let its hollow bed be made;
There gently lay the roots, and there
Sift the dark mould with kindly care,
And press it over them tenderly.
As, round the sleeping infant's feet
We softly fold the cradle-sheet;
So plant we the apple-tree.

What plant we in this apple-tree?
Buds, which the breath of summer days
Shall lengthen into leafy sprays;
Boughs where the thrush, with crimson breast,
Shall haunt and sing and hide her nest;
We plant upon the summer lea
A shadow for the noontide hour,
A shelter from the summer shower,
When we plant the apple-tree.

What plant we in this apple-tree?
Sweets for a hundred flowery springs
To load the May-wind's restless wings,
When, from the orchard-row he pours
Its fragrance through our open doors;
A world of blossom for the bee,
Flowers for the sick girl's silent room,
For the glad infant's sprig of bloom,
We plant with the apple-tree.

As a start, the children may be asked to pick out words which the author used which they never use. They will probably make some such list as "cleave," "greensward," "mould," "infant," "sprays," "haunt," "lea," and perhaps others. First make sure that the pupils understand these words; then let them make a list of words which they would have used instead. It is perhaps a little beyond children of this grade to understand why the poet's words are better than their own, except in cases like "lea," when it is a rhyme word that is in question.

The teacher may then make a list of simpler words from the poem—words which are used by the children every day—and ask them to make a list of words which mean the same. Of course in many instances the children's words will not mean exactly the same, but unless the difference is essential, it should not be pointed out. The word *synonym* need not be used if the teacher prefers; but it will be found that a name will not frighten the children if its meaning has been thoroughly explained to them.

Word-study of a different kind takes up the use of descriptive adjectives, not, however, under that name. The pupils may be directed to find words in the poem chosen for study which describe something. After such lists have been made, the children should use each one to describe something else. Some famous character from history or from literature may then be chosen, and each pupil may make a list of words describing that character.

Poems. One poem suitable for work in this grade has just been given; two others, *The Village Blacksmith* and *Paul Revere's Ride*, will be found on pages 679 and 680 of this volume. Studies of these two poems are there given which should prove very helpful to the teacher. In this grade a number of poems which have been used and learned in the earlier grades may be taken up for further study, for the children are now able to appreciate many points which were beyond them before. In addition, Whittier's *The Pumpkin* and selections from his *Snow-Bound*, Celia Thaxter's *The Sandpiper*, Tennyson's *Owl* and Browning's *Pied Piper of Hamelin* may be used. When a poem contains a story, the pupils may be asked to write out the story for their composition work.

Many a child who is not given exercises in composition work from poems in the fourth or fifth grade finds he is seriously handicapped in higher grades when required to paraphrase prose and poetry, in connection with lessons in grammar and composition. For a child to tell in his own words the story a poem contains is to make a simple paraphrase; such an exercise develops the reasoning faculties, tends to thoughtfulness and brings to the surface those bits of human interest contained in the poem which leads one to enjoy better not only that particular poem but makes all poetry more interesting.

Stories. The teacher will find that Kingsley's *Water-Babies* will afford her material for the most of her reading to her pupils throughout this year. There are some parts which the children will not understand and which need not be read to them; but there are editions of the work which give only the story part, omitting the political parallels and allusions.

Work of a slightly different kind may be done with stories in this year. A story should be read by the teacher, and when the pupils are familiar with it a test of their understanding may be made by reviewing it by means of an outline like the following:

I. Principal Characters
  (a) Appearance
  (b) Life
  (c) Home
  (d) Traits of character
  (e) Place in story
II. Other Characters
  Part in story
III. Incidents
  (a) Principal happenings
  (b) Where they take place
  (c) Minor happenings

The Ugly Duckling, given on pages 704–706 of this volume, is an excellent story for use in this way. There are many characters in the story and some of them have very well-marked personalities, so that they may be studied quite like human beings. A little character sketch of some one of the more important minor characters would make a good composition.

Such a story as *The Ugly Duckling* should be invested with all the realism possible. The children should see that there are types of people who in their relations with their fellow-men are quite likely to act in the same way as did the animals in the story. When such a view is taken the moral the story teaches is driven home with all the greater effect. Probably there is not another story of its length which can be used with better results, from every point of view the teacher and mother can summon to their aid.

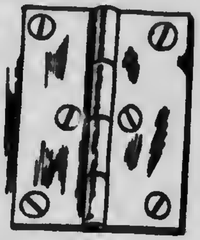
Essays. The essays which follow show the sort of composition work which may be expected from pupils in this grade.

Essay writing usually fails to interest boys; the girls' attitude is more receptive, as a rule. The teacher who can invest work in essays with a new feature, a new element, in which the competitive idea is prominent, and which appeals to the inventive and artistic mind, is assured of a good measure of success. Illustrated essays may be a novelty; pictures, though rude, surely add strength to the language work, and train the hand and eye in expression, just as writing the subject-matter trains the mind in the fine art of composition.

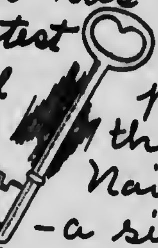
IRON

BY GEORGE CAMPBELL

Iron ore is very liberally distributed over the earth and with the exception of Australia every continent has a good supply The United States is the largest producer of iron ore.



It is the most useful of all metals and has been known from the remotest times. One of the most useful products of iron entering into the making of a home is nails. Nails are made automatically -a single machine making five hundred nails per minute. Their manufacture forms a very interesting study

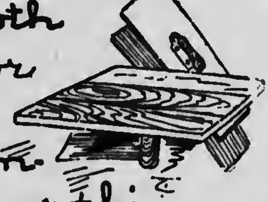


Brackets supporting balconies, windows or upper portions of a building are generally made of iron and sometimes elaborately designed and ornamented. Many other items of use and ornament are supplied our homes by this most useful metal.

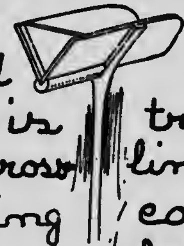
PLASTER

BY MAY GRANT.

Plastering is the art of covering the surface of masonry or woodwork with mortar, cement, staff, or stucco in order to give it a smooth and uniform surface. For the purpose of receiving the plaster the wall is generally covered with laths, or thin strips of wood or steel with narrow spaces between them.



The face of the first coat which should be of considerable thickness is trowelled or indented with cross lines to form a key for the finishing coats. The second coat is applied when the first is thoroughly dried.



The setting coat which is of pure lime or, for fine work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry.

A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat.

GLASS

By GLADYS HAYES

Glass, a hard brittle substance, is made by melting by intense heat certain ingredients.

Unless colored by some foreign substance it is usually transparent.

There are many different kinds of glass, some varieties are flint, crown, window, bottle, and plate.

The principal methods of manufacture are those used for window glass bottle glass, and plate glass.

For window glass the material is blown into the form of a cylinder, it is then slit, flattened, and cut into the desired sizes.

For bottle glass the sticky, melted glass is taken on the end of a tube and put into a mould where it is blown into shape.

For plate glass the melted compound is poured out on a large iron table, rolled to the desired thickness, cooled and afterwards polished.

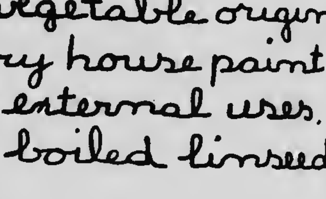
By Irma Jones

Paint is a compound of coloring sub-stances mixed with oil glue or water. The coloring substance is called a pigment and the liquid with which it is mixed a vehicle. The greater number of pigments are mineral but some like cochineal are animal substunces and others, like indigo, are of vegetable origin.

For ordinary house paint especially for external uses, white lead and boiled linseed oil are generally used.

Varnish is a liquid made by dissolving a resin in alcohal, tu-pentine or other oil. It is used to form a thin, transparent coat over surfaces, to protect them from heat, air and moisture and to make them more beautiful

The base of varnish is Copal, or fossil gum. The best gum is found in Zanzibar.

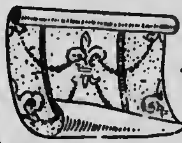


Wall Paper

BY JOHN HUDSON

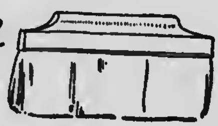
Paper used for decorating the walls and ceilings of rooms originated among the Chinese and was not introduced into Europe until the eighteenth century.

The papers at first were imitations of the leather tapestry and velvet hangings which had long been common as wall decorations but gradually the designs became original and varied.



Most of the processes are by machinery similar to that used in calico printing, but there is also much hand work done in the finer qualities.

The paper is prepared in strips which are made fast to the wall by paste.

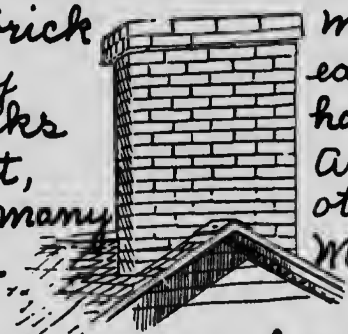


The skill of the workman consists in matching the strips and laying the paper so as to avoid wrinkles.

The manufacture of wall paper is a great industry and paper hanging is an important occupation.

By HARRY SCOTT.

Brick is a sort of artificial stone made by molding a mixture of clay and sand and drying it in the sun or baking or burning in a kiln. The ordinary brick used in building and paving is eight inches long, four inches wide, and two inches thick.



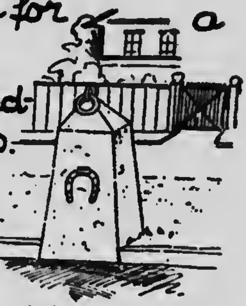
The art of brick making dates from very early times. Sun dried bricks have been found in Egypt, Assyria, Babylonia and many other ancient countries. Many of these bricks contain inscriptions which are of great historic value, since they constitute the only known record of the people and events of the time in which they were made.

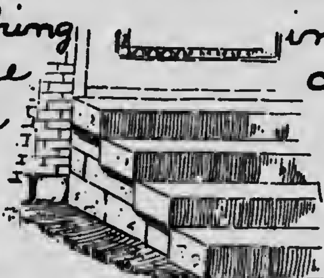
Bricks are extensively used in the foundations and walls of buildings. They are also used for sewers, cisterns, and numerous other purposes.

STONE

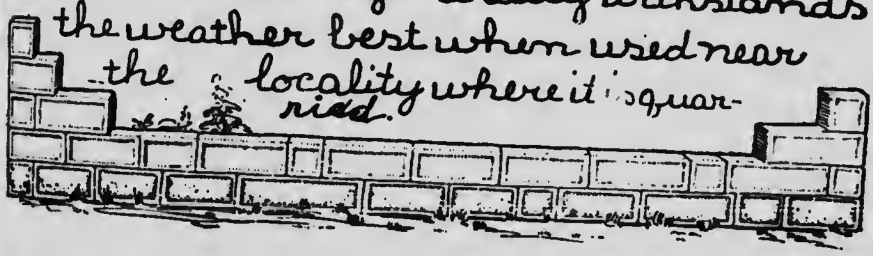
~BY CHARLIE SMITH~

Stones are of extensive use for a great variety of purposes, such as building, paving, grinding and ornamental purposes. Granite, slate, limestone, marble and sandstones are the building stones in most common use in the United States. There are numerous other stones however suitable for finishing interiors such as serpentine and onyx.





Granite is the strongest and slate the most durable of building stones. Soft sandstones absorb a great deal of water and are not durable for exteriors. Stones containing iron or other substance which the water dissolves frequently becomes discolored. Stone generally withstands the weather best when used near the locality where it is quarrid.



Fifth Year

Approach to Grammar. There is still in the fifth year no formal grammar work, but a closer approach to it is made in the language work. The points in language forms to be covered this year are many; not all of them can be covered here, but many will come up in connection with the ones discussed here. A review of *sit* and *set* will lead naturally to *lie* and *lay*. (See sentences on page 510.)

1. I *lay* the book on the table.
2. The book *lies* on the table.
3. The book *lay* there for a week.
4. He *laid* the book on the table.
5. Where does that city ....?
6. Who will .... this away for me?
7. I am going to .... down.
8. She .... down for half an hour.
9. The ship .... at anchor.
10. You may .... the pencil on the desk.
11. The sheep were .... in the field.
12. He .... still a long time.

A good method for combining work on right word forms with the study of synonyms is to give sentences such as the following and ask the class to replace the italicized words with forms of *lay* or *lie*.

1. She *reclines* on a couch.
2. He *placed* it on the floor.
3. Let it *rest* there.
4. She *put* the baby down.

Raise and *rise* may well be considered at the same time, since their relation is the same. It may be explained to the pupils, without the use of technical terms, that *raise, set, lay* are always followed by the name of what is *raised* or *set* or *laid*, while the other forms are not.

1. The stream .... in the woods.
2. The stream has .... several inches.
3. It has .... the water level.
4. I .... the window.
5. We have .... a large sum of money.
6. The sun .... an hour ago.
7. It has .... over the mountain top.
8. He .... his kite.
9. It .... gaily into the air.
10. If you had .... before the sun ...., your mother could have .... no objections to your plan.

Such words as *nice* and *awful* are common words which are misused almost constantly. Review the use of *awful* on page 510, and take up the word *nice*. Every child thinks he knows what the word *nice* means; he uses it frequently. "I have a nice apple. She is a nice girl. We live in a nice house." Make such a list of statements with the word *nice*, and have the pupils replace the word in each instance by another which gives the meaning more exactly. Then explain that nice really means *exact*, and have sentences made giving the word its correct meaning. As:

1. It will take *nice* work to fit those corners together.
2. What you say will mean more if you are *nice* in your choice of words.

Children may be easily interested in slang phrases and provincialisms which are current in their neighborhood, and may be set to work to find expressions which will better give the same meaning. Care is necessary in this work not to take the life out of the children's language and not to give them the idea that written language is something utterly different from spoken language.

Drill on the use of *them* and *those*, together with cautions against such expressions as "that there," "this here," may come in this year.

1. Give me .... books.
2. I have given .... to you.
3. All of .... books belong to .... children.
4. Who gave .... books?

Added drill may well be given on the proper forms of the pronouns; in fact, this is work which can with profit be taken up in almost any grade, for many of the most common faults of English come from a misunderstanding of the uses of the pronouns.

1. *Who* is that?
2. It is *I* (or *he*, *she*, *we*, or *they*).
3. *Whom* did they see?
4. They saw *me* (or *him*, *her*, *us*, or *them*).
5. *Whom* did she speak to?
6. She spoke to *him* and *me*.
7. *Whom* did the teacher scold?
8. She scolded *her* and *him*.
9. Will you give it to *me*?
10. I will give it to you and *him*.
11. Let you and *me* take a walk.
12. Do you want *us* girls?

There is not so much danger when pupils have reached this stage of their being misled by seeing incorrect forms if it is firmly impressed upon them that the forms are wrong. There is, too, a certain eagerness about correcting errors which adds new interest to the work. Let the pupils tell what is wrong with the following sentences:

1. Whom did you say was here this evening?
2. What did you and her talk about?
3. Whom did you think he was?
4. I can certainly do that better than her.
5. Such a person as him has no right here.
6. He can play better than me.
7. It might have been him.
8. I suppose it was them.
9. Who did you take him for?

The question of the singular and plural of nouns and verbs, with reference to the agreement of subject and predicate, may seem rather elementary to take up in this grade. A pupil of the fifth grade is not very likely to say "We goes," or "They thinks"; but the possibilities for mistake are still practically endless. The danger is particularly strong in sentences where prepositional phrases appear between the subject and the predicate. Let the pupils correct the wrong forms in the following sentences, and in others like them:

1. Either you or I are right.
2. When does your brother and your sister go?
3. The crowing of the roosters tell that it is morning.
4. The use of alcoholic drinks are dangerous.

In connection with the use of the contractions *isn't*, *hasn't*, *doesn't*, and so forth, which may be taken up in this grade, it should be impressed on the pupils that *don't* means *do not*, and should be used only where *do not* is correct. *He don't*, *it don't*, *she don't* are therefore incorrect, for we may not say *he do not*, and so forth. Have the blanks in the following sentences filled with contractions of *not* and some form of the verb *do:*

1. It ...... seems right to do it.
2. A pupil .... work as hard as a teacher.
3. I ...... care to go.
4. We ...... like some of our studies.
5. Mary .... come very regularly.
6. You ...... need to pretend to like it.
7. That tree .... bear many apples.
8. ...... he like his school?

The use of *kind* and *sort* with *these* and *those* is a most persistent error which it will require much drill to overcome. Let the pupils observe the correct forms in the first four sentences that follow, correct the wrong forms in the second four, and fill in the blanks in the last sentences.

1. I like *this* kind of apples.
2. There are many of *that* kind of trees.
3. *That* sort of berries is very expensive.
4. *This* sort of collars is very popular.
5. These kind of people cause much trouble.
6. Those kind of flowers are most beautiful.
7. Do you like these sort of books?
8. Will those sort of games ever be popular?

(Observe that in some of these sentences two corrections are necessary.)

9. I do not care for .... kind of hats.
10. .... sort of pencils .... too hard.
11. .... kind of electric lights .... brighter than .... kind.
12. Do you prefer .... kind of shoes, or .... ?

The distinction between *can* and *may* is easily grasped, but easily forgotten when it comes to a question of every-day use. *Can* expresses power or possibility; *may*, permission or probability. *Could* and *might* differ in the same way. *May* and *might* are seldom if ever incorrectly used for *can* and *could*, but the opposite error is heard almost constantly.

1. .... I have another piece of pie?
2. She said I .... play with Mary.
3. No, I .... not go for a walk today; mother will not let me.
4. You .... have a drink if you want one.
5. You....... not leave the room until I tell you to.

These, with review of exercises from former grades and exercises suggested by errors made by the pupils, will furnish sufficient material for language drill for this grade.

Poems. The poems which are suitable for study in this year are numerous and should appeal to the pupils for at least two reasons—for the stories they tell and for the pictures they present. Some of the poems have both pictures and story; some have only one. A list of poems which may well be used in this grade is as follows:

Barbara Frietchie—Whittier.
In Time's Swing—Lucy Larcom.
The Fountain—Lowell.
The Wreck of the Hesperus—Longfellow.
Song of the Brook—Tennyson.
Lochinvar—Scott.
Sheridan's Ride—Thomas Buchanan Read.
Landing of the Pilgrims—Felicia Hemans.
Christmas Bells—Longfellow.
Lord Ullin's Daughter—Thomas Campbell.
The Arrow and the Song—Longfellow.
Death of Lincoln—Bryant.
Bell of Atri—Longfellow.

The most of these poems will be found in any school library; a few, however, such as the ballad of Campbell's, *Lord Ullin's Daughter*, and Lucy Larcom's *In Time's Swing*, will not be so easy to find, and we give them here. One is a typical story poem; the other a typical picture poem. Longfellow's *Wreck of the Hesperus* is given for comparison with *Lord Ullin's Daughter*.

Lord Ullin's Daughter

A chieftain, to the Highlands bound,
  Cries, "Boatman, do not tarry!
And I'll give thee a silver pound,
  To row us o'er the ferry."

"Now who be ye, would cross Lochgyle,
  This dark and stormy water?"
"O, I'm the chief of Ulva's isle,
  And this Lord Ullin's daughter.

"And fast before her father's men
  Three days we've fled together,
For should he find us in the glen,
  My blood would stain the heather.

"His horsemen hard behind us ride;
  Should they our steps discover,
Then who will cheer my bonny bride
  When they have slain her lover?"

Out spake the hardy Highland wight,
  "I'll go, my chief—I'm ready;
It is not for your silver bright,
  But for your winsome lady:

"And by my word! the bonny bird
  In danger shall not tarry;
So though the waves are raging white,
  I'll row you o'er the ferry."

By this the storm grew loud apace,
  The water-wraith was shrieking;
And in the scowl of heaven each face
  Grew dark as they were speaking.

But still as wilder blew the wind,
  And as the night grew drearer,
Adown the glen rode armèd men,
  Their trampling sounded nearer.

"O haste thee, haste!" the lady cries,
  "Though tempests round us gather;
I'll meet the raging of the skies,
  But not an angry father."

The boat had left a stormy land,
  A stormy sea before her,—
When, oh! too strong for human hand,
  The tempest gather'd o'er her.

And still they row'd amidst the roar
  Of waters fast prevailing:
Lord Ullin reach'd that fatal shore,
  His wrath was changed to wailing.

For sore dismay'd, through storm and shade,
  His child he did discover:—
One lovely hand she stretch'd for aid,
  And one was round her lover.

"Come back! come back!" he cried in grief,
  "Across this stormy water:
And I'll forgive your Highland chief,
  My daughter!—oh my daughter!"

'Twas vain: the loud waves lashed the shore,
  Return or aid preventing;
The waters wild went o'er his child,
  And he was left lamenting.

This poem is written in the style of the old ballads, but it has very few of the strange old forms or the roughnesses of meter which mark the ballads. Longfellow's *Wreck of the Hesperus* shows more of the ballad characteristics.

Wreck of The Hesperus

It was the schooner Hesperus,
  That sailed the wintry sea;
And the skipper had taken his little daughter
  To bear him company.

Blue were her eyes as the fairy-flax,
  Her cheeks like the dawn of day,
And her bosom white as the hawthorn buds
  That ope in the month of May.

The skipper he stood beside the helm,
  His pipe was in his mouth,
And he watched how the veering flaw did blow
  The smoke now West, now South.

Then up and spake an old Sailor,
  Had sailed the Spanish Main,
"I pray thee, put into yonder port,
  For I fear a hurricane.

"Last night the moon had a golden ring,
  And tonight no moon we see!"
The skipper he blew a whiff from his pipe,
  And a scornful laugh laughed he.

Colder and colder blew the wind,
  A gale from the Northeast;
The snow fell hissing in the brine,
  And the billows frothed like yeast.

Down came the storm, and smote amain,
  The vessel in its strength;

She shuddered and paused, like a frighted steed,
Then leaped her cable's length.

"Come hither! come hither! my little daughtèr,
And do not tremble so;
For I can weather the roughest gale,
That ever wind did blow."

He wrapped her warm in his seaman's coat
Against the stinging blast;
He cut a rope from a broken spar,
And bound her to the mast.

"O father! I hear the church-bells ring.
O say, what may it be?"
"'Tis a fog-bell on a rock-bound coast!"—
And he steered for the open sea.

"O father! I hear the sound of guns.
O say, what may it be?"
"Some ship in distress, that cannot live
In such an angry sea!"

"O father! I see a gleaming light.
O say, what may it be?"
But the father answered never a word,
A frozen corpse was he.

Lashed to the helm, all stiff and stark,
With his face turned to the skies,
The lantern gleamed through the gleaming snow
On his fixed and glassy eyes.

Then the maiden clasped her hands and prayed
That savèd she might be;
And she thought of Christ, who stilled the wave,
On the lake of Galilee.

And fast through the midnight dark and drear,
Through the whistling sleet and snow,
Like a sheeted ghost, the vessel swept
Towards the reef of Norman's Woe.

And ever the fitful gusts between
A sound came from the land;
It was the sound of the trampling surf,
On the rocks and the hard sea-sand.

The breakers were right beneath her bows,
She drifted a dreary wreck,
And a whooping billow swept the crew
Like icicles from her deck.

She struck where the white and fleecy waves
Looked soft as carded wool,
But the cruel rocks, they gored her side
Like the horns of an angry bull.

Her rattling shrouds, all sheathed in ice,
With the masts went by the board;
Like a vessel of glass, she stove and sank,
Ho! ho! the breakers roared!

At daybreak, on the bleak sea-beach,
A fisherman stood aghast,
To see the form of a maiden fair,
Lashed close to a drifting mast.

The salt sea was frozen on her breast,
The salt tears in her eyes;
And he saw her hair, like the brown sea-weed,
On the billows fall and rise.

Such was the wreck of the Hesperus,
In the midnight and the snow!
Christ save us all from a death like this,
On the reef of Norman's Woe!

Have the children read the poem through first to get a general idea of the story and of the swing. Then ask them to point out any strange words or any seeming breaks in the swing. In the very first stanza there is a word which has to be pronounced incorrectly to make it sound right; *daughter* must be accented on the second syllable. In the fourth stanza *sailor* must be treated in the same way, while in the same stanza are found two expressions which are not usual—"up and spake" and "had sailed," with *who* omitted. The children will be able to pick out other instances. Explain to them that Longfellow did not write in this way because he knew no better, and read to them some particularly musical passage from the same poet. Then, in explanation of the irregularities, tell a little about the old ballads: how they grew up among people who knew nothing of poetry, and how they were intended to be set to music. Describe the way they were kept alive, by word of mouth for centuries, and tell of the changes that took place in them. Make your pupils feel, if you can, that what would be defects in more formal poems are really the chief charm of the old ballads.

The Wreck of the Hesperus is primarily a story poem, but are there pictures in it? The second stanza gives a picture of the little daughter; the sixth stanza has the brief picture of the billows that "frothed like yeast"; the thirteenth stanza gives the painful picture of the dead skipper

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lashed to the helm, with the lantern-light gleaming on him. Let the children find other pictures.

IN TIME'S SWING

Father Time, your footsteps go
Lightly as the falling snow.
In your swing I'm sitting, see:
Push me softly; one, two, three,
Twelve times only. Like a sheet
Spread the snow beneath my feet.
Singing merrily, let me swing
Out of winter into spring.

Swing me out, and swing me in!
Trees are bare, but birds begin
Twittering to the peeping leaves,
On the bough beneath the eaves
Wait,—one lilac bud I saw.
Icy hillsides feel the thaw;
April chased off March today;
Now I catch a glimpse of May.

Oh, the smell of sprouting grass!
In a blur the violets pass.
Whispering from the wildwood come
Mayflower's breath and insect's hum.
Roses carpeting the ground;
Thrushes, orioles, warbling sound:
Swing me low, and swing me high,
To the warm clouds of July.

Slower now, for at my side
White pond lilies open wide.
Underneath the pine's tall spire
Cardinal blossoms burn like fire.
They are gone; the golden-rod
Flashes from the dark green sod.
Crickets in the grass I hear;
Asters light the fading year.

Slower still! October weaves
Rainbows of the forest leaves.
Gentians fringed, like eyes of blue,
Glimmer out of sleety dew.
Meadow-green I sadly miss:
Winds through withered sedges hiss.
Oh, 'tis snowing, swing me fast,
While December shivers past!

Frosty-bearded Father Time,
Stop your footfall on the rime!
Hard you push, your hand is rough;
You have swung me long enough.
"Nay, no stopping," say you? Well,
Some of your best stories tell,
While you swing me—gently, do!—
From the Old Year to the New.

This is, first and last, a picture poem. Point out to the children, if they do not get it from their own first reading, that the swinging is only a symbol of the passing year, and then let them direct their attention to the pictures. Have them find first the winter pictures, then the spring pictures, then the summer pictures, then the autumn pictures. Point out to them the fact that each picture is made with a very few words.

There are many birds and flowers mentioned in the poem, some of which are familiar to teachers and mothers, but not so much is known about others. Great good will result from studying about them in THE NEW PRACTICAL REFERENCE LIBRARY, under their regular alphabetical titles.

The children will enjoy making illustrations for this poem. The whole course of the year cannot be accurately covered, but enough pictures can be made to ornament beautifully many of the month's calendars.

"Underneath the pine's tall spire
Cardinal blossoms burn like fire."

" . . . . the golden-rod
Flashes from the dark green sod."

"Asters light the fading year."

" . . . . October weaves
Rainbows of the forest leaves.
Gentians fringed, like eyes of blue,
Glimmer out of sleety dew."

These are some of the pictures which will give ideas for illustrations to the pupils.

Composition Work. A part of the composition work of this year may be connected with the work on the poems. Once or twice during the year it will be well to have the pupils give for their compositions the story of some narrative poem which they have studied in this grade or an earlier one. *The Pied Piper of Hamelin* and *The Bell of Atri* are good poems for use in this way. Or, after the study of a narrative poem, it may be well to have the children write a story —either an original story or one from history. Their own original stories, of course, need not be of the same heroic proportions as the tales in the narrative poems.

After some time has been spent on the study of a descriptive poem, let the children write descriptions of some scene with which they are familiar. Impress upon them that they cannot describe a scene or an object clearly until they really know what it looks like, until they have a picture of it with its lights and shadows, its important points and its minor points, distinct in their own minds. *A Garden I Have Seen*, *My Favorite Corner of the Park*, *Our Front Yard* are subjects which it should be possible for the children to handle well.

There is one subject for composition work which rarely fails to interest children. Let each pupil choose an animal or an article which he wishes to be—a rabbit, a fish, a coin, a bottle—and write the experience of that animal or article in the form of an autobiography. These may be fanciful, but not too much so; the experiences should be those which are possible to the article in question. Andersen's *Constant Tin Soldier*, *The Darning-Needle* and *The Pea Blossom* should be interesting to the children in this connection.

Composition topics which fit the season are useful in varying the monotony. Thus in October some such subject may be assigned as *How My Garden Has Changed*. In December the topic may be *A Christmas Picture*, which affords numerous possibilities—the Christmas tree, the family taking down the stockings, the Christmas dinner table, the group about the fire in the twilight. In February the subject may well be George Washington. His life may be divided into several parts—his youth, his early manhood, his career as a soldier, his presidency, his later life. Each of these parts may be assigned to several pupils, and when all the work is in, a number of lives of Washington may be made by putting the different chapters together.

Related Topics. This year should ground the children still further in the use of capitals, punctuation marks, simple abbreviations, such as those for the different months, and paragraphing. Conversations should be copied from readers or made use of in original compositions until the use of quotation mark is well understood, and practice in letter-writing should not be neglected.

Sixth Year

Correction of Errors. The work of the sixth grade is very closely related to that of the fifth. The drill on the correction of common errors begun in the earlier grades should be continued in this, until the teacher is sure that the pupils understand thoroughly the end to be accomplished. Additional errors on which exercises may be based are given here.

The distinction between *most* and *almost* is one which is frequently overlooked. *Most* means the *greatest quantity*, the *greatest number*; *almost* means *nearly*, and should be used only in places where *nearly* might be used. Place the following sentences on the board and let the children correct those which are wrong:

1. I can go most any time you are ready.
2. Most of us have been here.
3. Most all of us have been there.
4. It is most always impossible to find a seat in this train.
5. I shall be most too tired to go.
6. Most everybody likes flowers.

The proper use of *between* and *among* requires thought. Have the blanks in the following sentences filled correctly with one or the other of these two words:

1. She and I divided it ...... us.
2. He had only two apples, but he divided them ...... the three of us.
3. John and Mary and I appealed to father, but he said we must settle it .... us.
4. There are four beautiful little lakes, and a village nestles .... them.
5. Father and mother divide the responsibility .... them.

The statement that *good* is an adjective and *well* is often an adverb cannot be made to pupils of this grade who have not yet been introduced to formal grammar, but the difference in their use may be made clear by numerous illustrations.

1. You are a *good* boy; you have done your lessons *well*.
2. The bread looks *good* (meaning, the bread looks as if it were good).
3. The bread is baked *well*.
4. He is never *well*, but her health is very *good*.
5. She is a........worker and does everything........
6. Can you do this ....?
7. My work is not done as .... as yours.
8. Is your health fairly ....?
9. If you do this .... you shall have a .... rest.

Without and *except* should not be used in the place of *unless*, to introduce a dependent statement. The first four sentences which are given here are incorrect:

1. I shall not go *without* you do.
2. She will not do it *except* she feels like it.

3. *Except* the teacher tells you to, you must not do it.

4. They never do anything *without* they are forced to.

5. .... the sun comes out, it will be ruined.

6. I shall not go with you .... you wear a hat.

7. There is no use in promising .... you intend to do it.

Had or *had not* should never be used with *ought*.

1. She *ought* to go, *not*, She had ought to go.
2. I ought not to do it, *not*, I had not ought to do it.
3. Ought we to speak of it? *not*, Had we ought to speak of it?
4. She thought we ought not to buy the house, *not*, She thought we had not ought to buy the house.

The word *real* is often incorrectly used in place of *very*. Do not say:

1. I am *real* sick.
2. She is a *real* strong girl.
3. We had a *real* good time at your house.
4. If you are *real* sure you do not mind, I will take it.
5. I think I shall like the new teacher *real* well.

In each of these cases the word *very* is the proper word to use.

Word Study. The study of synonyms, begun in earlier grades, may well be continued in this. Such groups of words as *aged, ancient, old, antique; abandon, desert, forsake; admit, confess, acknowledge; at last, at length,* may be discriminated and used in sentences. Very fine distinctions between words should not be drawn with children in this grade.

Very helpful exercises may consist in making lists of adjectives describing certain objects. For example, ten words may be called for which describe a tree, ten which describe a horse, ten which describe a person. These, of course, are not called adjectives in this grade; they are simply descriptive words. The comparison of adjectives, always without using the technical terms, may also be taken up here. After the pupils have given several words describing a tree, as, for instance, *tall, beautiful, sturdy,* call on them to express those qualities in three different degrees and point out the difference between *tall, taller, tallest,* and *beautiful, more beautiful, most beautiful.*

Poems. Any of the poems listed in the fifth-grade work which have not been studied may be used in this year. In addition, the following will be found adapted to pupils of this age:

How They Brought the Good News from Ghent to Aix—Browning.

The Bugle Song—Tennyson.

An Incident of the French Camp—Browning.

The Fringed Gentian—Bryant.

The Daffodils—Wordsworth.

Old Ironsides—Holmes.

The Leak in the Dyke—Phoebe Cary.

These poems should be studied just as those for the fifth year were studied, though of course with each grade a little truer appreciation may be expected from the children. The teacher may first in each instance give a brief sketch of the life of the poet; this may, in all the cases given for this year, be found in THE NEW PRACTICAL REFERENCE LIBRARY. Then, if the poem is a story-poem, it will be of interest to the pupils to learn whether or not the incidents on which the poem is based are true or imaginary. For instance, the two poems of Browning named for study in this year may be contrasted. Let the children read *How They Brought the Good News from Ghent to Aix*, and *An Incident of the French Camp*, and see whether they feel that one is any more *real* than the other. Perhaps the fact that Napoleon is named in the latter poem may make that one seem a little more actual, but for the most part one rings as true as the other. In the case of *An Incident of the French Camp*, however, the historical background, at least, is true; the French did take Ratisbon just in the way Browning describes. As to whether or not the story of the boy, as he tells it, is true, we do not know; but the character of Napoleon, from the glimpse we have of him here, is very true to life. When it comes to the other poem, we find that Browning invented the circumstances entirely; there is no record that there was ever any good news sent from Ghent to Aix. But so real does Browning make the story seem that we almost hold our breath as the galloping ride goes on.

The story of Browning's *Pippa Passes*, if told simply and well, will make a strong appeal to children of this grade, and they will enjoy learning the beautiful little song which Pippa sings as she starts on her day's pleasuring:

"The year's at the spring,
And day's at the morn;
Morning's at seven:
The hillside's dew-pearled;
The lark's on the wing;
The snail's on the thorn;

God's in his heaven—
All's right with the world."

Composition Work. This, again, differs in kind very little from the work of the fifth grade. The subjects may be much the same, but of course a little better results may be expected. A list of topics suitable for composition work in this grade is given here:

1. Business letters:
   (1) To a magazine, inclosing money order for one year's subscription.
   (2) To a large department store, ordering six or eight articles, and giving directions about delivery.
2. Why I Like My Favorite Book.
3. The Boyhood of Lincoln.
4. The Story of "The Bell of Atri."
5. A Brave Deed I Saw.
6. The Story of a Dollar Bill.
7. The Adventures of a Pin.
8. A January Thaw.
9. A February Blizzard.
10. The Toboggan Slide.
11. How I Ran Away.
12. Having a Tooth Pulled.
13. My Grandma's Kitchen.
14. Our Church.
15. What I See from My Window.
16. The Most Beautiful Place I Know.
17. My First Teacher.

Compositions on such subjects as *Sugar, Coffee, Cotton, Lumber, Apples, Iron, Fisheries, Wheat, Corn* will connect the language work with other studies. The teacher may find it advisable to draw up an outline for such compositions first, that the work may be orderly in form. Material on these subjects may be found in THE NEW PRACTICAL REFERENCE LIBRARY, in regular alphabetical order, and also with special treatment in this volume, under the heading *Industries*.

Seventh Year

The Simple Sentence. In the seventh grade formal grammar is taken up. Of course this should be connected as much as possible with the language work of the previous years, but the line between the two is distinct. The greater part of the seventh-year work concerns itself with the sentence, and that subject should be the first thing taken up. Put before the pupils the two groups of words *Flying birds* and *Birds fly* and have them discuss the difference. Lead them to the statement that the former simply *assumes* something about birds, while the latter *asserts* the same fact. Then give them the definition of a declarative sentence—that it is a group of words which asserts something about something else.

Given this definition, it is apparent that there must be two parts to every sentence, no matter how simple; there must be the part that asserts and the part about which something is asserted. Thus in the sample sentence given, the word *fly* asserts something about *birds*. The asserting part of a sentence is called the *predicate*, the part about which something is asserted, the *subject*.

Though the difference between groups of words which assert and groups of words which merely assume is very simple to the teacher, it is by no means always so clear to the pupils. They should have much drill on groups of words such as the following, distinguishing the sentences from those expressions which only assume:

1. The fishes swim.
2. Swimming plants.
3. The roaring storm.
4. The train runs.
5. The tree falling.
6. Children play.
7. Books are read.
8. The drifts of snow.
9. The green grass.
10. The grass grows.

It will thus be made plain to the pupils that in order to have a sentence, two things are absolutely essential—a subject and a predicate; but it may then be pointed out that comparatively few sentences have this very simple form. Even in the little sentences in the list above, the word *the* is used before the subject more often than not. This modifier of the subject does not, however, make the *sentence* any less simple; it merely makes the *subject* less simple. By a combination of the last two groups of words in the list above, *The green grass* and *The grass grows*, it may be shown that the same sentence may both assume and assert something of the subject. *The green grass grows* assumes the greenness and asserts the growth.

Complements. After sufficient drill has been given on the very simplest form of sentences, the point may be made that some predicates do not in themselves contain enough to assert about a subject all that is meant. Thus for instance, if we want to assert about flowers the quality assumed in the expression *beautiful flowers*, it is not enough to say *Flowers are;* we must add to the predicate the word *beautiful*. Give many examples of this use of a word after *is, are, was were,* etc., to complete the meaning, using adjectives in some and nouns in others. The distinction between these two parts of speech need not be pointed out to the pupils at this stage.

1. Birds are graceful.
2. Swallows are birds.
3. Man is an animal.
4. Men are intelligent.
5. You are good.
6. You are a boy.

The word which is thus used after some form of *to be* is known as the *attribute complement.*

But there are other predicates besides forms of *to be* which need something to complete their asserting power. If we say *The man wants,* we feel that something is lacking. *What* does the man want? The word which answers that question is the *object,* or *object complement,* of the word *wants.* The object is that which receives the action expressed by the verb. Have the pupils point out objects or object complements in such sentences as these:

1. I ate an apple.
2. He threw the ball.
3. John sang a song.
4. The bird caught a worm.
5. The teacher scolded the pupil.
6. He was reading the book.
7. You like flowers.
8. I broke the glass.

When the pupils have reached this point in their study of the sentence, they may make some such table as the following:

Complete Subject	Predicate	Attribute Complement	Object
John	is	good	
He	has		a dog
The girl	likes		apples

Let them analyze as above and place in their proper compartments the parts of the following sentences, giving, as they do so, their reasons. In analyzing the first sentence, for instance, the pupil will say: "*Cats* is the subject, because something is asserted of them; *catch* is the predicate, because it makes the assertion; *mice* is the object, because it is that which receives the action."

1. Cats catch mice.
2. The boy is tall.
3. The clock was old.
4. A boy was making kites.
5. The kite had a tail.
6. It flew.
7. Gold is heavy.
8. My home was beautiful.
9. The dog was running.
10. The pupil knows the lesson.
11. Cats scratch.
12. Horses eat corn.

Such sentences as the fourth and the ninth will call to the attention of the pupils the fact that a predicate is not always only one word, but the subject of conjugation need not be taken up just at this point.

The Noun. The first part of speech which is given definite treatment is of course the noun. The statement that "a word used to name an object is a noun" is so simple that the children will find no difficulty in understanding this first part of speech; but after the word *noun* is learned it should be used—"name" and "name word" and such expressions should be dropped. Give plenty of practice in the recognition of nouns, by having the pupils point out all that occur in the following examples:

1. "The breaking waves dashed high
   On a stern and rockbound coast;
   The woods against a stormy sky
   Their giant branches tossed."

2. "Their home was a little hut on the edge of a little village—a Flemish village a league from Antwerp, set amidst flat breadths of pasture and corn-lands, with long lines of poplars and of alders bending in the breeze on the edge of the great canal which ran through it."

3. "I was rich in flowers and trees,
   Humming-birds and honey-bees;
   For my sport the squirrel played,
   Plied the snouted mole his spade;
   For my taste the blackberry cone
   Purpled over hedge and stone;
   Laughed the brook for my delight
   Through the day and through the night."

4. "Up from the meadows, rich with corn,
   Clear in the cool September morn,
   The clustered spires of Frederick stand,
   Green-walled by the hills of Maryland."

Antwerp, in the second selection, and *Frederick* and *Maryland,* in the last, will give opportunity for pointing out the distinction between common and proper nouns.

The Pronoun. The pronoun, the "word used instead of a noun," follows very easily after the work on the noun. *I, you, he, she, it, we, they, who, me, him, her, us, them,* and *whom* may be taken up now, but the possessive forms cannot be understood until after the subject of adjectives has been studied. The nouns, common and proper, and the pronouns may be picked out from the following paragraph, the pronouns being classified from their forms as subject, attribute complement and object:

"In a remote village among some wild hills in the province of Lorraine, there lived a countryman whose name was Jacques d'Arc. He had a daughter, Joan of Arc, who was at this time in her twentieth year. She had been a solitary girl from her childhood; she had often tended sheep and cattle for whole days where no human figure was seen or human voice heard; and she had often knelt, for hours together, in the gloomy, empty, little village chapel, looking up at the altar, and at the dim lamp burning before it, until she fancied that she saw shadowy figures standing there, and even that she heard them speak to her. The people in that part of France were very ignorant and very superstitious; and they had many ghostly tales to tell about what they had dreamed, and what they saw among the lonely hills when the clouds and mists were resting on them. So they easily believed that Joan saw strange sights, and they whispered among themselves that angels and spirits talked to her."

The Verb. The study of the verb comes next, and while this is more complicated than the work on the noun, there is no reason why it should not be so presented as to be perfectly simple. The definition usually given of a verb is that it is "a word which asserts." There is a difficulty in this, however; the word *assert* has been used of the predicate of a sentence, and there is a danger that the pupils will become confused when such verb forms as *giving, given* are introduced, since these forms obviously never of themselves assert anything. The old definition that "a verb is a word that tells what some object is or does" is as simple a starting point as any. The distinction between transitive and intransitive verbs may be easily connected with the study of the object complement, and if that work has been thorough there is no reason why the classification of verbs as transitive and intransitive should give any trouble. For drill, the verbs in the following sentences may be classified in this way:

1. Mary is a good child, but she has a quick temper.
2. The cat has sharp claws.
3. The dog runs swiftly.
4. The river carries ships to the sea.
5. I see four pine trees from my window.
6. The girl sang well.
7. She sang a beautiful song.

(These last two sentences may be used to show how the same verb may be both transitive and intransitive.)

8. I stood on the bridge.
9. You own a horse, do you not?
10. The sun shines.
11. The rain freshens the flowers.
12. The flowers grow.
13. I like dogs and horses; you like cats.
14. I walked slowly.

Inflection. The word *inflection* is not too difficult to introduce to seventh-grade pupils, but it should be introduced after the fact of inflection, not before. Call attention first to the fact that verbs do something in sentences besides asserting. When we say "I *eat* an apple," "I *ate* an apple," the verb tells us that there is a difference in time in the two actions; when we say "I *go* to school," "I *may go* to school," the verb tells us that in one case the speaker is certain, in the other doubtful. Different forms of the verb are necessary if it is to tell us all of these things when used in a sentence. Write on the board *give, gives, gave, giving, given* and ask the pupils how many words you have written; then explain that these five are really only five different forms of the one word *give*. The use of copulas, *is, has, may*, etc., may be introduced here, by showing that even the five forms of the verb *give* cannot always tell us all that a verb needs to tell.

Point out, too, that some forms of the verb can assert, while others have not that power; "I *give*," "you *gave*," "he *gives*" assert, while *giving* and *given* do not, however they may be used. Such forms of the verbs as do not assert are called *verbals*. Give a brief drill on verbals, letting the pupils pick them out from the following list:

have, has, having, had.
go, goes, going, went, gone.
break, breaks, breaking, broke, broken.
buy, buys, buying, bought.
bring, brings, bringing, brought.
paint, paints, painting, painted.

The study of verbals leads up to the *verb phrase*—the combination of one or more verbals with a verb. By combining the forms picked out as verbals above with copulas, the verbals may be used in making assertions. Perhaps the simplest definition that can be given of a verb phrase is that it is "a group of words used like a verb of one word." Verb phrases may be pointed out in the following sentences:

1. The sun has risen.

2. The moon rose.
3. The children were playing.
4. He has learned his lessons.
5. They did their work.
6. We earned the money.
7. The boys will run races at the picnic.
8. I shall go tomorrow.
9. She lost her book.
10. The cat is watching for a mouse.
11. The girls were having a good time.
12. We had much trouble before we found it.

Have each of the above sentences rewritten, directing the pupils to employ different forms of the same verbs, so that where simple verbs are now used there may be a verb phrase, and where there are now verb phrases, verbs of one word may be used. The first sentence would thus be written:

The sun *rose*, or
The sun *rises*.

It is not necessary that the time expressed be the same.

The Adjective. The adjective, with its uses as direct modifier and as attribute, and the adverb, modifying verb, adjective or adverb, should next be introduced, and from the study of these two parts of speech the transition may be made to adjectives and adverb phrases and clauses. This brings in the study of prepositions, conjunctions and relative pronouns. In connection with the complex sentences, or those containing dependent clauses, may be introduced the compound sentence, with its two or more coördinate parts. A list of sentences is given here, which may be used for drill in work with all of these topics.

(a) Pick out the adjectives in the following sentences and tell whether they are direct modifiers or attributes:

1. The long day is over.
2. The blue flowers have faded.
3. Over the brown fields the pale autumn sun shone.
4. The water is cold.
5. The days in summer are long and sunny.
6. On the chill days of November we long for the bright, fresh days of spring.
7. The red leaves of the vine are beautiful against the dark, shaggy trunk of the old tree.
8. Far above us, graceful birds circled in the blue sky.
9. Do you think these red flowers will be pretty in this green vase?
10. The soft, fleecy snow has covered up the ugly, bare ground.
11. She is well, but her sister is ill.
12. I have been very happy all day.

(b) Pick out the adverbs in the following sentences and tell whether they express place, direction, manner, degree, time when, or duration of time. Also point out the word which each adverb modifies:

1. She plays well.
2. She plays very well.
3. I am extremely sorry that you cannot go.
4. The frightened animal fled still more rapidly.
5. The Indian vanished swiftly in the forest.
6. Put it there.
7. The crayfish scuttled backward.
8. He seems to do everything easily.
9. If you do not do it now, you will never do it.
10. They worked long and hard.
11. The army moved forward as one man.
12. He searched eagerly for the house where he had lived so happily.
13. A very tall man rose and said emphatically, "We are wasting the swiftly passing time in utterly useless debate."

(c) Pick out the prepositions in the following sentences, and tell what each prepositional phrase modifies:

1. Pansies grow in the garden, but their violet cousins grow in the open fields.
2. Through the window came a snowball, which broke against the wall.
3. It was thrown by a small boy who was hiding behind a bush in the garden.
4. Above the tree tops floated a gorgeous kite.
5. Scores of people were rushing toward the spot, asking wildly about the accident.
6. The dog ran around the house and under the barn.
7. It is on the table, just inside the door.
8. Between you and me, I do not believe it.
9. Such talk is out of place among friends.
10. A cottage in the woods is all I desire.
11. This letter from my mother has news for all of us.
12. Beyond the park paling is the unbroken forest.

(d) Tell whether the following sentences are complex or compound, and pick out the clauses. In the case of complex sentences, tell whether the dependent clauses are adjective or adverb clauses, and whether they are introduced by conjunctions or by relative pronouns:

1. She came while I was there.
2. They went, though they should have remained at home.

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3. John and Mary walked rapidly to the top of the hill, but they were afraid to go farther.

4. The man who sent the presents is rich.

5. Birds sing and flowers bloom.

6. The home which I like best of all is too expensive.

7. She ran toward the box that contained the gold.

8. Since I have been here, I have seen two bears.

9. Because his father would not let him go, he ran away.

10. You had better stay at home, for you could never stand the journey.

11. The wind is not blowing, nor does it rain as it did an hour ago.

12. This is the man who wrote the letter.

13. We found the house which we were seeking.

14. The boy whom the teacher scolded yesterday did better today.

15. I prefer to read but I will play tennis if you wish.

16. If you hear from him before I do, send me word.

17. The flowers which I bought yesterday are still fresh, and I think I shall wear them when I go out this evening.

18. She is the girl whom we all love.

19. "The world goes up and the world goes down."

20. He was pardoned, though he was guilty.

21. He was pardoned but he was guilty.

22. I cannot go until my work is done.

23. "Knowledge comes, but wisdom lingers."

24. "You never miss the water till the well runs dry."

25. "Blessed is the man that walketh not in the counsel of the ungodly."

26. Bring me the book which you will find on the table.

No attempt has been made here to instruct the teacher as to just how each of these subjects should be introduced; the intention has been rather to furnish a fund of illustrative material for the needed drill.

For the work on sentence analysis, any or all of the above sentences may be used. A table similar to that used for the simple sentences at the beginning of the year's work may be made, and the various parts of the sentences may be classified under it.

Composition Work. The grammar work should not be emphasized to the exclusion of composition work in this grade. In fact, the composition work may be made a real help in the grammar, for illustrations of the principles being introduced may constantly be found in the compositions, and the pupils may be more easily interested in a form if they know they make use of it themselves. The topics for composition work in this class should be varied from month to month. Here follows a list of suggested composition topics:

1. Why I Should Not Like to Live in ____ (some country being studied in geography).
2. The Woods in Autumn.
3. Our Autumn Out-of-door Games.
4. A Newsboy's Christmas, or,
   A Selfish Girl's Christmas.
5. The Story of Barbara Frietchie (as it might be told to a child of ten).
6. Why I Should Like to Have Lived in the Time of Lincoln (or Washington).
7. A Windy March Day, or
   The First Real Spring Day.
8. What I Have Learned in Grammar This Year.

Poems. Much of the work on poems will come with the reading, but there should be occasional exercises in the grammar class. This does not mean that just the grammatical features are to be taken up, for while it may be very beneficial to point out ways in which the poetical expression differs from the prose, a poem may well be spoiled by too long dwelling on such points. But the re-telling of stories, the reproduction of descriptions contained in poems, and the putting into words of the impression produced by a part or the whole will make helpful exercises. The following poems are suitable for use in this grade:

The Building of the Ship—Longfellow.
A *Robin Hood* Ballad.
The Courtin'—Lowell.

Subject Modifiers			Subject	Predicate	Predicate Modifiers			Object	Attribute
Word	Phrase	Clause			Word	Phrase	Clause		
A gorgeous			kite	floated		above the tree tops			
This	from my mother		letter	has		for all of us		news	
The	who sent the presents		man	is					rich

The Song of the Brook—Tennyson.
The Diverting History of John Gilpin—Cowper.
The Children's Hour—Longfellow.
Rhoecus—Lowell.
The Hot Season—Holmes.
The Old Clock on the Stairs—Longfellow.

As it may not always be possible to find a *Robin Hood* ballad, we give here the one dealing with *Robin Hood and the Stranger.*

ROBIN HOOD AND THE STRANGER

Come listen awhile, you gentlemen all,
With a hey down, down, a down, down,
That are this bower within,
For a story of gallant bold Robin Hood,
I purpose now to begin.

"What time of day?" quoth Robin Hood then;
Quoth Little John, "'Tis in the prime."
"Why then we will to the green-wood gang,
For we have no vittles to dine."

As Robin Hood walkt the forest along,
It was in the mid of the day,
There he was met of a deft young man
As ever walkt on the way.

His doublet was of silk, he said,
His stockings like scarlet shone,
As he walkt on along the way,
To Robin Hood then unknown.

A herd of deer was in the bend,
All feeding before his face;
"Now the best of your Ile have to my dinner,
And that in a little space."

Now the stranger he made no mickle adoe,
But he bends a right good bow,
And the best buck in the herd he slew,
Forty good yards him froe.

"Well shot, well shot," quod Robin Hood then,
"That shot it was shot in time;
And if thou wilt accept of the place,
Thou shalt be a bold yeoman of mine."

"Go play the chiven," the stranger said;
"Make haste and quickly go,
Or with my fist, be sure of this,
Ile give thee buffets sto'."

"Thou had'st not best buffet me," quod Robin Hood,
"For though I seem forlorn,
Yet I can have those that will take my part,
If I but blow my horn."

"Thou wast not best wind thy horn," the stranger said,
"Beest thou never so much in haste,
For I can draw out a good broad sword,
And quickly cut the blast."

Then Robin Hood bent a very good bow
To shoot, and that he would fain;
The stranger he bent a very good bow,
To shoot at bold Robin again.

"O hold thy hand, hold thy hand," quod Robin Hood,
"To shoot it would be in vain;
For if we should shoot the one at the other,
The one of us may be slain.

"But let's take our swords and our broad bucklèrs,
And gang under yonder tree."
"As I hope to be sav'd," the stranger said,
"One foot I will not flee."

Then Robin lent the stranger a blow
'Most scar'd him out of his wit:
"Thou never felt blow," the stranger he said,
"Thou shalt be better quit."

The stranger he drew out a good broad sword,
And hit Robin on the crown,
That from every haire of bold Robin's head,
The blood ran trickling down.

'God a mercy, good fellow!" quod Robin Hood then,
"And for this that thou hast done,
Tell me, good fellow, what thou art,
Tell me where thou doest wone."

The stranger then answered bold Robin Hood,
"Ile tell thee where I did dwell;
In Maxwel town I was bred and born,
My name is young Gamwel.

"For killing of my own father's stewàrd,
I am forc'd to this English wood,
And for to seek an uncle of mine;
Some call him Robin Hood."

"But art thou a cousin of Robin Hood then?
The sooner we should have done."

"As I hope to be sav'd," the stranger then said,
"I am his own sister's son."

But lord! what kissing and courting was there,
When these two cousins did greet!
And they went all that summer's day,
And Little John did (not) meet.

But when they met with Little John,
He unto them did say,
"O master, pray where have you been,
You have tarried so long away?"

"I met with a stranger," quod Robin Hood,
"Full sore he has beaten me."
"Then Ile have a bout with him," quod Little
John,
"And try if he can beat me."

"Oh no, oh no," quoth Robin Hood then,
"Little John, it may not be so;
For he is my own dear sister's son,
And cousins I have no mo'.

"But he shall be a bold yeoman of mine,
My chief man next to thee;
And I Robin Hood, and thou Little John,
And Scalock he shall be."

There are a number of expressions in this old poem which will not be clear to a modern reader. Explain to the pupils the nature of the old ballads, as given in the fifth-year work, and tell them the meanings of the following words:

"Gang" is a Scotch word meaning *go;* "deft" means *carefully dressed, neat;* "Ile" is an old spelling for *I'll;* "Mickle adoe" means *much adoo;* "froe" is *from*—the strange order of this line is due to the ballad form. No one can be just sure what "chiven" means, but it is probably an old word for *coward;* "buffets sto'" means *store of buffets;* "quod" is an old form for *quoth.* "Cousin" formerly meant almost any relative; here it means *nephew.* "Mo'" is a shortened form of *more,* as "sto'" is of *store,* above.

Eighth Year

Introduction. The eighth-grade work in grammar is a continuation of the seventh-grade work in an unusually real and close sense. There is little that is new introduced in the eighth year, but all of the subjects studied in the seventh year are expanded and systematized.

Nouns. The definition of this part of speech, together with many facts about it, was learned in the seventh grade. There yet remains, however, much systematic information about the noun which the pupils have not yet had given to them. The division into common and proper nouns has been touched upon, but it may be emphasized here, together with the further division of common nouns into classes. Lists of *collective* nouns, names which denote a group, and of *abstract* nouns, words which name qualities, conditions or actions, may be made. Have collective and abstract nouns pointed out in the following sentences:

1. A crowd gathered rapidly.
2. Truth crushed to earth will rise again.
3. Praise the Lord for his goodness.
4. I find much pleasure in talking with him.
5. The row of houses looked bright and fresh in the sunlight.
6. My memory is not good.
7. Honesty is the best policy.
8. She had much trouble with her children.
9. Death comes to all.
10. The whole tribe was in arms.
11. A great herd of cattle was frightened by the storm.
12. His weight has increased.
13. One needs a good imagination to call up during the winter a picture of a summer day, with groups of children playing on the lawn, flocks of birds hovering over the trees, and the wonderful summer "feel" in the air.

Let the pupils make a list of all the ways they have studied in which nouns may be used: as subject, as object, as attribute, as part of a prepositional phrase. Add to these the uses as possessive modifier, as indirect object, independently in address, and in apposition. In the following sentences, the italic words illustrate the various uses in the order given above:

1. The *bird* flies.
2. He threw a *stone.*
3. John is a good *boy.*
4. I found the book on the *table.*
5. The *boy's* hat blew off.
6. The teacher sent his *mother* a note.
7. *John,* come here this instant!
8. Mr. Smith, an upright, intelligent *man,* was elected.

After the pupils thoroughly understand the use of each noun in the above sentences, they may tell the way in which each one in the following sentences is used:

1. Child, did you not hear me call you?
2. He is a strong man, in mind as well as in body.
3. Did you see the mountains while you were away?
4. Rover, the most faithful dog I ever knew, is dead.
5. Mother, may I go out to swim?
6. He bought books, books, nothing but books.
7. The prisoner is guilty; there is no doubt about that fact.
8. The violet is a dainty flower.
9. The violet is one of the daintiest of flowers.
10. Father, John says that in the woods he saw a squirrel, a tiny fellow, steal a bigger squirrel's horde of nuts.
11. Give John that apple.
12. They never offer a visitor a chair.

The regular formal inflection of nouns follows this. Explain first the reason for inflection of nouns—to indicate differences in number and in case—and tell the pupils that inflection in English is very much simpler than in any of the ancient languages or many of the modern. The matter of number will give them little trouble, for they have been used to considering singular and plural forms of nouns ever since they began language study. But in dealing with the question of *case*, be sure that all understand that while there are only two case *forms* of a noun (as *boy, boy's*) there are three *cases*, one form doing duty for nominative and objective. Let them now turn back to the sentences on page 532 and classify each noun according to number and case. A little table may be worked out, dividing up the various uses of nouns which they have been studying according to the cases which they demand.

Nominative Case	Possessive Case	Objective Case
subject attribute independently in address in apposition with another noun in nominative.	possessive modifier in apposition with another noun in possessive	object part of prepositional phrase indirect object in apposition with another noun in objective

Of course rules for the formation of plurals and possessives, together with a discussion of gender in English, form a part of this work on inflection.

Pronouns. The classes of pronouns, personal, relative, interrogative, adjective, will require considerable drill, though if each step is connected as closely as possible with the work which has previously been done on the noun, the subject will be much simplified. When the subject of inflection is reached, call the attention of the pupils to the fact that certain of the pronouns have fuller inflections than have the nouns, possessing, indeed, a distinct form for each case of each number.

	Singular	*Plural*
Nominative:	I	we
Possessive:	my, mine	our, ours
Objective:	me	us

An interesting exercise will consist in letting the pupils try to use each kind of pronoun in as many as possible of the constructions in which nouns are used. Take, for example, the third personal pronoun, *he, his, him*. It may be used:

(a) As subject: *He* crossed the river.
(b) As object: John saw *him* yesterday.
(c) As attribute: Yes, it was *he* who did it.
(d) As object of preposition: In *him* I find my ideal.
(e) As possessive modifier: He snatched *his* hat.
(f) As indirect object: The teacher gave *him* the prize.
(g) In apposition: The stranger, *he* in the fur coat, is from Alaska.

This work with the personal pronouns is comparatively easy; that on the relative will be a little more difficult. The following will serve as examples of what may be done:

(a) As subject: The man *who* bought our house is here.
(b) As object: There is one boy *whom* we all like.
(c) As object of preposition: There is the woman to *whom* I gave the message.
(d) As possessive modifier: The boy *whose* hat was knocked off was very angry.

Although all of the pupils may have had drill on the correct forms of pronouns, there is no danger that they will be given too much practice. Let the blanks in the following sentences be filled in with the proper forms of the pronouns:

1. The man ...... you met is my father.

2. I shall give this to the person to ...... it belongs.

3. If you and ...... (3rd person) will go, I shall go too.

4. She asked her and ...... (1st person) to come to the house after school.

5. ...... do you suppose I met today?

6. ...... do you think he meant?

7. They demanded to know ...... I was waiting for.

8. Frank, John and ...... (1st person) will do it for you.

9. Was that John in the first seat? No, it was not ......

10 I do not think that it could have been ...... (3rd person).

11. He declared that it was not ...... (3rd person) who broke the window.

12. The teacher scolded Mary and ...... (1st person) for being late.

13. Jane is crying because some bad boys hit Mary and ...... (3rd person) with snowballs.

14. ...... that honor me, I will honor.

Adjectives. The work on adjectives includes a review of their various uses, as studied in the seventh grade, and a drill on the comparison of adjectives.

Verbs. The subject of verbs will need much time, for conjugation is not a simple subject, and nothing but continued drill will make the pupils familiar with it. The fact that each number, each person, each mode and sometimes each tense does not have a distinct form makes the memorizing of conjugations easier, but makes parsing more difficult, because there are not always "tags" to help the pupil recognize each form. Another source of error which must be cleared away is the idea that the name of the tense always tells the time of the action. Thus in the sentence "He *leaves* town next week," the verb form is present, but the time is plainly future; in the sentence "Even though he *saw* me, he would not speak to me," the subjunctive *saw* is past in form, but present or future in meaning.

The difference between weak, or regular, verbs, which form their past tense and past participle by adding *d* or *ed*, and strong, or irregular, verbs, which make those forms by changing the vowel of the root, should be emphasized.

Regular: play, played, playing, played.
Irregular: write, wrote, writing, written.

There are certain verbs which resemble each other in form whose past tenses are likely to give trouble. There should be, therefore, special drill on such verbs as

sit	sat	sat
set	set	set
lie	lay	lain
lay	laid	laid
rise	rose	risen
raise	raised	raised

It is impossible to give here complete directions for the method of presenting all phases of this subject of the verb; any good textbook, however will, with the aid of the teacher, make the subject clear.

Parsing. The parsing of sentences is a very important part of this year's work. It forms, in fact, in itself a complete review of all that has been learned about sentences and about the parts of speech. Too much emphasis cannot be placed on this subject. The exact form of words in which the parsing is done may vary, but each teacher should have a method which should be rather rigidly adhered to. In parsing a noun, the following facts regarding it should be given:

1. The class to which it belongs.
2. Its number and gender.
3. Its case.
4. The reason for its case—that is, its construction in the sentence.

In parsing a verb or verb phrase the following facts should be given:

1. Class—whether transitive or intransitive, regular or irregular.
2. Principal parts.
3. The voice, mode, tense.
4. The person and number, and the subject with which it agrees.

A personal or relative pronoun is parsed as a noun is parsed, except that there is no distinction between common and proper, while the person and the antecedent, if there is one, must be mentioned.

In parsing an adjective, give:

1. The class to which it belongs.
2. The degree.
3. Its use.

In parsing an adverb, tell:

1. The kind of adverb, whether of time, place, manner, etc.
2. The verb, adjective or adverb which it modifies.

To parse a preposition, state its object and the relation which the phrase bears to some other word in the sentence; to parse a conjunction, tell whether it is coördinate or subordinate, what elements of the sentence it connects, and what its special significance is.

The complete parsing of a sentence should proceed about as follows:

"His house, which was very old, burned quickly."

"His" is a third personal pronoun, singular number, masculine gender and possessive case. It is a possessive modifier of "house."

"House" is a common noun. It is in the singular number, neuter gender and nominative case. It is the subject of the sentence.

"Which" is a relative pronoun, singular number, neuter gender and nominative case. It is the subject of the clause "which was very old." Its antecedent is "house."

"Was" is an irregular copulative verb. The principal parts are *is, was, being, been*. It is in the indicative mode and the past tense. It is third person, singular number, agreeing with "which," the subject of the clause.

"Very" is an adverb of degree, modifying the adjective "old."

"Old" is a descriptive adjective. It is in the positive degree, and is used attributively, after "was."

"Burned" is a regular, intransitive verb. The principal parts are *burn, burned, burning, burned*. It is in the active voice, indicative mode and past tense. It is in the third person and singular number, agreeing with "house," the subject of the sentence.

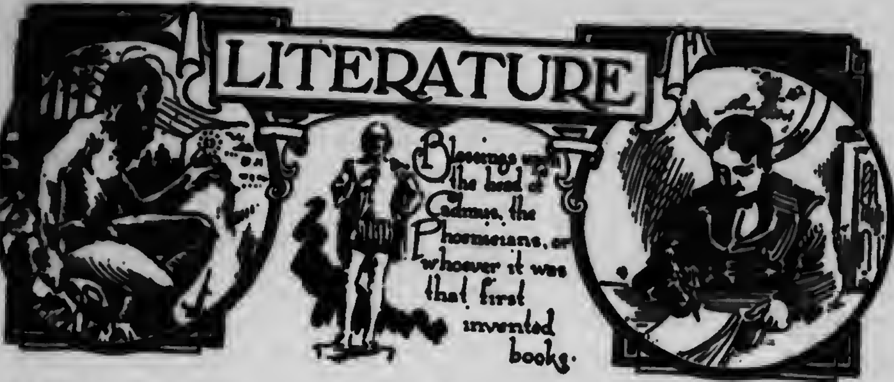
"Quickly" is an adverb of manner, modifying the verb "burned."

Composition Work. The same general directions apply to composition work in this grade as were given for the seventh grade. The following list of topics is meant to be suggestive merely; the teacher can relate the subjects with the work in other classes:

1. An original story on "The Last Day of Johnny's Vacation."
2. A letter from Norway, telling of the midnight sun.
3. Indian Summer.
4. An Original Fable.
5. A Visit to a Haunted House.
6. What I Shall Have in My Garden.
7. My Kitten, or, My Dog.
8. A letter to some author whose stories or poems you have read.
9. A Moonlight Evening.

Poems. Any or all of the following poems will be good material for study in this grade:

The Gift of Tritemius—Whittier.
Herve Riel—Browning.
To a Mountain Daisy—Burns.
The Chambered Nautilus—Holmes.
The Burial of Sir John Moore—Charles Wolfe.
O Captain! My Captain!—Whitman.
The Last Leaf—Holmes.
Abou Ben Adhem—Leigh Hunt.



What Literature Is. We use the word "literature" very commonly, and yet if we were called on to give a definition of it, many of us might find the question embarrassing. The simplest way out of the difficulty would be to say that literature means everything that has been set down in writing and preserved. That is, English literature would include everything that has been produced in the English language, from the Scripture commentaries of the earliest ecclesiastics to the last feeble volume of verse which has just come from the press. However, such a definition is too wide really to be accepted, and the term "literature" has come to mean a much more restricted thing. When a professor of mathematics turns over eagerly the leaves of a new technical work on differential calculus, he is not reading literature; when a boy, hidden behind the barn, devours cheap tales of the lives of bandits, he is not reading literature. As distinguished from what is merely technical, from what is harmful, or from what is of a merely passing interest, literature is the body of writings which by reason of beauty of form or beauty or interest of content make a continued appeal to the higher emotions or the intellect of men. Even when we have narrowed the definition this much it is very wide, embracing as it does poems, dramas, essays, biographies, histories, novels, orations and countless writings which cannot be classified under any of those heads. Wherever we find it, that which brightens, uplifts, encourages, is literature.

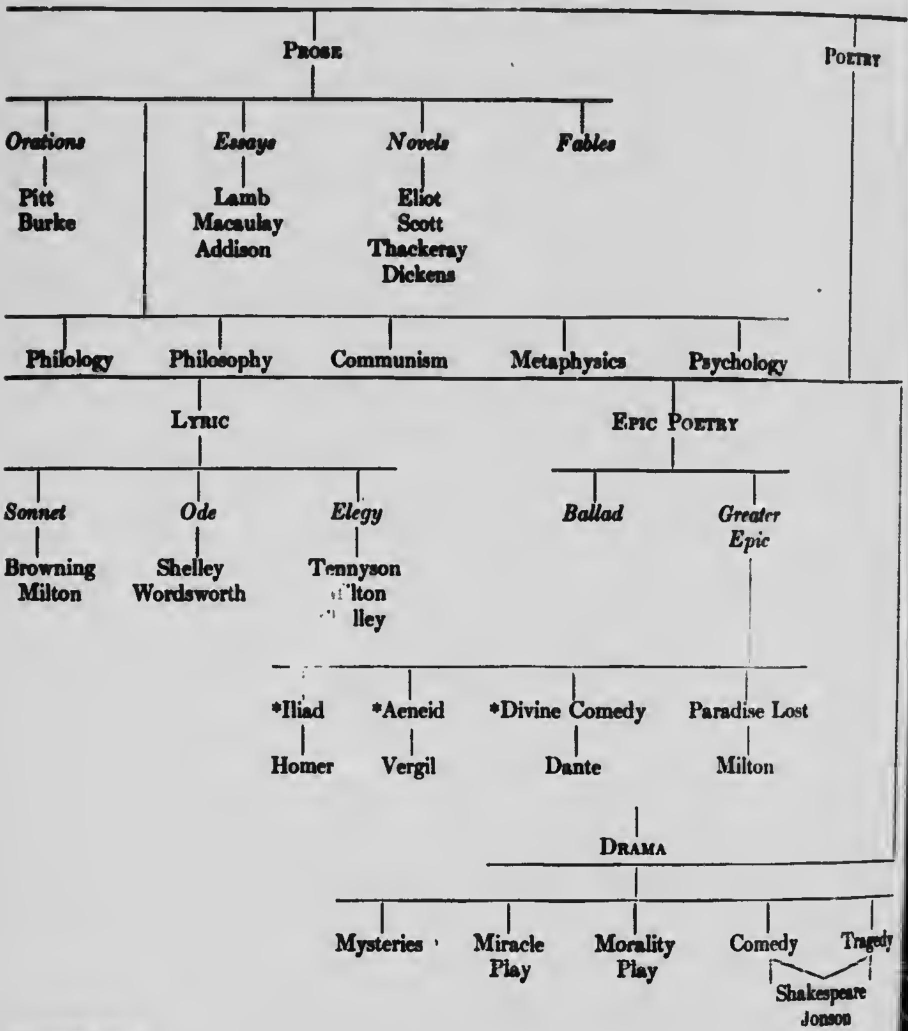
Poetry and Prose. The two great obvious divisions of literature are poetry and prose, and we are likely, as we think casually of the question, to take for granted that prose was the earlier form of literature. Moliere in one of his comedies shows the surprise of an old man who discovers that he has been, all his life, "talking prose without knowing it;" but most of us are conscious that we "talk prose," and we see nothing wonderful about it. Prose is so much simpler and more natural than poetry, we think, and surely the early nations must have had a well-developed prose literature before they ventured to attempt poetry.

But when we study just a little way into the subject, we find that such was far from being the case. Centuries and centuries before there was any attempt to produce a prose literature, poetry flourished. And this, when we come to think of it, is natural enough; for just because the daily speech was so commonplace a thing, no effort was made to preserve it. It would have been, moreover, a difficult thing to hand down by word of mouth prose dissertations on any subject. With poetry the case was different. Every nation, it seems, has in its early stages naturally expressed itself in poetry. That does not always mean poetry such as we know so well today; it does not mean rhyme and a rhythmic swing which our ears can recognize as such. But it does, in every case, mean something which had a rhythm to the ears of the people who produced it; something which could be sung or chanted to a musical accompaniment. For invariably, in its earliest stages, poetry belonged with music, and both were the outgrowth of religion. Hymns were sung to the gods, rhythmic accounts of their great deeds were chanted. Gradually, the figurative manner of speech, the musical form without the music, began to be used in writing of other things than religion. Naturally enough—for the step from the gods to the heroes was not a great one with primitive peoples—the deeds of the men of might were celebrated. Thus narrative poetry, the ambitious epic and the simple ballad were among the earliest forms of poetry.

These poems, or songs, were handed down by word of mouth from generation to generation, sometimes through centuries, before they were set down in writing. Thus, when we read an old ballad, such as the "Robin Hood" ballad which is given on page 536 of this volume, we may feel that we are reading what our ancestors in Great Britain, hundreds of years ago, heard repeated or chanted to the music of the harp, as they sat about their huge hearth fires.

Long before the invention of the printing press in the fifteenth century prose literature had begun to assume an importance; but from that time on its importance increased immeasurably. If a man wished to reach many people, he could do it more easily and more surely by writing what he wished to say and having it printed than by any other method. Religious arguments, political theories, discussions on ancient literature—all such subjects were dealt with; but it was some time before a really artistic prose literature began to grow up.

ENGLISH LITERATURE



*Translations.

MILESTONES IN ENGLISH LITERATURE

AGE OF CHAUCER

Chaucer, the Father of English poetry.

The Canterbury Tales.

The Allegoric Type.

AGE OF SHAKESPEARE

Shakespeare the leader and master spirit of the Age of Elizabeth.

The great analyst of human nature.

The Historic Type.

AGE OF MILTON

Milton, the Puritan.

Paradise Lost and Paradise Regained.

The Epic Type.

AGE OF BROWNING

Browning as a teacher the prince of poets.

The great optimist and modern apostle of faith.

The Philosophic Type.

THE SCORE OF ENGLISH LITERATURE

THE GOLDEN AGE

Non-dramatic Poetry.

Spenser, Sackville, Sidney, Chapman, Drayton.

Dramatic.

Shakespeare, Marlowe, Jonson, Beaumont, Fletcher, Webster, Middleton, Heywood, Dekker, Massinger, Ford, Shirley.

Prose.

Historical—Sir Walter Raleigh.

Theological—Richard Hooker.

Philosophical—Francis Bacon.

FROM MILTON TO SCOTT

Poetry.

Milton, Cowley, Dryden, Pope, Young, Gray, Goldsmith, Cowper, Burns, Scott, Byron, Keats, Wordsworth, Coleridge, Southey, Shelley.

Prose.

Walton, Taylor, Baxter, Milton, Bunyan, Locke, Newton, Addison, Steele, Swift, Defoe, Richardson, Fielding, Johnson, Hume, Gibbon, Burke, Scott, Lamb.

THE VICTORIAN AGE

Poetry.

Tennyson, Browning, Elizabeth Barrett Browning, Macaulay, Rossetti, Morris, Swinburne, Arnold.

Historical.

Macaulay, Hallam, Froude.

Essayists.

Macaulay, DeQuincey, Carlyle, Ruskin, Arnold.

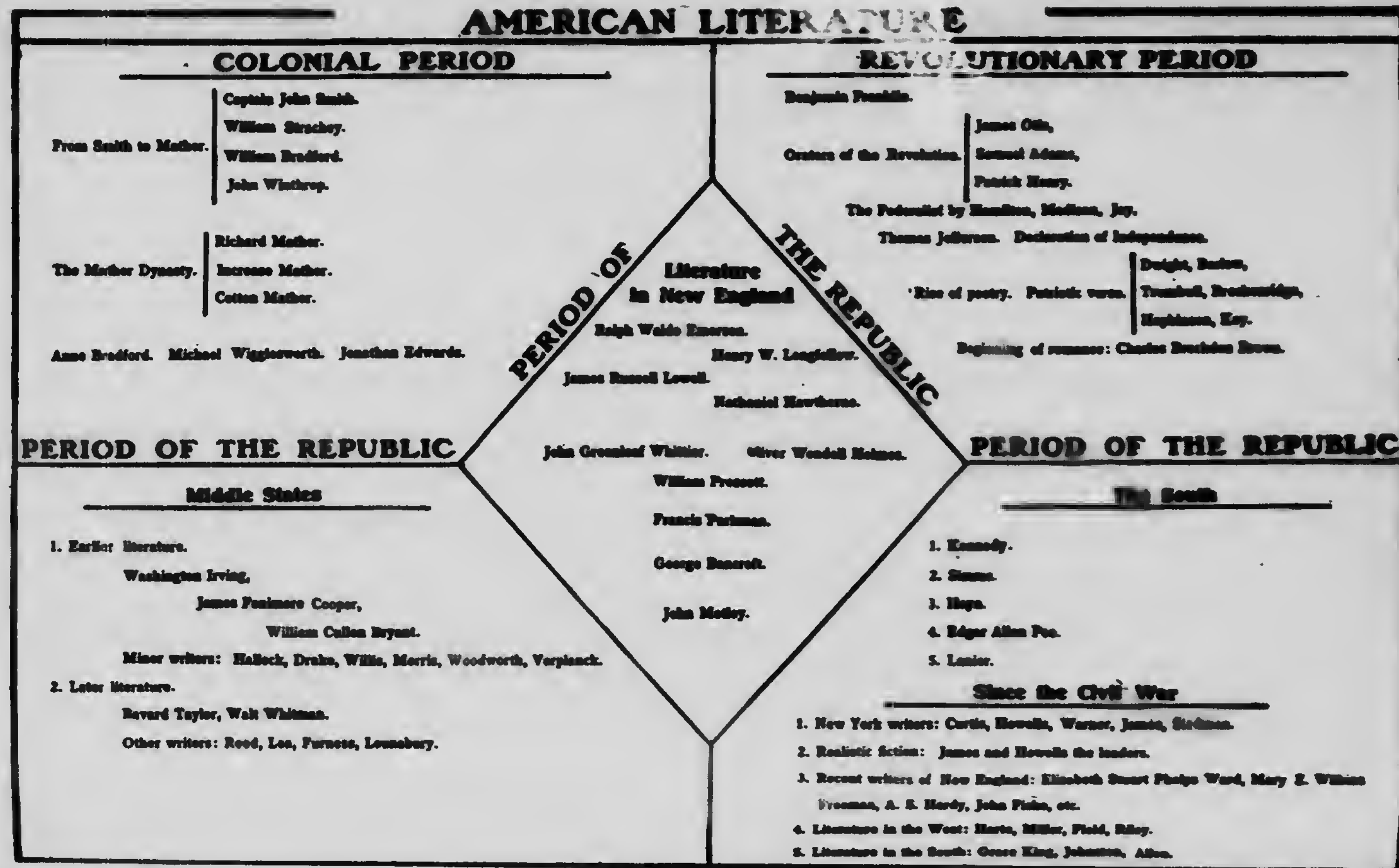
Scientific and Philosophical.

Hamilton, Lyell, Darwin, Huxley, Tyndall, Wallace, Spencer.

Novelists.

Dickens, Thackeray, George Eliot, Reade, Trollope, Charlotte Bronte, Lytton, Kingsley, Mrs. Gaskell, Blackmore, Meredith, Hardy, Stevenson.

SUGGESTION FOR BLACKBOARD OUTLINE



SUGGESTION FOR BLACKBOARD OUTLINE

How to Read Literature. It is not necessary to emphasize here the important part which good literature plays in the building of character and of intellect. But it is not enough that one should read; one should read systematically, with a purpose. This does not mean that all the works of the eighteenth century should be read before those of the nineteenth are touched, or that essays should be read one year and dramas the next. But there is an immense gain in connecting reading in some way with what has gone before. To follow, for instance, the growth of the English novel through the two centuries and a half of its existence will give one a more real knowledge of that most popular of all forms of literature than years of scattered novel-reading can do.

Outlines. The outlines on English and American literature which follow are intended not only to give a general, comprehensive view of the literature of those two countries, but to make possible some such systematic plans of reading. In connection with the articles on the various outlines and on the various forms of literature given in these volumes, these outlines may be used in many ways to suggest schemes of reading:

English Literature

I. Early Literature
 1. Before Chaucer
  a. Poetry
   Beowulf
   Caedmon's Paraphrase
   Vision of Piers Plowman
  b. Prose
   The Venerable Bede
   King Alfred
   John Wyclif
 2. Geoffrey Chaucer
   Legend of Good Women
   The Canterbury Tales
II. Elizabethan Age
 1. Poets and Their Principal Works
  a. Non-Dramatic
   Edmund Spenser. 1552-1599
    Shephearde's Calendar
    Faery Queen
  b. Dramatic
   William Shakespeare. 1564-1616
    The Merchant of Venice
    Hamlet
    Macbeth
   Ben Jonson. 1573-1637
    Every Man in His Humor
   Christopher Marlowe. 1564-1593
    Tamburlaine
 2. Prose Writers and Their Principal Works
  a. Historical
   Sir Walter Raleigh. 1552-1618
    History of the World
  b. Theological
   Richard Hooker. 1553-1600
    The Ecclesiastical Polity
  c. Philosophical
   Francis Bacon
    Novum Organum (New Instrument)
    Essays
III. The Age of Milton
 1. Poets and Their Principal Works
  a. John Milton. 1608-1674
    Paradise Lost
    L'Allegro
    Il Penseroso
  b. Abraham Cowley. 1618-1667
    Davideis
 2. Prose Writers and Their Principal Works
  a. Izaak Walton. 1593-1683
    The Compleat Angler
  b. Jeremy Taylor. 1613-1667
    Holy Living and Holy Dying
  c. Dr. Richard Baxter. 1615-1691
    The Saints' Everlasting Rest
    Call to the Unconverted
  d. John Milton
    Areopagitica
    Tenure of Kings and Magistrates
IV. The Age of Restoration
 1. Poets and Their Principal Works
  a. John Dryden. 1631-1700
    Alexander's Feast
    Religio Laici
    Hind and Panther
 2. Prose Writers and Their Principal Works
  a. John Bunyan. 1628-1688
    Pilgrim's Progress
    Life and Death of Mr. Badman
  b. John Locke. 1632-1704
    Essay Concerning Human Understanding
  c. Sir Isaac Newton. 1642-1727
    The Principia
    Optics
V. Augustan Age
 1. Poets and Their Principal Works
  a. Alexander Pope. 1688-1744
    Essay on Man
    Iliad
    Dunciad
  b. Edward Younge. 1681-1765
    Night Thoughts
    Revenge
 2. Prose Writers and Their Principal Works
  a. Joseph Addison. 1672-1719
    Sir Roger de Coverley Papers
    Essays
  b. Richard Steele. 1672-1729
    Essays
  c. Jonathan Swift. 1667-1745
    Gulliver's Travels
    Journal to Stella
  d. Daniel Defoe. 1661-1731
    Robinson Crusoe
    Journal of the Plague Year
VI. The Age of Johnson
 1. Poets and Their Principal Works

a. Thomas Gray. 1716-1771
Elegy Written in a Country Churchyard
The Bard
b. Oliver Goldsmith. 1728-1774
The Vicar of Wakefield
The Traveler
She Stoops to Conquer
The Deserted Village
c. William Cowper. 1731-1800
The Task
The Diverting History of John Gilpin
d. Robert Burns. 1759-1796
Cotter's Saturday Night
Tam O'Shanter
2. Prose Writers and Their Principal Works
a. Samuel Richardson. 1689-1761
Pamela
b. Henry Fielding. 1707-1754
Tom Jones
c. Samuel Johnson. 1709-1784
Rasselas
d. David Hume. 1711-1776
History of England
Essays
e. Edward Gibbon. 1737-1794
Decline and Fall of the Roman Empire
f. Edmund Burke. 1729-1797
On Conciliation with America

VII. Age of Scott
1. Poets and Their Principal Works
a. Walter Scott. 1771-1832
The Lady of the Lake
Marion
Lay of the Last Minstrel
b. George Gordon Byron. 1788-1824
Childe Harold's Pilgrimage
Don Juan
The Giaour
c. John Keats. 1795-1821
Endymion
Eve of St. Agnes
Hyperion
Lamia
d. The Lake School
William Wordsworth. 1770-1850
Ode on Immortality
Lines on Tintern Abbey
The Excursion
We Are Seven
Samuel Taylor Coleridge. 1772-1834
The Ancient Mariner
Kubla Khan
Christabel
Robert Southey. 1774-1743
Joan of Arc
Roderick, The Last of the Goths
The Curse of Kehama
Percy Bysshe Shelley. 1792-1822
Queen Mab
Ode to the West Wind
Ode to a Skylark
2. Prose Writers and Their Principal Works
a. Novelist
Walter Scott. 1771-1832
Ivanhoe
Kenilworth
Quentin Durward
Guy Mannering
b. Essayist
Charles Lamb. 1775-1834
Tales from Shakespeare
Essays of Elia

VIII. Victorian Age
1. Poets and Their Principal Works
a. Alfred Tennyson. 1809-1892
The Princess
In Memoriam
Idylls of the King
Maud
b. Elizabeth Barrett Browning. 1806-1861
Sonnets from the Portuguese
Aurora Leigh
Prometheus Bound
c. Robert Browning. 1812-1889
My Last Duchess
Andrea del Sarto
The Ring and the Book
Rabbi Ben Ezra
d. Thomas Babington Macaulay. 1800-1859
Lays of Ancient Rome
The Battle of Ivry
e. Jean Ingelow. 1820-1897
Divided
2. Prose Writers and Their Principal Works
a. Historical
Thomas Babington Macaulay
History of England
Henry Hallam. 1777-1859
Constitutional History of England
James Anthony Froude. 1818-1894
History of England
Thomas Carlyle: A History
b. Essayists
Thomas DeQuincey. 1785-1859
Confessions of An Opium Eater
Joan of Arc
The English Mail Coach
Thomas Carlyle. 1795-1881
Sartor Resartus
French Revolution
John Ruskin. 1819-1900
Seven Lamps of Architecture
Stones of Venice
Sesame and Lilies
c. Theological
John H. Newman. 1801-1890
Apologia pro Vita sua
Lead Kindly Light
C. H. Spurgeon. 1834-1892
The Saint and His Saviour
Speeches at Home and Abroad
d. Scientific
Sir William Hamilton. 1788-1856
Discussions on Philosophy and Literature
Sir Charles Lyell. 1797-1875
Elements of Geology

Antiquity of Man
Charles Darwin. 1809-1822
Origin of Species
Descent of Man
Thomas Huxley. 1825-1895
Man's Place in Nature
Elements of Comparative Anatomy
Herbert Spencer. 1820-1902
First Principles
a. Novelists
Charles Dickens. 1812-1870
Pickwick Papers
David Copperfield
Nicholas Nickleby
William Makepeace Thackeray. 1811-1863
Henry Esmond
The Newcomes
Vanity Fair
George Eliot. 1819-1880
Silas Marner
Adam Bede
Felix Holt

IX. Modern Period
1. Poets and Their Principal Works
a. Dante Gabriel Rossetti. 1828-1882
The House of Life
The Blessed Damosel
b. Matthew Arnold. 1822-1888
Sohrab and Rustum
Dover Beach
c. Algernon Charles Swinburne. 1837-1909
A Song of Italy
Poems and Ballads
2. Prose Writers and Their Principal Works
a. Charles Kingsley. 1819-1875
Hypatia
Westward Ho
b. Robert Louis Stevenson. 1850-1894
Dr. Jekyll and Mr. Hyde
Treasure Island
c. Rudyard Kipling. 1865-
The Jungle Book
Kim

American Literature

I. Colonial Period
1. Poets and Their Principal Works
a. Anne Dudley Bradstreet. 1612-1672
The Tenth Muse
2. Prose Writers and Their Principal Works
a. Thomas Hooker. 1586-1647
Fundamental Orders—First Written Constitution
b. Cotton Mather. 1667-1728
Witchcraft
Wonders of the Invisible World
Magnalia
c. Jonathan Edwards. 1703-1758
Freedom of the Will
d. Benjamin Franklin. 1706-1790
Poor Richard's Almanac
Essays
Autobiography

II. Revolutionary Period
1. Poets and Their Principal Works
a. Philip Freneau. 1752-1832
The British Prison Ship
Political Poems
b. John Trumbull. 1750-1831
McFingal
c. Francis Scott Key. 1780-1843
Star Spangled Banner
2. Prose Writers and Their Works
a. Alexander Hamilton. 1757-1804
The Federalist
b. Thomas Jefferson. 1743-1826
Rights of British America
Declaration of Independence
c. James Madison. 1751-1836
The Federalist
e. Charles B. Brown. 1771-1810
Wieland

III. National Period
1. Poets and Their Principal Works
a. William Cullen Bryant. 1794-1878
Thanatopsis
My Country's Call
The Ages
Flood of Years
Translation of the Iliad and Odyssey
b. Henry Wadsworth Longfellow. 1807-1882
Evangeline
Hiawatha
The Spanish Student
The Courtship of Miles Standish
c. John Greenleaf Whittier. 1807-1892
The Barefoot Boy
Snowbound
Among the Hills
d. Edgar Allen Poe. 1809-1849
Annabel Lee
The Raven
e. James Russell Lowell. 1819-1891
The Commemoration Ode
The Vision of Sir Launfal
The Cathedral
f. Oliver Wendell Holmes
Old Ironsides
The Poet at the Breakfast Table
The Chambered Nautilus
The Last Leaf
Wonderful One-Hoss Shay
g. James Whitcomb Riley. 1853—
The Old Swimmin' Hole
Afterwhiles
Rhymes of Childhood
h. Eugene Field. 1850-1895
Little Boy Blue
Jes' 'Fore Christmas
Seein' Things
2. Prose Writers and Their Principal Works
Essayists
a. Ralph Waldo Emerson. 1803-1882
Representative Men
The Conduct of Life
b. Henry David Thoreau. 1817-1862
Walden
The Maine Woods

(c) William E. Channing. 1700-1842
Sermons and Reviews

Critics
(a) James Russell Lowell. 1819-1891
(b) Edmund Clarence Stedman. 1833-1908

Historians
(a) George Bancroft. 1800-1891
The United States of North America
History of the Revolution in North America
(b) Richard Hildreth. 1807-1891
The White Slave
History of the United States
(c) William H. Prescott. 1796-1859
Conquest of Mexico
Conquest of Peru
(d) John L. Motley. 1814-1877
The Rise of the Dutch Republic
The United Netherlands
(e) Francis Parkman. 1823-1893
California and the Oregon Trail
The Jesuits in North America
Montcalm and Wolfe
John Fiske. 1842-1901
Outlines of Cosmic Philosophy
The American Revolution
(g) Theodore Roosevelt. 1858—
American Political Ideals

Novelists
(a) Nathaniel Hawthorne. 1804-1869
The Scarlet Letter
The Marble Faun
The House of the Seven Gables
(b) James Fenimore Cooper. 1789-1851
The Spy
The Pilot
The Last of the Mohicans
(c) Harriet Beecher Stowe. 1811-1896
Uncle Tom's Cabin
(d) William Dean Howells. 1837—
A Modern Instance
Venetian Life
A Foregone Conclusion
(e) Mary E. Wilkins Freeman. 1862—
Jerome, a Poor Man
The Portion of Labor
(f) Henry James. 1834—
Daisy Miller
A Passionate Pilgrim

Humorists
(a) Joel Chandler Harris. 1848-1908
(b) Samuel L. Clemens. 1835-1910

Miscellaneous Writers
(a) Washington Irving. 1783-1859
(b) Bayard Taylor. 1825-1876
(c) J. G. Holland. 1819-1881
(d) George Ticknor. 1791-1871
(e) Charles Dudley Warner. 1829-1900
(f) Silas Weir Mitchell. 1829—
(g) Thomas Bailey Aldrich. 1836-1907

Canadian Literature.

The literature of Canada may be very properly separated into the following divisions: period of exploration and discovery; period of settlement; pre-confederation period; period since confederation.

The period of discovery and exploration begins with the earliest accounts of those who attempted to plant on this continent a new civilization. The very beginnings of this literature lie far back in the old French annals. The chief of these works reach down to the very bedrock of Canadian history. The chronicles of Cartier's voyages; Champlain's narratives; the histories of Marc L'Escarbot and G. Sogard; the writings of Father Hennepin; the annals of Father le Clerq, and the history by Pierre de Charlevoix are the most important. These furnish the basis of the early literature and are the most important source of history. It is as true of Canada as of any other country, that the development of the institutional life of the country colors the literature of any particular period.

Francis Parkman was one of the early writers on the period of settlement, and it must be added, one of the most interesting. Though not a Canadian, Parkman is the acknowledged authority for the colonial period of North American history. He was one of the first historians to study the Indians and their point of view. His books are remarkable for their impartiality, accuracy and clearness.

Of the later authors who have written of the early period of Canadian history some mention should be made here. Douglas's *Old France in the New World* offers a good survey of Canada in the seventeenth century. The romantic story of Quebec is admirably told in Arthur G. Doughty's *Cradle of New France.* Charles William Colby's *Canadian Types of the Old Regime* treats interesting aspects of French colonization. Colonel William Wood's *Fight for Canada* is a popular and thoroughly accurate account of the conflict between England and France. Sir Alexander Mackenzie's *Voyages,* published in 1802, La France's *Exploration of the Country Adjoining Hudson Bay* (1744), Hearne's *Journeys* (1795), Henry's *Narrative* (1809), and Ross' *Red River Settlement* (1856), discuss in a most interesting manner the lives and labors of the period of settlement.

The ax of the settler and the pen of the pioneer alike mark the progress of the settlement of this country. One of the earliest native productions was the *History of Canada* by Francois Xavier. It holds a very important place in the literature of the country. Biband's *History of Canada Under the French Regime* is a work of much value. With the War of 1812 came a list of writers, many of whom are deserving of notice. Auchinleck wrote the *History of the War of 1812* (1855), and Bouchette gave us *British Dominions in North America* (1831). These writings, numerous and varied, belong directly to the period between that of the settlement and the confederation.

The first half of the nineteenth century is further marked by a flood of political literature, most of which is now of no value except to the historian. The writings of such men as William Lyon Mackenzie on the one side, and of Bishop Strachan and Sir John Beverly Robinson on the other, must be excepted from a general statement. Though thoroughly partisan, their writings are brilliant.

The fur trade has been so extensive and so vitally connected with the development of the country that we may reasonably expect it to wield an important influence on Canadian literature. This influence has persisted to the present day, especially in fiction and poetry. Especially noteworthy are the novels of Sir Gilbert Parker and the poems of William Henry Drummond. Agnes C. Laut's *Conquest of the Great Northwest* and Dr. George Bryce's *Remarkable History of the Hudson's Bay Company* are valuable books of reference which are also of interest to the general reader.

With the coming of the Confederation came a distinct development of literary activity in the provinces. Some have characterized it as the creation of a new literature. The speeches which had for their purpose the arousing of a spirit of unity come down to us as a distinct type of literature. For example, read those of the Hon. Joseph Howe and the Hon. D'Arcy McGee. Perhaps the most important historian of this period was J. Charles Dent. In his *Last Forty Years* (1841-1881) and his *Rebellion of 1837* he produced a series of volumes invaluable to the student of this period. Other important histories are those by J. M. MacMullen, Dr. W. H. Withrow and Dr. George Bryce, each of whom wrote entertainingly.

After the confederation the great Northwest came into prominence and there grew up a mass of descriptive and historical literature. The *North-west Passage by Land* by Lord Milton and Mr. Cheedle, *Great Lone Land* by Butler, *Highway from Ocean to Ocean* by Cumberland, *Columbia and Canada* by Rae, *Red River Rebellion* by Huyshe, *The Canadian Dominion* by Marshall, *A Sketch of the North-west of America* by Archbishop Taché, *From Ocean to Ocean* by Rev. George Monro Grant, are a few of the many which are beautifully descriptive of the country.

The Confederation period is rife with a new spirit, and the gradual growth of the literature of this period is worthy of careful study. A Canadian national spirit first asserts itself, and perhaps for the first time a truly national literature crystalizes. Heroic achievement, appreciation of sacrifice, scenery and just pride in home and native land, inspire the author and poet. Not alone do we see the kind of literature which expresses itself in history and adventure and travel, but the literature as expressed in the educational, scientific and political journals of the day deserves attention. The various historical societies are producing a literature distinctly Canadian, yet of such importance that we may say it is sure of universal acknowledgment.

Biography has been devoted mainly to political subjects, especially the statesmen of the period immediately preceding and following Confederation. Among the best of these are Joseph Pope's *Memoirs of Sir John Macdonald*, Sir John Bourinot's *Lord Elgin*, D. C. Scott's *John Graves Simcoe*, Charles Lindsey's *William Lyon Mackenzie* and A. D. de Celles' *Papineau and Cartier*.

In fiction Canada was for a long time far behind the rest of the English-speaking world. She had authoritative historians and famous poets long before any novelists were known outside her borders. Towards the close of the nineteenth century Canadian novelists rapidly came to the front and many of them now rank among the best of English writers. Sir Gilbert Parker easily stands first among contemporary Canadian novelists. Among others who have a secure place are the following: Joanna E. Wood, Sara Jeanette Duncan (Mrs. Everard Cotes), Grant Allen, Robert Barr, P. J. O. Chauveau, James de Mille, Margaret Marshall Saunders, William Kirby, Charles G. D. Roberts and Ralph Connor (Rev. Charles Gordon).

In poetry Canada deserves a high place. Louis Honoré Frechette, who received the laureated approval of the French Academy, and who has been termed the chief of the French-Canadian authors, is, perhaps, the greatest writer produced in this country. Charles Heavysege was the author of *Saul*, probably the most remarkable poem ever written by a Canadian. William Kirby, author of *The Golden Dog*, a fascinating romance of early Quebec, also wrote excellent verse. Charles Sangster, Alexander McLachlan, John Reade and Isabella Valancey Crawford hold high rank among the earlier poets of English-speaking Canada.

Other poets of note are J. J. Proctor, Isidore G. Ascher, Helen M. Johnson, William Murdoch, Evan McCall, Alexander McLaughlin, Jean Blewett, S. Frances Harrison, William D. Lighthall, Duncan Campbell Scott, Charles G. D. Roberts, Harriet Annie Wilkins, Charles Mair, Bliss Carman, Archibald Lampman, William Henry Drummond and Robert W. Service.

No account of Canadian literature would be complete without reference to two remarkable men, Thomas Chandler Haliburton and Goldwin Smith. Each in his field won a place second to none: Haliburton as a humorist, Smith as publicist. Haliburton's stories, under the pen name of Sam Slick, won for him the place of Canada's greatest humorist. Had he known how to construct a plot he would certainly rank as a great novelist. But he knew human nature in all its phases, and the characters he created live and talk naturally. To read his books merely for their humor is to lose much of their value. Goldwin Smith, on the other hand, as teacher, author and lecturer gained world-wide fame for his influence for progress and sanity, especially in political affairs. Though his views were not always those of the majority, his high standards of thought and action won for him a unique position in the affections of Canadians.

Canadian literature has won a distinct place as one of the productions of the English-speaking race. For a more extended view of the subject read Lareau's *History of the Literature of Canada*, Dewart's *Selections from Canadian Literature* and G. Mercer Adams' *Outline History of Canadian Literature*.

Drama

I. Forms.

1. Tragedy.
    - a. Subject matter serious or classic.
    - b. Language dignified and graceful.
    - c. Motive of presentation—purification of passions.
2. Comedy.
    - a. Less serious than tragedy.
    - b. Treatment somewhat light throughout.
    - c. Originally used as means of ridicule.
3. Opera.
    - a. General—Dramatic composition set to music and sung by artists, enriched by costumes, scenery, music, etc.
    - b. Grand—Usually serious or classical themes. Generally heavy and impressive treatment, although it is sometimes of a lighter vein.
    - c. Comic—Light, fanciful or humorous. Treatment light and graceful. Oftentimes means of ridicule.
4. Pastoral.
    - a. Aimed at a fanciful portrayal of Arcadian and mythological scenes.
    - b. Treatment quiet and in keeping with the subjects.
5. Burlesque.
    - a. Depicts dignified and serious subjects of life in a ludicrous manner, or vice versa.
    - b. Means of satirical criticism.
    - c. Modern—Mixture of travesty, vaudeville and ballet.
6. Farce.
    - a. More extravagant and ludicrous than the comedy. Any absurdity or improbability is allowable.
    - b. Motive—To excite laughter in any event.
7. Mysteries.

a. Rude dramas presented at solemn festivals; religious in character.
b. Object—To strengthen Christian church.
c. Extended from twelfth to sixteenth centuries. Passion play, Oberammergau, is an example.

3. Moralities.
a. Allegorical plays. Moral discourses praising virtue and condemning vice.
b. Object—To influence public sentiment toward right living.

II. Development.
1. Old Testament.
a. Job.
b. Songs of Solomon.
2. India.
a. Drama much inferior to Greek or modern European.
b. Dramatic poetry elegant and tender. Writings voluminous.
3. China.
a. Dramatic writings extensive, but unknown to other peoples.
4. Greece.
a. European drama originated in Greece, foremost nation in literature in early times.
b. Dramas at first were celebrations of festivals of Bacchus, god of wine.
c. Æschylus, first writer of Greek tragedy, wrought many changes in chorus, number of actors, etc.
5. Rome.
a. Drama borrowed from Greeks. In a sense imitators.
b. Became powerful and influenced modern literature more forcibly than did Greece.
6. Italy.
a. Foundation of the drama as produced by Shakespeare came directly from Italian.
b. At first classic models were followed.
c. Great periods were during fourteenth, fifteenth and sixteenth centuries. Noted pastoral dramas were written.
d. Interest waned in seventeenth century.
e. Eighteenth century classic tragedy and genuine comedy were restored.
7. France.
a. 1684, early school of dramatic writings flourished.
b. Corneille, Racine and Moliere, the distinguished dramatists.
c. 1820, a new school of art was formed, called the romantic, in contrast to the former classical school. Hugo largely promoted the former.
d. Writers in this school, Sardou, Dumas, Rostand.
8. Spain.
a. The drama flourished at the same time as the English and rose to its height at the same time.
9. England.
a. Last half of the sixteenth century marked the height of the most brilliant period of the English drama.
b. Writers—Jonson, Shakespeare, Marlowe.
c. Theaters were shut up for thirteen years by Puritans.
d. With Charles II the drama reappeared. Licentious and degrading treatment.
10. German.
a. At first merely translations from the French.
b. Original works appeared later on.
c. Schiller and Goethe greatest of modern dramatists.

Shakespeare

Birth.
1. Born at Stratford-on-Avon, 1564.

Parents.
1. Of humble origin; respectable tradespeople; financially well-to-do.

Education.

1. Best education grammar school offered.

Marriage.

1. Nineteen years of age. In 1592 established in London, engaged in literary work, and also took some of the leading parts in plays.

Character.

1. Ben Jonson said: "I loved the man and do honor to his memory, on this side idolatry, as much as any. He was indeed honest and of an open nature; had an excellent phantasy, brave notions and gentle expressions."

Writings.

1st Period.
- a. Experimenting in characterization; looseness in construction. Feeling after his powers and testing them.
- b. Writings—Love's Labor Lost, The Comedy of Errors, A Midsummer Night's Dream, Richard III.

2d Period.
- a. With increased assurance follow his brilliant portrayal of English history and comedy of life in general, and one great romantic tragedy, King Richard II.
- b. Writings—Parts I and II of Henry IV, King John, Romeo and Juliet, The Merchant of Venice, Much Ado About Nothing, As You Like It, etc., etc.

3d Period.
- a. Master of all the resources of his art.
- b. Personal experiences portrayed in writings. Comedy becomes bitter; tragedies black with human experiences.
- c. Writings—Measure for Measure, Julius Cæsar, Hamlet, King Lear, etc., etc.

4th Period.
- a. Attains glad serenity of mind, enabling him to write his last romantic plays.
- b. Writings—Chiefly poetry.

Death.

1. Dies in 1616. Buried in Stratford church; a monument with bust and epitaph was soon afterward set up.

Questions

What is the nature of Haliburton's humor?

To what period do the writings of Champlain and Father Hennepin belong?

For what characteristics are the histories of Francis Parkman remarkable?

What can you say of the influence of the fur trade on Canadian literature?

Who is the leading contemporary Canadian novelist? Name some of his best-known books.

In what branches of literature did Goldwin Smith excel?

What kind of books has Ralph Connor (Rev. Charles W. Gordon) written?

What has been the character of most Canadian biography?

What was the hermit period of Thoreau's life?

When was the first edition of Webster's dictionary published?

In what philanthropic work did Walt Whitman ruin his health?

What distinct style of literature did Addison found?

Who described Francis Bacon as the "wisest, brightest, meanest of mankind"?

Which is the longest and most polished of Mrs. Browning's works?

To what romantic circumstances was the publication of Burns' first book of poems due?

For what calling was Carlyle trained? What educational endowment did he make?

Which of Dickens' works embodied his experiences in America?

Which are Henry Drummond's three best-known works?

What was the novel that established George Eliot's high rank?

In the verse of what language is Thomas Gray almost unsurpassed?

What is the elegy in which Shelley has honored his friend Keats?

In what novel do Kingsley's opinions on social and economic questions appear?

At what exceptionally early age was Pope recognized as an able poet?

Which of Charles Reade's novels was directed against the English prison system?

What desire of Walter Scott eclipsed even his literary ambition?

What class of people did Swift try to better and to what end did he bequeath his fortune?

When did Tennyson become poet laureate and what was the first great poem written after the event?

What career did Thackeray first plan for himself and why did he give it up?

To what subject is the literary talent of Israel Zangwill devoted?

What work of Hans Christian Andersen was written by him in English?

What was the period of Goethe's and Schiller's intimate association?

What constitutes the strength and what the defective element in Jean Paul Richter's works?

What was the tragic death of Æsop?

How does Aristophanes rank in Grecian literature?

How did Herodotus prepare himself for his great work? What well-known appellation has been given him?

In which of his writings is Horace at his best?

What was Livy's great purpose in his works?

What peculiar circumstance directed Virgil toward a literary career?

Whose translation of the Æneid has become most popular?

For what reason has the history of Dante's life become half mythical?

Has Dumas a rightful claim to the 1,200 volumes which bear his name?

What is the characteristic of Jules Verne's writings which makes them appeal to readers of all ages?

For what is Emile Zola noted?

What positions did Bjornson and Ibsen hold together during their lives?

What is literature? How old is it?

What is the first account we have of a book? On what was it written?

How old is Sanskrit Literature? Chinese?

What is Poetry? Prose? What is a Lyric? An Epic? A Sonnet? An Ode?

Name the divisions into which prose is subdivided.

What is the difference between an essay and an oration?

When did Chaucer live? What is he popularly called because of his relation to English Poetry?

When, where, and by whom was printing invented? When was the first book printed?

Where and when was Shakespeare born? When did he die? Where is he buried?

How does Shakespeare rank as a dramatist? Name five of his most noted productions.

Name five contemporary writers of Shakespeare.

Who wrote "Paradise Lost"?

For what was Spenser noted?

When did Burns live? Name some of his noted poems.

Is Walter Scott more famous for his poems than for his novels? What caused Scott to give up poetry for prose? What are his most famous novels? Name three.

When did Tennyson live? What is the character of his poems?

What famous American orator lived during the Revolutionary War?

For what was Franklin chiefly noted in the field of literature?

What poem established the reputation of Charles Heavysege?

Who is the greatest French-Canadian poet?

For what qualities are the poems of Robert W. Service remarkable? William H. Drummond?

How does Bliss Carman rank as a poet?

Why is Charles G. D. Roberts famous?

Name three prose writers and three poets of the United States living today.

Why is the study of literature so important? Give three reasons for your answer.

Why was Whittier called the Quaker poet?

For what production is Oliver Wendell Holmes best remembered? Lowell? Hawthorne? Cooper?

What is known as the Golden Age of French literature?

What was the *Spectator*, and when did it appear?

Why is King Alfred known as the Father of English Prose?

Who were the Minnesingers? With what subjects did their compositions deal?

What is a masque? During what age and in what country were masques especially popular?

To the influence of what nation is to be traced much of the correctness and elegance of the literature produced during the age of Queen Anne?

What is the theme with which the *Iliad* deals? How does this epic rank in ancient poetry?

What is the greatest of the German national epics? Tell the story of this poem.

How does William Dean Howells rank among American novelists of today?

Selections for Memorizing

We give here fifty selections from as many eminent authors and literary personages. These lessons on character, education, industry, sincerity, truth, wisdom and kindred subjects, supplemented with the lives of their authors, as given in THE NEW PRACTICAL REFERENCE LIBRARY, should prove of great value.

If but one of these quotations were committed to memory each week and a study made of the life of its author, the student would have a knowledge, at the close of a year, of some of the choicest sayings of the ages. Aside from this delightful accomplishment, the acquaintance formed with the greatest writers would prove a daily source of pleasure.

Talk not to me of the stock whence you grew,
But show me your stock by what you can do.
—*Spurgeon.*

Lost, yesterday, somewhere between sunrise and sunset, two golden hours, each set with sixty diamond minutes. No reward is offered, for they are gone forever. —*Horace Mann.*

Breathes there a man with soul so dead,
Who never to himself hath said,
"This is my own, my native land?"
Whose heart hath ne'er within him burned,
As home his footsteps he hath turned
From wandering on a foreign strand?
—*Sir Walter Scott.*

Do not look for the flaws as you go through life,
And even when you find them,
It's wise and kind to be somewhat blind,
And look for the virtue behind them.
—*Wilcox.*

Laziness grows on people; it begins in cobwebs and ends in iron chains. The more business a man has to do, the more he is able to accomplish, for he learns to economize his time.
—*Sir Matthew Hale.*

Do the duty which lies nearest thee, which thou knowest to be a duty. Thy second duty will already have become clearer. —*Carlyle.*

I would not enter on my list of friends
(Though graced with polished manners and fine sense,
Yet wanting sensibility) the man
Who needlessly sets foot upon a worm. —*Cowper.*

If a task is once begun,
Never leave it till it's done;
Be the labor great or small,
Do it well, or not at all. —*Phoebe Cary.*

Happy hearts and happy faces,
Happy play in grassy places—
That was how, in ancient ages,
Children grew to kings and sages.
—*Robert Louis Stevenson.*

Diving and finding no pearls in the sea,
Blame not the ocean: the fault is in thee. —*Alice Cary.*

Awake, he loved their voices,
And wove them into his rhyme;
And the music of their laughter
Was with him all the time.

Though he knew the tongues of nations,
And their meanings all were dear,
The prattle and lisp of a little child
Was the sweetest for him to hear.
—"About Longfellow," by *Riley.*

We sow a thought and reap an act; we sow an act and reap a habit; we sow a habit and reap a character; we sow a character and reap destiny.
—*Thackeray.*

People seldom improve when they have no other model but themselves to copy after.
—*Goldsmith.*

The only reason we don't see good things everywhere is because we haven't good eyes.
—"A Fool of Nature," *Julian Hawthorne.*

Ah, faithful to Little Boy Blue they stand,
Each in the same old place,
Awaiting the touch of a little hand,
The smile of a little face.
And they wonder, as waiting these long years through,
In the dust of that little chair,
What has become of our Little Boy Blue
Since he kissed them and put them there.
—"Little Boy Blue," *Eugene Field.*

Then here's to our boyhood, its old and its gray!
The stars of its winter, the dews of its May!
And when we have done with our life lasting toys,
Dear Father, take care of Thy children—The Boys.
—"The Boys," *Oliver Wendell Holmes.*

Do you count your birthdays by the year,
And thank the gods with gladness and good cheer,
O'erlook the failings of your friends, and grow
Gentler and better as your sands run low?

—A Prayer for Health and Content.
Translation from "Horace" by *Conington.*

With malice toward none, with charity for all; with firmness in the right, as God gives us to see the right, let us finish the work we are in—to bind up the nation's wounds; to care for him who shall have borne the battle and for his widow and his orphans; to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations.
—From Second Inaugural Address: *Abraham Lincoln.*

He who, from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone,
Will lead my steps aright.
—"Ode to a Waterfowl," *William Cullen Bryant.*

Errors, like straws, upon the surface flow;
He who would search for pearls must dive below.

—*John Dryden.*

In battle or business, whatever the game,
In war or in love, it's ever the same;
In the struggle for power, or scramble for pelf,
Let this be your motto, "Rely on yourself."

—*Saxe.*

Our greatest glory consists not in never failing, but in rising every time we fall.—*Emerson.*

My son, observe the postage stamp! Its usefulness depends upon its ability to stick to one thing until it gets there.
—*Josh Billings.*

But chief of all,
Oh loss of sight, of thee I most complain!
Blind among enemies, O worse than chains,
Dungeon, or beggary, or decrepit age!
Light, the prime work of God, to me's extinct,
And all her various objects of delight
Annulled, which might in part my grief have eased;
Inferior to the vilest now become
Of man or worm the vilest here excel me.
They creep, yet see; I, dark in light, exposed
To daily fraud, contempt, abuse and wrong,

Within doors or without, still as a fool
In power of others, never in my own
Scarce half I seem to live, dead more than half. —*Milton.*

Beware of how you say more than you mean; better mean more than you say.—*Gladstone.*

The moment I heard of America, I loved her; the moment I knew she was fighting for freedom, I burnt with a desire of bleeding for her; and the moment I shall be able to serve her at any time or in any part of the world, will be the happiest one of my life.—*Lafayette.*

I steal by lawns and grassy plots,
I slide by hazel covers;
I move the sweet forget-me-nots
That grow for happy lovers.

I chatter, chatter as I flow
To join the brimming river;
For man may come and man may go,
But I go on forever. —"The Brook," *Tennyson*

It is nearly an axiom, that people will not be better than the books they read. —*Bishop Potter.*

We grow like what we think of; so let us think of the good, the true, and the beautiful. —*Phillips Brooks.*

Ponder well, and know the right,
Onward, then, with all thy might!
Haste not! years can ne'er atone
For one reckless action done. —*Goethe.*

I hope I shall always possess firmness and virtue enough to maintain what I consider the most enviable of all titles, the character of an "Honest Man." —*George Washington.*

My idea is this: ever onward. If God had intended that man should go backward, He would have given him an eye in the back of his head. —*Victor Hugo.*

Boys flying kites haul in their white-winged birds;
You can't do that way when you're flying words.
"Careful with fire," is good advice, we know;
"Careful with words," is ten times doubly so.
Thoughts unexpressed may sometimes fall back dead;
But God himself can't kill them when they're said. —*Will Carleton.*

The next gale that sweeps from the north will bring to our ear the clash of resounding arms. Our brethren are already in the field! Why are we here idle? What is it that gentlemen wish? What would they have? Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take; but as for me, give me liberty or give me death. —*Patrick Henry.*

So, Willy, let you and me be wipers
Of scores out with all men—especially Pipers;
And whether they pipe us free from rats or from mice,
If we've promised them aught, let us keep our promise.
—"The Pied Piper of Hamelin," *Robert Browning.*

Which is the wind that brings the heat?
The South wind, Katy; and corn will grow
And peaches redden for you to eat,
When the South begins to blow.
—"What the Wind Brings," *Edmund Clarence Stedman.*

He prayeth best who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all. —*Samuel Taylor Coleridge.*

Full many a gem of purest ray serene
The dark unfathomed caves of ocean bear;
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air.
—"Elegy in a Country Churchyard," *Thomas Gray.*

Nothing useless is and low,
Each thing in its place is best;
And what seems but idle show
Strengthens and supports the rest.
—*Longfellow.*

Sloth, like rust, consumes faster than labor wears; while the used key is always bright.
—*Benjamin Franklin.*

A mere life of ease is not in the end a satisfactory life, and, above all, it is a life which ultimately unfits those who follow it for serious work in the world.
—*Roosevelt.*

Honor and shame from no condition rise;
Act well your part, there all the honor lies.
—*Pope.*

Not what we give, but what we share,
For the gift without the giver is bare;
Who gives himself with his alms feeds three—
Himself, his hungering neighbor and me.
—*Lowell.*

Be good, dear child, and let who will be clever,
Do noble things, not dream them all day long;
And so make life, death, and that vast forever
One grand sweet song.
—*Chas. Kingsley.*

Strike—for your altars and your fires;
Strike—till the last armed foe expires;
Strike—for the green graves of your sires,
God—and your native land!
—*Fitz Greene Halleck.*

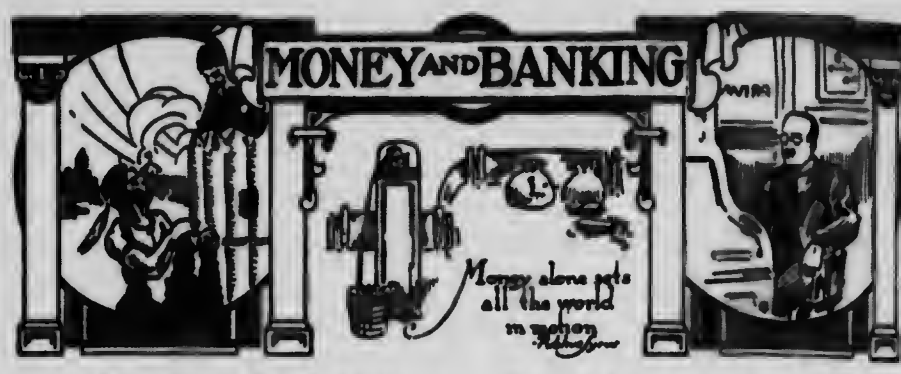
There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows, and in miseries.
—*Shakespeare.*

He smote the rock of the national resources, and abundant streams of revenue gushed forth. He touched the dead corpse of Public Credit, and it sprang upon its feet.
—Speech on Hamilton, March 10, 1831.—*Webster.*

But words are things, and a small drop of ink,
Falling, like dew, upon a thought, produces
That which makes thousands, perhaps millions, think.
—*Byron.*

Unanchor'd ships, they blow and blow,
Sail to and fro, and then go down,
In unknown seas that none shall know,
Without one ripple of renown.
Poor, drifting dreamers sailing by,
They seem to only live to die.
—*Joaquin Miller.*

I care not that sharp thorns grow thick below
And wound my hands and scar my anxious feet:
I only care to know God's roses grow,
And I may somewhere find their odor sweet.
—"Care and Carelessness," *Frank W. Gunsaulus.*



What is Money? You will probably say, "That is a foolish question; everybody knows what money is?" If you go to the store to buy a pair of shoes, you pay for them with money. Suppose you were a stranger and had no money? Would the owner of the shoe store give you a pair of shoes? No, indeed. The money was the means by which you got what you wanted. In other words, the first purpose of money is to be the means of exchange.

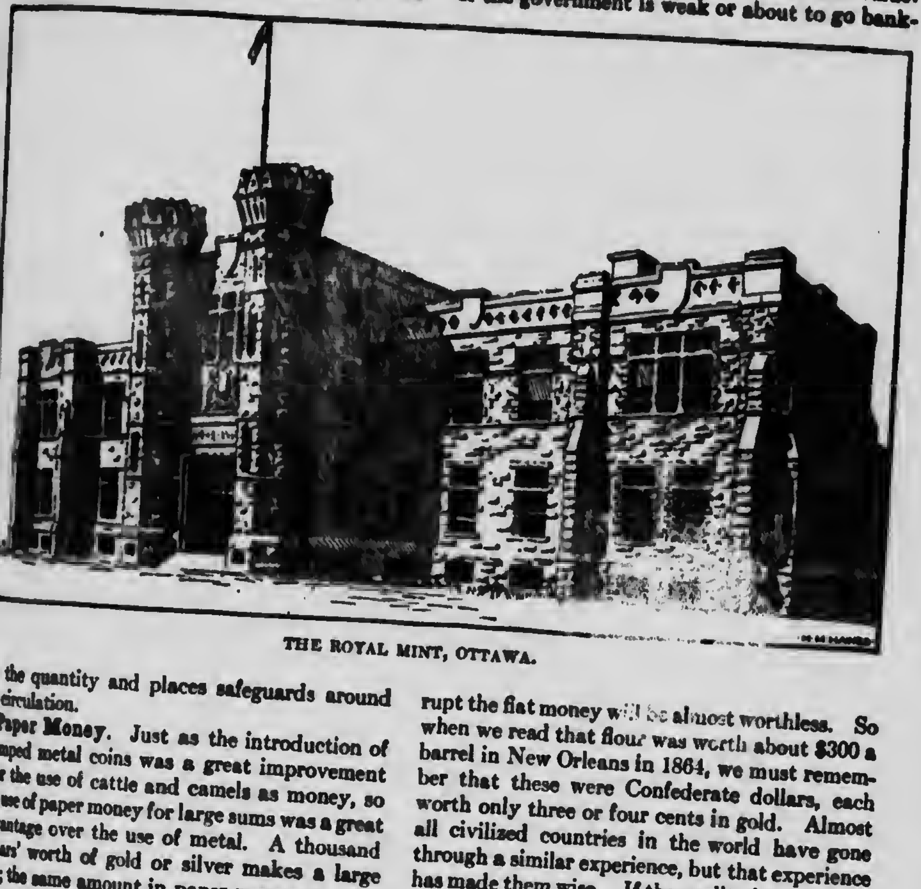
Let us suppose that no such thing as money existed and that instead of money you had a barrel of flour which you wanted to trade for shoes and slippers. Unfortunately for you, the shoemaker did not want flour just then, but wanted sugar. You would have to look for somebody who would take your flour and give you sugar in exchange. You might have to trade several times before you could get sugar worth as much as your flour. If men had money you could say that your flour was worth so much money, you could sell it for money, and with the money buy your shoes. When we say that a thing is worth $5, or costs $5, we are thinking of money as a measure of value. This is the second use of money. There is still a third function of money—a standard by which to measure future debts, but this does not concern us here.

Primitive Money. You can see how difficult it would be to carry on business simply by trading without money. Every person who had things to sell would have to search till he found somebody who wanted to buy and had other things to trade which the other man wanted. Among very primitive races such a condition of affairs is sometimes found. Even most savages, however, speak of value in terms of a common denominator. Many years ago the Chinamen spoke of things being worth "so much rice;" the Bedouins of the desert spoke of things being worth "so many pounds of dates" or "so many camels;" the ancient Hebrews said "so many oxen."

There are obvious objections to using camels, oxen, rice, etc., as money. The main objection is that their size may be inconvenient; in the second place, they are not divisible. How could you sell a barrel of flour for half a camel? Hundreds of years ago people realized this difficulty as well as you do. So we find such small things as wampum beads used as money by the Indians, tea by the Russians, and tobacco in Maryland and Virginia by the colonists. These things were divisible into small portions.

Metal Money. Even better than such commodities are metals. The ancient Spartans used bars of iron, but this money was open to great objection on account of its weight. It is characteristic of the Spartan simplicity that they were using base metals when their Athenian neighbors were using silver and gold. The great advantages of the precious metals are clear: small bulk, divisibility, durability. Furthermore, they are comparatively soft and can be easily made into coins. The earliest pieces of metal used as money went by weight. The next step, of course, was to stamp the coins so that they would not have to be weighed each time. First, only the sides were stamped, as in Greece and Rome, but this left the edges unstamped; dishonest people were detected clipping off small pieces. Merchants and bankers refused to take clipped pieces, because they were too light. To prevent clipping, the edges were stamped, sometimes with an inscription, a crown, or stars, sometimes with little ridges. When the coins are stamped with ridges they are said to be "milled."

The next step in the development of coinage was the restriction of the right to coin. In the Middle Ages almost every nobleman and many of the cities, besides the rulers of the nations, had the right to coin money. We can imagine the hopeless confusion. Many of the coins were debased, that is, they were actually worth less than the stamp said they were. A poor nobleman would take twenty cents worth of silver, put a stamp on it and call it one dollar's worth. To remedy this situation the privilege of coinage was gradually reserved to the ruler of the country. Today the money of the world is coined by the governments only. Some paper money, to be sure, is issued in the name of national banks, but it is printed by the government, which also lim-



THE ROYAL MINT, OTTAWA.

its the quantity and places safeguards around circulation.

Paper Money. Just as the introduction of stamped metal coins was a great improvement over the use of cattle and camels as money, so the use of paper money for large sums was a great advantage over the use of metal. A thousand dollars' worth of gold or silver makes a large bulk; the same amount in paper money may be less than a handful. Paper money in general is of two kinds, "convertible" and "inconvertible," in other words, "exchangeable for gold" and "not exchangeable for gold." During the Civil War the United States issued "greenbacks," pieces of paper which were called "five dollars" or "ten dollars," as the case might be. There was no promise that the government would redeem the paper for coin. This is a good example of "fiat" money. "Fiat" is a Latin word meaning "let it be done," and thus "fiat money" is money which the government has simply *decreed* to be worth a certain amount. Some of this old money is still in use today, but most of the paper money says on its face that it is a promise "payable on demand" in gold or silver coin, as the case may be. You can see that fiat money may not always be worth its face value. If the government is weak or about to go bankrupt the fiat money will be almost worthless. So when we read that flour was worth about $300 a barrel in New Orleans in 1864, we must remember that these were Confederate dollars, each worth only three or four cents in gold. Almost all civilized countries in the world have gone through a similar experience, but that experience has made them wise. If the credit of the government is unstable, a fiat currency will fluctuate in value. We can appreciate the difficulties of carrying on business in the United States in the thirties of the last century when every merchant needed a directory of banks to tell him whether his paper money was worth two cents or one hundred cents on the dollar.

Gold as a Standard. It has taken a long time for people to realize that the safest money is the soundest, that the best possible form of money is money which has an intrinsic value as well as a legal value. To possess value of its own this material must be in constant demand with very little change in price. No commodity satisfies these requirements better than gold. Gold has a high value in itself; there is a steady demand for it in the arts; and the supply is practically unchanged, for the world's stock of gold is so large that the annual product of the mines, in millions though it is, is merely a percentage too small to affect the total. The realization of the fact that gold is the best material for money has caused the civilized world to adopt the gold standard.

Canadian Currency. It is only in recent years that the Canadian system of coinage has become fully developed. Until 1906 all Canadian coins were minted in England. The Ottawa branch of the Royal Mint was established in 1907 but it was not until 1910 that a law was passed by Parliament authorizing the government to provide a gold currency for the country in denominations of \$20, \$10, \$5 and \$2.50, and it was not until May, 1912, that the first \$5 and \$10 pieces were issued by the Mint. The British sovereign continues to be legal tender for \$4.86 2-3, but in fixing the standard for the new Canadian gold pieces these are made to correspond exactly in intrinsic value with the gold coinage of the United States. Gold pieces are accepted at face value in almost every part of the world, because their face value is their real value. The Canadian \$5 and \$10 gold pieces have five and ten dollars' worth of metal in them.

The Canadian silver pieces, on the other hand, do not contain silver worth the face value of the coins; it is the government's stamp on the coins and the acts of Parliament making them legal tender that give them value. "Legal tender" is a new phrase in our study; what does it mean? Simply that Parliament has passed an act authorizing a debtor to offer and requiring a creditor to receive certain coins in payment of debt. The words "legal tender" originally meant simply the "offer to pay in currency authorized by law," but in the course of time they have come to mean the money itself. The Dominion government issues five, ten, twenty-five and fifty cent pieces in silver. The Currency Act of 1910 also authorized the issue of a silver dollar.

There are two kinds of paper money in circulation in Canada today; these are the currency notes issued by the national government and the notes of the chartered banks. The government is authorized by statute to issue legal tender notes to the amount of \$30,000,000 against a reserve of 25 per cent and in excess of \$30,000,000 against a reserve of 100 per cent in specie. These government notes are divided into two kinds, the "legal tenders" and "bank legals." The legal tenders are in denominations of \$1, \$2, \$4, \$5, \$10, \$20, \$50, \$100, \$500 and \$1,000. According to the latest returns, the total issue of these notes is about \$20,000,000. The Dominion government also issues "bank legals"; these are bills in large denominations, generally \$5,000, which the banks use among themselves for the purposes of the clearing house. They get these bills by depositing gold specie for them in the government treasury and hold them for use in clearing or for conversion into gold the moment it is required. The second kind of paper money is the bank note, which we shall study under the heading of chartered banks.

Meaning of Credit. Let us now go back to the store we visited when we first spoke of money. This time we have no money when we tell the owner we want a pair of shoes, but he knows us and he says, "That's all right, I'll trust you." He is giving us "credit," which means simply that he believes in us and believes we will pay him as soon as we can. We tell him that we shall come back in a month and pay him the \$2.50 for the shoes. At the end of the month we offer him \$2.50, but he says that the shoes will cost \$3.50, because the leather has gone up in price since we bought our shoes. The owner of the shoe store is wrong, because he has already sold us the shoes for \$2.50. If he had said, 'I'll sell you the shoes for half a barrel of flour," and the value of the flour had risen from \$2.50 to \$3.50 we would still owe him the half barrel; but that would be unfair because we should have to pay more than the shoes were worth. We do not owe him half a barrel of flour; we owe him \$2.50. That is the third principal function of money; a standard by which to measure future obligations.

Without some such standard for future payments the general use of credit would be impossible. More business is today carried on by credit than by cash payments, simply because it is more convenient and because we can trust other people. We trust the government when we accept its paper money. We trust each other every day. As long as business transactions were confined to a small area this credit, which is generally called "book credit," because the account was kept in the books of the firm, did all that was required of it. But when a merchant in Montreal buys goods in New York and later sells them to a man in Alberta, more complex machinery for handling business is necessary.

Banks. The main feature of this machinery is called a "bank." The earliest banks we might call "exchange banks," or banks to facilitate exchange. Their object was to turn the values they received into "current money" or "bank money;" that is to say, into money which was immediately accepted by merchants without the necessity of testing the value of the coin or bullion brought to them. For this service they charged a small fee. The main business of these banks was in foreign commerce. "Current money" or "bank money" was merely the standard by which other moneys were measured, so the "mark" of the Bank of Hamburg was merely the equivalent of an equal value of pure silver. While the bank at first was practically nothing more than a money exchange, many of the banks soon combined the functions of exchanging money with those of lending and borrowing money.

When we say lending and borrowing money, what do we mean? A bank lends us money when we have security or credit to cover the amount of the loan. On the other hand, when we deposit money in the bank are we not lending money, and does not the bank borrow? Perhaps few of us think of deposits in that way, but every bank's accounts will show that the money there on deposit is considered a debt. We deposit money in the bank for safekeeping, for convenience, and for the interest, but that money does not lie idle. As soon as possible the banks lends or invests it again, or as great a part as the law allows. A bank, however, to carry on business successfully, must possess sufficient capital of its own to give it the standing which will lead other people to trust it with their money. Most of the bank's funds are loaned to men and firms engaged in productive industry; in other words, the money not only brings to the bank a profit but assists the business development of the country.

The early banks, then, received money on deposit, for which they issued receipts. When the depositor surrendered his receipt he could get his money back. Our modern savings banks are based on this plan. We deposit our money in the bank and receive a "pass book," which shows the amount to our credit. If we wish to draw out this money we must go to the bank and present the pass book.

Government Savings Bank. Since Confederation the Canadian government has conducted two kinds of savings banks. The first of these, known as the Dominion government savings bank, was established by the Maritime Provinces and was assumed by the Dominion after Confederation. As far as possible the accounts in these banks have been transferred to the postoffice savings banks. This postal savings system is nothing more or less than a national savings bank conducted by the postoffice department. Money is deposited just as in any bank and interest at three per cent is paid on deposits. Any person may have a deposit account—the accounts of children, however, are protected by special regulations. The total deposits made by an individual in each fiscal year (ending June 30) may not exceed $1,500 and the total balance, exclusive of interest, to the credit of any account is limited to $5,000. A depositor in any of the savings bank postoffices may continue his deposits at any other such offices and he may withdraw money at that office which is most convenient to him. For instance, if he makes his first deposit at the savings bank at Regina, he may make further deposits at, or withdraw his money through, the postoffice at Moose Jaw, Banff, Winnipeg or any place that may be convenient to him, whether he still lives at Regina or has removed to some other place. In 1911 there were over 1,100 postoffices holding a total of $11,000,000 in savings deposits.

There is a third class of government savings bank; this is known as the "school savings" or "penny savings" bank. The Penny Bank of Toronto, with total deposits of $150,000, was the first one to be founded. It has a charter from the Dominion government, granting the right to receive school savings from any part of the Dominion. These savings, according to statute, must be deposited with the government.

Banking in Canada. It was not until 1792 that any serious attempts were made to establish banks in Canada. In that year a number of merchants in Montreal applied for a charter for the Canada Banking Company, but the charter was refused. In 1807 Quebec tried to get a bank, but failed; again in 1808 both cities failed. During the War of 1812 the exportation of specie was forbidden by the parliaments of

Upper and Lower Canada, and paper currency, known as "army bills," was in general circulation. The experience of the country with an elastic paper currency was so satisfactory that in 1817 the first joint stock bank, the "Montreal Bank," was formed as a private institution. It was later chartered by the government and is now famous throughout the world as the "Bank of Montreal."

Banking was placed under the control of the Dominion government by the British North America Act of 1867. In May, 1870, and in April, 1871, were passed the acts on which the Canadian banking system is founded. Banks are chartered for ten-year periods and a revised bank act has been passed every decade. The later laws have made few changes in the essential features, though they have added to the safety of the system. In 1890, for example, a bank circulation redemption fund was created by a cash payment to the government of five per cent of the maximum circulation of each bank. As this fund may be drawn upon in case the assets of any bank are insufficient to pay its notes in full, it is clear that all the banks are responsible for the payment of the notes of every individual bank. Again in 1900 the bank act provided for the formation of the Canadian Bankers' Association,which exercises a general supervision of the affairs of each bank. Every chartered bank becomes by law a member of the association.

To secure a charter from the government a bank must have a capital of $500,000, of which one-half must be paid in cash before the charter is granted. During the process of organization this sum of $250,000 must be deposited with the government, which returns it when the organization is completed. As directors are supposed to direct, the law compels them to hold what it considers a sufficient amount to make it worth while for them to give proper attention to the bank's affairs. This amount is graded according to the paid-up capital; thus when the capital is a million dollars, a director must hold at least thirty shares. Since 1890 the par value of bank shares is fixed by law at $100 each. The most important feature about bank shares, so far as the public is concerned, is the "double liability" of the stockholders. This means that for every share of $100 the owner is responsible for another $100 in case the bank becomes insolvent and the assets are not enough to pay the debts. If, therefore, the capital of a bank is $1,000,000, the creditors have security to the amount of $2,000,000. As it is very important to persons who are dealing with banks that the shareholders should be good for this amount the law requires the publication each year of a list of the shareholders in all the chartered banks with the number of shares held by each. As a rule, the wider distribution a bank's stock has, the safer it is; other things being equal, a man is more likely to be good for double the value of a small number of shares than for double the amount of a large number.

Bank Reserves. One of the important problems connected with the operation of a bank is the amount of cash reserve. By reserve is meant the necessary balance of cash which the bank keeps on hand to meet its obligations. This money, of course, is lying idle in the vaults and is earning no interest. From one point of view, therefore, it is to the bank's interest to keep as little cash reserve as possible, in order that the bank may have the use of all its funds. But such a course would lead to popular distrust of the bank. In the United States the national law requires the banks to maintain a cash reserve of a fixed per cent of their liabilities, but in Canada there is no such thing as a "fixed reserve." The only requirement is that 40 per cent of whatever reserve a bank does keep must be in "legal tenders." A detailed statement of the position of every bank is sent to the government each month, and this is published in the *Canada Gazette*. These statements contain all the information necessary to enable any intelligent person to find out the strength or weakness of any bank. Thus one of the best possible safeguards is established when public opinion may be based on an exact knowledge of the position of any chartered bank.

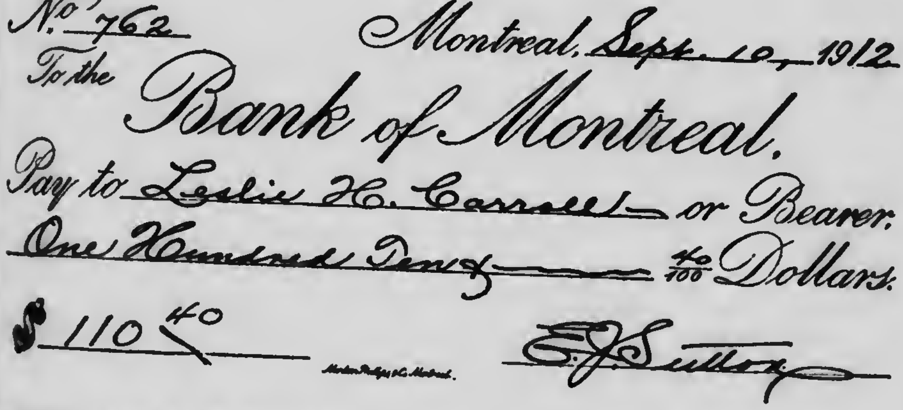
Bank Notes. If there were no money in Canada except the paper and silver currency issued by the Dominion government, there would not be enough to transact all the business. We may now study the bank note or bill, the second kind of paper money in circulation. When we speak of money in circulation or of a bank's circulation we mean money in actual use or the bank notes in use in transacting the business of the country.

The right to issue paper money, or "bank notes," is a great privilege. Let us try to understand why. Any bank, as we have seen, must have a paid-up capital of at least $250,000 before it can begin business. This capital is invested directly in the business operations of the bank. The government allows the banks to make double use of this money by issuing bank notes to the full value of their paid-up capital. Thus the capital is not only invested in the business but is used again as the basis of increasing the bank's earning power by 100 per cent. It is seldom that the banks issue notes to the legal maximum; in 1912, for example, the amount of banknotes in circulation varied from 85 to 95 per cent of the capital of all the banks. This doubling of the earning power makes it right that shareholders should be liable for double the value of their shares.

The Branch System. In the United States the minimum capitalization of a bank organized under the National Banking Act is $25,000. Many small towns, in consequence, have one or two national banks, each with a small capital, just enough to transact the local business. In Canada, on the other hand, the large amount required as capital made it impossible to establish independent banks in all the cities which needed banking facilities. This led to the development of the present system of branches. All the large banks have numerous branches throughout the country. The business of these branches is conducted just like the branches of any firm; they have their own local managers and their own books, but they are directly responsible to the central office of the bank. There are today over 2,500 branches of chartered banks in the Dominion.

Trust Companies. The trust company is a corporation, with a large capital, authorized to act as agent for the living or dead. As the name indicates, trust companies were originally chartered to act as trustees. Thus the trust company was often employed to administer large estates. This is still its principal function, but in the course of time a general banking business has been developed. The great advantage possessed by these companies is that, as a rule, they are less restricted then the chartered banks. They may be incorporated by the Dominion or provincial governments; in Ontario and New Brunswick they are subject to inspection if a client demands it. The trust companies have developed a great savings and safety deposit vault business. Most of the funds thus received or controlled by a trust company remain in their hands for a long time; it can afford to pay interest on such accounts. The payment of interest has gradually led many small depositors to patronize trust companies, whereas the chartered banks, in the main, are more likely to attract commercial accounts.

Bank Checks. For people who want to leave their money in a safe place for a long time, a savings account is good, but most business men can not afford to waste so much time running back and forth for money. One of the first improvements to be made in our modern banking system was the introduction of "checks" or "cheques." The check is usually a printed form filled out by the depositor, somewhat like the one below.


No. 762 Montreal, Sept. 10, 1912
To the Bank of Montreal.
Pay to Leslie H. Carroll or Bearer.
One Hundred Ten $\frac{40}{100}$ Dollars.
$ 110.40
E. J. Sutton

A "certified check" is one which the bank promises to pay—that is, it certifies that the drawer of the check has enough money on deposit to cover the amount, and it agrees to hold enough money to pay the check. Carroll signs his name on the back, that is, "endorses" the check, to show that he has received the money. He may present this check to the Bank of Montreal and receive the money in cash; or, if he has an account at the same bank he may merely have it credited to his account; or if his account is with another bank he may deposit it there and have it placed to his credit. Let us suppose that Carroll has his account with the Dominion Bank. At the close of the banking day, or perhaps only once a week in small towns, the Dominion Bank and the Bank of Montreal balance accounts, in which Sutton's check would be included. Thus it becomes quite possible that no actual currency has changed hands at all, if the customers of each bank have received checks on the other bank to equal amounts.

The Clearing House. We can see clearly that there would be a great deal of confusion and unnecessary work in a large city like Montreal if each bank tried independently to settle its accounts with every other bank. To improve the situation a "clearing-house" was established in Halifax in 1887, based on the model of the London Clearing House, founded in the seventeenth century. Two years later a clearing house was established at Montreal. Each bank sends two clerks every day to meet the clerks from the other banks. Each bank keeps its account with the clearing house, so that all checks drawn against one bank are charged to its account and all checks received by it and drawn against other banks are credited. Usually daily balances are settled in cash, but occasionally, as in times of panic, balances are carried on the books for a week or even months. When each bank has received all checks drawn against it, and the balance has been settled, the checks are stamped "paid through the [Montreal] Clearing House." E. J. Sutton, at the end of the month, will receive from the bank all the checks the bank has paid for him during that time, including the check to Mr. Carroll with Carroll's signature on the back as receipt for the money.

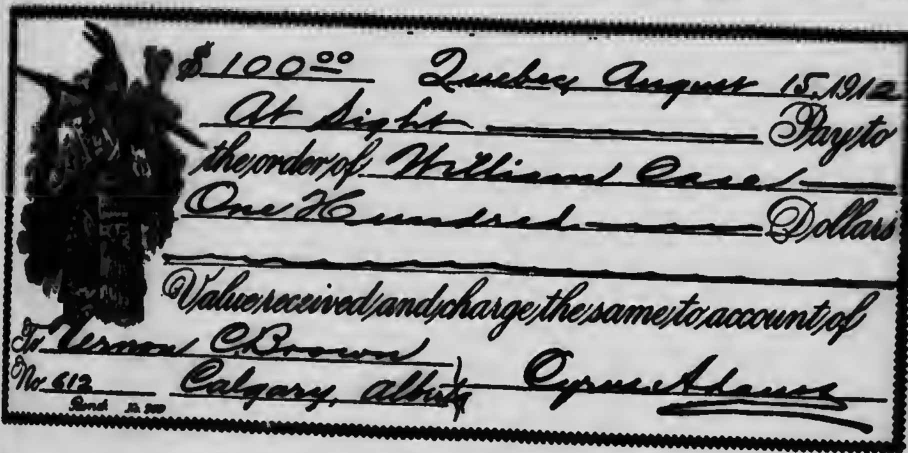
Today there are clearing houses in nineteen of the large cities of Canada, but the ones at Montreal and Toronto still do about sixty per cent of the business. The average for daily clearings at Montreal is over $7,000,000. It is hard to believe that the banks could settle such a tremenduous amount of business if it were not for the convenience of the clearing house. Banks in small towns will "clear" through the nearest clearing house, that is, their accounts with other banks throughout the country are settled in this way. Each bank contributes a small share to the expenses, which are very small, as the clerks are already employes of the banks and the chief expense is a room or building in which to meet.

Drafts. A check is not the only way in which we may "remit" money. Let us suppose that Alexander Smith lives in Calgary, Alberta, and John Jones, to whom he wants to pay a bill, lives in Halifax, Nova Scotia. Instead of sending a check Smith will send a draft, which is an order from Smith's bank, the Bank of Montreal, to its agent in Halifax, to pay to Jones the $100 due him. The advantage of a draft lies in the fact that it is good on its face, because it is an order from the bank, which agrees that it will repay the Halifax bank. The cashier at the Halifax bank knows at once that the draft is good, whereas if a check on a Calgary bank is presented to him he has no way of knowing that the check really comes from a reliable depositer. When the draft has been paid it goes through the clearing house in the same manner as a check.

A draft is also an exceedingly convenient means of exchange whereby debts may be canceled between private parties without the interchange of cash. Let us suppose that Cyrus Adams of Calgary owes William Case of Quebec one hundred dollars. Now it happens that Vernon C. Brown, also of Quebec, owes Mr. Adams an amount which is at least one hundred dollars. It is evident if Mr. Brown will hand one hundred dollars to Mr. Case, Mr. Case will be willing to accept it as cancellation of the debt owed to him by Mr. Adams, and it does not matter to whom Mr. Brown pays the money if in making the payment he can decrease his indebtedness to Mr. Adams. Therefore, Mr. Adams writes a draft addressed to Mr. Brown asking him to pay to Mr. Case the sum named, and he gives this draft to Mr. Case, who in turn presents it to Mr. Brown, and the latter honors it. Thus the money changed hands but once, but a debt of one hundred dollars is satisfied on the books of three people. The illustration on next page shows the form of the draft in question.

Foreign Exchange. So far we have considered banking at home. A very important factor in banking is foreign business. Why do we send money abroad? To pay for goods we have bought, to pay for services, such as transportation and insurance, to pay the expenses of Canadians traveling abroad. To send money abroad we generally use a draft, but we call it a "bill of exchange," to distinguish it from the draft used at home. The bill of exchange is an order from a Canadian bank to its agent in London, Paris, Berlin, or other city, directing the agent to pay a certain sum of money to a third party.

You will see that we have traveled in a circle in our study of banks. We noticed that the first function of the early banks in the sixteenth century was to facilitate exchange; in the twentieth century this function is more widely developed. The large banks have their agents or correspondents all over the world. It is no longer necessary to speak of "current money" or "bank money," though we still use expressions such as "pound sterling," which are relics of the days when such a standard was needed.


\$100.00 Quebec August 15, 1912
At Sight Pay to
the order of William Case
One Hundred Dollars
Value received and charge the same to account of
To Vernon C. Brown
No. 612 Calgary, Alberta Cyrus Adams

Today, with better means of communication, we speak of a *rate of exchange*. It is not necessary each time we buy a bill of exchange to have our money changed to an international standard, and then ship it to England. In theory, if A in Montreal buys goods of B in London, the simplest way to pay would be to ship the gold; but in practice this is not true because of the expense of shipping, of insurance, and the interest lost on the money while idle on board ship.

Rate of Exchange Explained. No doubt you are puzzled to know just what this expression, "rate of exchange," means. In order to understand the situation we must imagine thousands of transactions like our sale of goods by B to A. The total of the payments to be made by Montreal to London must be balanced off against those of London to Montreal. But you must remember that not only London but dozens of other cities in England must be considered, and dozens of cities besides Montreal in the Dominion. In the general circle of transactions of this kind the city which has the largest number of transactions will have the largest number of debtors and creditors and will offer the best facilities for one compensating the other. Thus it is that London has become the central money market, where all the debits and credits of the word may be said to meet and cancel each other.

If, now, the debits and credits of Montreal and London balance exactly, there would be an equal demand on both sides for bills of exchange. To pay a debt of £100 in London the Canadian merchant would buy a draft with the exact equivalent in Canadian money. This would be the normal or standard rate of exchange. But this balance seldom, if ever, exists; there is usually an excess of payments to be made to one point or the other. When Montreal has more to pay London there is naturally an excessive demand in Montreal for bills of exchange. Merchants in Montreal will be willing to pay a premium rather than go to the expense of shipping gold. The fact that they can ship gold, however, will generally keep the premium down below the cost of shipping. If it rises higher, gold shipments will begin, and the premium will immediately begin to drop, because there will be less demand for bills of exchange.

It is clear if the rate of exchange is high in Montreal it will be low in London; in other words, there is less demand in London and bankers will be willing to grant a discount to the English merchants rather than be flooded by Canadian bills.

Importance of Music. Someone has said that "music is our fourth great material want—first food, then raiment, then shelter, then music." It may seem at first reading that this statement exaggerates beyond all bounds the importance of what we too often look on as a "mere art." Surely a man can live without music, we think; and too surely the most of us do—without real music. But whether we recognize it or not the want is there; there is that in every one of us which calls for something that only music can supply. So large a part of our lives is of necessity spent in a rush and grind which almost inevitably dulls our finer sensibilities and blinds us to the better things of life that we owe it to ourselves to take time for those things which make for relaxation and for uplift. And among these uplifting agencies music certainly ranks with the first. It makes no attempt to instruct us, to tell us a story, to put facts before us. It simply appeals to the love for the beautiful and excites emotions of pleasure, and for these reasons it is considered the purest of the arts. For many people to whom religion makes no appeal, music is almost the only bond of connection with the world beyond the purely physical; and for all of us it may, as Carlyle says, "lead us to the edge of the infinite, and let us for moments gaze into that."

Of course no one can learn to be a musician by reading articles on music, nor can one learn in that way to compose music; but it is possible to learn much which helps in the understanding and appreciation of the art. An orchestra concert is much more interesting if the hearer knows something about each instrument—what its musical value is and just what it adds to the effect; a famous song gains much if we know by whom and under what circumstances it was written, and perhaps by what great singers it has been used.

How to Study about Music in These Books. THE NEW PRACTICAL REFERENCE LIBRARY deals with the subject of music in three different ways; there are articles on musical terms, on musical instruments and on the lives of famous musicians. There are, moreover, a number of special articles on such topics as *Hymns and Hymn Tunes* and *Hymns, National*, and a general article *Music*, with subheads on Nature and Terminology of Music, Notation, and History.

Perhaps as interesting a way as any to begin, not to study music but to study about music, is to take up the history of the art. The article *Music* has as its third subdivision History, which will serve as a good starting point. Emphasis is placed, in this section, on the distinctions between the musical ideals of the different nations, and numerous references to the great composers make it possible to pursue this idea of nationalism in music yet farther. The names in the lists of cross references are arranged in chronological order, so that the historical idea is carried out. If all of these topics are carefully looked up, the result is bound to be a fairly comprehensive view of what each of the great nations has accomplished in music.

By no means all, however, of the great composers are listed in the article *Music*, while but a very small proportion of the world's great singers and instrumentalists are there mentioned. For further information we turn to the Classified Index, where we find a list of over a hundred musicians. They are there classified by countries, but perhaps that may not be the most satisfactory way to take them up. If a person is particularly interested in vocal music, it is the great singers he wishes to study. The following list shows how much THE NEW PRACTICAL REFERENCE LIBRARY has to offer on the subject of the world's great singers:

Albani, Emma
Alboni, Marietta
Calve, Emma
Campanini, Italo
Catalini, Angelica
Eames, Emma
De Reszke, Edouard
De Reszke, Jean
Farinelli, Carlo
Gadski, Johanna
Garcia, Manuel
Henschel, Georg
Kellogg, Clara L.
Lind, Jenny
Malibran, Maria F.
Mario, Giuseppe
Melba, Nellie
Nilsson, Christine
Nordica, Madam
Patti, Adelina
Reeves, John Sims
Schumann-Heink, Ernestine
Sembrich, Marcella
Sontag, Henriette

A list of composers includes the following:

Auber, D. F. E.
Bach, Johann Sebastian
Balfe, Michael W.
Barnby, Sir Joseph
Beethoven, Ludwig von
Bellini, Vincenzo
Berlioz, Hector
Bizet, Alexandre
Brahms, Johannes
Buck, Dudley
Bülow, Hans Guido von
Chadwick, George W.
Chaminade, Cecile Louise
Cherubini
Chopin, Frederick François
Coleridge-Taylor, Samuel
Costa, Sir Michael
Czerny, Karl
DeKoven, Reginald
Donizetti, Gaetano
Dvorak, Antonin
Elgar, Sir Edward
Flotow, Friedrich von
Foote, Arthur
Franck, César
Gade, Niels W.
Gluck, Christoph
Godard, Benjamin
Gottschalk, Louis M.
Gounod, Charles François
Gretry, André Ernest
Grieg, Edvard Hagerup
Guilmant, Felix Alexandre
Halevy, Jacques
Handel, George Frederick
Haydn, Joseph
Heller, Stephen
Herschel, Georg
Herbert, Victor
Humperdinck, Engelbert
Jommelli, Nicolo
Liszt, Franz
MacFarren, Sir George A.
Massenet, Jules
Mendelssohn-Bartholdy, Felix
Meyerbeer, Giacomo
Monteverde, Claudio
Moszkowski, Moritz
Mozart, Johann Wolfgang
Nevin, Ethelbert
Offenbach, Jacques
Palestrina
Parker, Horatio
Raff, Joachim
Root, George F.
Rossini, Gioachino
Rubinstein, Anton
Saint-Saens, Charles
Schubert, Franz
Schumann
Sinding, Christian
Smetana, Friedrich
Stainer, Sir John
Strauss, Johann
Strauss, Richard
Sullivan, Sir Arthur
Van der Stucken, Frank
Verdi, Giuseppe
Vieuxtemps, Henri
Wagner, Wilhelm Richard
Weber, Karl von

The person who is particularly interested in instrumental music and its chief exponents will find articles on the following:

Bach, Johann Sebastian
Bloomfield-Zeisler, Fanny
Bull, Ole Bornemann
Bülow, Hans Guido von
Chaminade, Cecile Louise
Chopin, Frederic François
Corelli, Arcangelo
Czerny, Karl
Damrosch, Leopold
Eddy, Clarence
Gade, Niels W.

Gottschalk, Louis M.
Grieg, Edvard Hagerup
Guilmant, Felix
Handel, George Frederick
Heller, Stephen
Herbert, Victor
Hofman, Josef
Joachim, Joseph
Kubelik, Jan
Liszt, Franz
Moszkowski, Moritz
Paderewski
Paganini, Niccolo
Remenyi, Edouard
Rubinstein
Schubert, Franz
Smetana, Friedrich
Stainer, Sir John
Thalberg, Sigismund
Urso, Camilla
Vieuxtemps, Henri

Interesting Facts About Hymns

It has been estimated that there are at least 400,000 hymns in all languages. The greatest number of these are in German, the next greatest number in English.

The Hebrews produced the most noted hymns before the Christian era.

The Mohammedans have no hymns.

The most ancient Christian hymn of any length which we possess today is the well-known *Te Deum*—"We praise thee, O God." It has come to us through the Latin from a very early Greek original.

Martin Luther's great hymn, *Ein feste Burg* (A Mighty Fortress), was a great force in the spread of the Reformation. The tune to which this hymn is always sung was also composed by Luther.

Four hymns, *When I Survey the Wondrous Cross, Rock of Ages, Jesus, Lover of My Soul,* and *Coronation* are printed in more collections, translated into more tongues, and used in more congregations than any others. Some authorities, among whom is no less a critic than Matthew Arnold, consider *When I Survey the Wondrous Cross* the finest hymn in the English language, others place it second to *Rock of Ages.* This latter hymn has been translated into almost as many languages as the Bible itself, probably over three hundred. Gladstone translated it into Latin, Greek and Italian.

One of the best known hymns is *Blest Be the Tie That Binds,* by John Fawcett. Fawcett was an English Baptist pastor, who served for years a little congregation at Wainsgate, receiving from them a very small salary. Finally he decided to accept a call from an important church in London, but after his goods were packed he decided that he could not leave his people. It was on that occasion that he wrote this hymn.

One Sweetly Solemn Thought, by Phoebe Cary, was composed in a little chamber of a village cottage one Sunday morning, after church. It has been translated into nearly all languages of the civilized world.

Charles Wesley's most famous hymn, *Jesus, Lover of My Soul,* was written immediately after a narrow escape from death by shipwreck. Henry Ward Beecher said of it: "I would rather have written that hymn of Wesley's than to have the fame of all the kings that ever sat on earth."

Henry Francis Lyte wrote *Abide with Me* at the close of the service at which, "scarce able to crawl," he had taken part in his last communion with the congregation which he had served for twenty-five years.

The most famous hymns written by women are *Nearer, My God, to Thee,* by Sarah Flower Adams, *Just as I Am,* by Charlotte Elliott, *One Sweetly Solemn Thought,* by Phoebe Cary, *Battle Hymn of the Republic,* by Julia Ward Howe, and *Take My Life and Let It Be,* by Frances Ridley Havergal.

Questions

What is a note? a scale? a bar? a clef? a time signature? Define *forte, pianissimo.*

What is an oratorio? an opera? Mention a number of famous oratorios and of famous operas.

Name five noted composers, five singers and five instrumentalists.

Is there any difference between a band and an orchestra?

Why may it be said that violin music is more agreeable to the thorough musician than piano music?

What is the chief distinction between ancient and modern music?

Who is regarded as the most celebrated of modern composers?

Why of all the arts does music appeal most to the popular taste?

What did each of the following nations try to emphasize in their music: Italy, Germany, England, Scandinavia, and France?

What were some of the ancient musical instruments? Give a list of ten modern instruments.

We think sometimes of mythology as the religion of the ancients, but it was much more than that. It was their religion, their science, much of their literature. And yet it was none of these things, in just the sense in which we understand the words. All mythologies of which we have any record tell of the supernatural beings who had made and who controlled the universe, and in this sense they were religions; but few of them made any attempt to make people better morally, and in that they differed from religion, as we understand it. The primitive religions, in fact, concerned themselves little enough with morals. They demanded worship of the gods, forms, ceremonies, observances; they forbade, as the worst of sins, anything which might be translated as slights to the deities, or as ceremonial carelessness.

So far as science was concerned, it was really science in only one sense—in that it concerned itself with the explanation of things which the people saw about them. It did not observe and trace causes; it simply invented supernatural explanations for the facts and the happenings of the world of nature.

All of the striking characteristics of mythology are to be found in Greek and Roman mythology, the best known and in many ways the most interesting of any of these ancient collections of tales and legends. We find stories which concern themselves entirely with the actions and characters of the gods; we find other stories which give explanations, often beautiful and poetic, but far from scientific of nature; and we find still other tales which seem to have no other purpose except to give pleasure—no value except a literary one. It will be interesting to read stories of these various kinds and to become acquainted in some measure with the imaginings of that wonderful people, the Greeks; for the most that is beautiful and attractive in what we call Grecian and Roman mythology comes from the Greeks.

We must remember, when we read stories of the gods, that to the ancients these supernatural beings were not of necessity better, purer, more self-controlled than men. They were only stronger, more clever, more resourceful. When they were angry, they were more angry than men; when they loved, they loved more fiercely; when they were jealous they were more bitter, more relentless, than men. In fact, the beings whom the ancients worshiped as gods were simply beings who did what the people who created them would have done had they been powerful enough.

One of the best-known stories of Jupiter, the king of gods and men, is that of Europa. Minerva, too, enters into this story.

Story of Europa

Europa, the daughter of Agenor, king of Phoenicia, was so beautiful and charming that everybody who looked at her loved her. But she was young and all unconscious of her charm, and cared little for anything except playing with her young companions in the fields; and there they would stay all day gathering the narcissus, the crocus, the violet, the crimson rose, and twining them into wreaths for their hair and their robes.

One day as they wandered, now here, now there, about the fields near the seashore, calling to each other and holding up any unusually brilliant blossoms which they might find, their attention was attracted to a beautiful snow-white bull that had entered the field and was coming toward them. Ordinarily they would have been frightened at the sight of such an animal; but this bull looked so intelligent, so gentle, so almost declaring that he had no desire to do such a thing, got swiftly to his feet and started across the fields to the sea. Faster and faster he went, and Europa stretched out her hands toward her companions and called to them. Run as they might, however, they could not overtake her, and when the bull gained the shore of the sea, they were startled and horrified to see him plunge at once into the water. With one hand Europa grasped a horn of the bull; the other she stretched toward her companions. As she found out, however, that no harm came to her, that she was as safe on the bull's back as she could have been in her father's largest sailing vessel, her fear gave place to curiosity and wonder.

"What does this mean?" she asked of the bull, feeling sure that as he had understood when she spoke to her companions, he would surely understand her now, "and where are you carrying me? How does it happen that a bull is able to move in this way as safely over the water as on the land?"

And what was her astonishment to have the bull reply to her in a deep voice:

"I am no bull, though to the most careful eyes I look so. I am the god Jupiter, and seeing you in the field, I loved you, and assumed this disguise that I might carry you off and make you my wife."

With these words he comforted the girl, and we may be sure that her pride was great in having so gained the attention and the love of the greatest of all the gods.

At home, however, Europa's parents knew nothing of this side of the story. Europa's sister, for he had loved her and was much distressed at her loss. He set out, therefore, and journeyed, day after day, inquiring of all he met as to whether they had seen a white bull carrying on his back a beautiful girl. All over his own land and far into foreign lands he went; but never a word could he hear of his lost sister. Knowing well his father, and what his wrath would be if his command were disobeyed, Cadmus did not dare to return to Phoenicia; but where else could he find a home?

At length he decided to consult a famous oracle of Apollo in the Castalian cave. Down into the darkness of the cave he went to where the priestess of the god sat, waiting to hear the questions of those who came seeking information. Cadmus put his question:

"Where shall I find a home, now that I no longer dare to go back to Phoenicia?"

Strange sounds came up from the ground which Cadmus himself was unable to interpret. The priestess, however, translated them for him.

"Follow the cow," she said, "follow the cow."

In vain Cadmus begged for a full explanation; the priestess would say nothing more, and he returned to his companions from the darkness of the cave not much wiser than when he had entered. What cow was he to follow? As he stood in deep thought he lifted his eyes and saw a cow walking in a leisurely manner down a path but a little distance from him.

"This as well as any other," he said, beckoning to his companions, and they set off to follow her.

She went on for some distance, Cadmus keeping close behind her, and at length she stopped, Dragging his glittering length across the leaves and the stones, there came from the depth of the cave a monstrous serpent, the guardian of the spring. In vain the men scrambled to their feet and attempted to flee. Terror held them rooted to the ground, and the venomous dragon was upon them; and not one of them escaped the monster's fangs or tightening coils.

Cadmus waited long for his companions and then, when they did not come, he set out in search of them. In the little grove which he had seen them enter he too heard the sound of running water, but when he came to the side of the spring, he found his dead companions with the shimmering serpent coiled up beside them.

After a severe struggle, in which he more than once despaired of his life, Cadmus slew the dragon, and as he stood looking down upon the monster, he heard a voice say, close beside him:

"Bury the dragon's teeth and see what will happen."

He looked about hastily, but could see no one. It was indeed the goddess Minerva, who, invisible to him, had watched the conflict and was now giving him advice.

Cadmus plucked out all the teeth of the dragon, and a great number there were, for the huge mouth had had three gleaming rows. These he took back to the field and planted in the soft, moist earth. He had not long to wait before something bright began to appear above the surface of the ground. First the tips of spears, then the glimmering points of helmets, then the heads and shoulders, and, finally, the whole bodies of stalwart men pushed up through the ground before him until the field was full of

And thus there was begun in this place, where no city had before existed, a city which grew and became powerful and attracted to it people, from all nearby lands. But Cadmus, the king, never heard again of his sister Europa, whose loss had been the beginning of all his adventures.

As proof that the gods and even the goddesses could be very cruel when mortals did not act to suit them, we may take the story of Arachne.

The Story of Arachne

Arachne had many things of which she might have been very proud; she was young, beautiful, and had many friends. But she cared less for any of these things than she did for the fact that she was a very skilful weaver. People came from all the country near her home to see the beautiful patterns which she wove on her loom; and as they watched the web grow under her fingers, they would exclaim:

"Surely Minerva herself must have taught you; in no other way could you have learned to do such wonderful work."

Most girls would have been proud to have been taken for a pupil of the wisest and most skilful of the goddesses, but Arachne was so proud that she could not bear to have people think that even Minerva ever could have taught her anything. Finally her boasts came to the ears of Minerva herself. Now Minerva was not naturally cruel or revengeful, but there was a wickedness in any mortal's setting herself up to surpass a deity which even Minerva could not pardon. Determined, however, to give the human, that they could not feel afraid of him. He advanced until he was in their midst, and they began to throw about his neck and horns the flower wreaths which they had been weaving. At length, Europa said:

"I know what we shall do; we shall mount on the back of the bull and he shall carry us far over the fields and meadows. I know he will not hurt us. See! he seems to understand just what I am saying and to be telling us that he is willing to have us ride on his back."

For the bull had lain down on the grass at the feet of Europa and her companions. Europa first seated herself on his back, and a beautiful picture she made with her purple robe and her flower-wreathed hair.

"Come," she said, "he can carry several of us at once."

But as she said these words the bull, as if declaring that he had no desire to do such a thing, got swiftly to his feet and started across the fields to the sea. Faster and faster he went,

frightened companions had rushed to the palace, calling aloud how the bull, the beautiful, white bull, had run off with their dear comrade.

"Into the sea he plunged," they cried, "and as far as eyes could reach, we could see him swimming safely, while Europa's purple mantle spread out behind her like a sail."

The king was in despair, for he loved his only daughter, and felt that his palace, and indeed, his whole kingdom, would be but a sorry place without her. So he called to him his son Cadmus, and said:

"You are strong and wise for so young a man. I cannot leave my kingdom and my people, but you may set forth now, at once, and search for your sister; and do not, whatever happens, venture to come back without her."

Cadmus was willing enough to search for his sister, for he had loved her and was much distressed at her loss. He set out, therefore, and journeyed, day after day, inquiring of all he looked about, and quietly lay down. This then, if Cadmus had understood the oracle aright, was to be his future home. He stooped down and kissed the ground and made his followers do the same; and he then sent them out to see whether there was in the neighborhood any pure, clear water. They carried with them jugs which they were to bring back full if possible. They passed across the fields into a little grove which looked wild and untouched as though no man had ever set foot in it. Presently they heard a sound of gushing water and looked about them hopefully. Yes, there out of the darkness of a cave there flowed a clear little stream. They bent and drank, and then lowered their jugs into the water. The jugs began to fill with a gurgling sound which was pleasant enough to their ears; but soon they heard another sound which caused them to look up in terror.

Dragging his glittering length across the leaves and the stones, there came from the depth of the cave a monstrous serpent, the guardian

armed men in ranks. Was this a new enemy which he had to fight? If so, he might as well begin the conflict first as last, and he rushed toward the nearest man. Before he reached him, however, this man cried out:

"What part have you in our civil war?" and turning to the soldier nearest to him, who was so exactly like him that Cadmus could never have told the difference, he struck him a sharp blow with his spear. Instead of striking back, this soldier thrust his spear at the man on the other side of him, and soon the whole field was in an uproar. But in an incredibly short space of time the dragon-tooth warriors had almost all perished; indeed only five remained. These ceased their strife and came and knelt down before Cadmus, saying:

"Let us help you to build your city. We choose you here as our king."

And thus there was begun in this place, where no city had before existed, a city which grew and became powerful and attracted to it people

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)

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boastful girl a chance, Minerva took the form of an old woman and went to Arachne's home.

"Foolish girl," she said, "how do you dare to set yourself up as an equal in skill to the goddess of the arts? Do you not know that she could punish you severly for such boasting?"

"Let her!" said Arachne. "I am her equal, and I am willing that she should know what I have said. Let her come and match her skill with mine. And if I am beaten I will pay the penalty."

"Foolish girl!" cried the goddess, dropping her disguise and appearing in her own radiant form; "the trial shall take place here and now."

All those who stood by were terrified; some of them fell at the feet of Minerva; others besought Arachne to yield before it was too late. But the proud girl remained defiant, unafraid.

So the goddess began, while the bystanders stood breathless with fear and admiration. Minerva at her loom worked rapidly, the shuttle seeming to fly as she passed it back and forth through the threads; and a marvelously beautiful pattern soon began to show itself in the web. But Arachne's web seemed, to those who watched, little, if any, less perfect than that of the goddess herself. Only what was this which the reckless girl was daring to do? Not content with defying one of the gods, she chose for her subject in the web she was making the faults and failings of the dwellers on Olympus, showing them so clearly that nobody could mistake.

Her own web finished, Minerva turned and looked at Arachne's. It was wonderful—the goddess could not but admit it to herself. But the presumption! the wickedness of it! thus to hold up the faults of the gods before these staring people.

With her shuttle she tore the beautiful web of Arachne from top to bottom, and then turned to the girl herself.

"Your sin merits death," exclaimed the angry goddess, "but death shall not be your portion. Since, however, you have been so fond of weaving, your punishment shall be, that forever and forever you and your descendants shall make your threads and weave your webs. And wherever men see you they shall tear your webs as I have torn this, and shall drive you from them as I drive you from me now."

And touching the girl upon the forehead, she transformed her into a spider.

This story has a hint in it of the nature myth. We can perhaps imagine that watching the spiders spin their endless threads may have suggested to some imaginative Greek the possibility of the spider's being but a mortal transformed to this low form as a punishment. In other stories which we may study, however, the nature element is far stronger.

Phaethon

When the boys with whom Phaethon played about the fields and river banks boasted of their fathers, Phaethon was silent. His mother, he knew, was more beautiful than the mothers of his friends; his grandfather was a wealthy, honored man; but his father—he knew nothing whatever about a father. This was bad enough, but when his playmates began to see that such was the fact, they made him suffer constantly.

"No one can play in this game unless he can tell who his father is," one would cry mischievously.

"Let's spend our time telling about the greatest deeds our fathers ever did," another would suggest.

And Phaethon, ashamed and angry, would rush home to his mother and pour out his wrath and shame.

"Some day, Phaethon," she would assure him, "you shall know about your father, and then none of the other boys will dare to taunt you."

"But I want to know now!" Phaethon would insist, stamping his foot.

"You are too young yet, my son," Clymene would reply, looking sadly at her son.

At length one day when Phaethon had grown to be a tall, handsome lad, he came into the house in a fiercer state of anger than usual.

"I will endure this no longer!" he cried. "Either I shall be able to tell those insulting boys tomorrow who my father is, or I shall never look them in the face again."

Clymene smiled. "Come here, Phaethon," she said, "and let me whisper something in your ear."

What he heard made the boy look first astonished, then delighted; and he rushed out-of-doors and back to the place where he had left his comrades, radiant with joy.

"*Now* let's tell tales of the deeds of our fathers!" he cried.

And the other boys looked at him in surprise.

"But you have no father," one of them declared.

"O haven't I!" replied Phaethon, no longer angered by the taunt which had so many times stung him. "You see him every day when he drives his chariot across the highest part of the heavens. He is Apollo, the sun god."

A burst of laughter greeted this proud statement.

"Oho!" cried one boy. "Why could you not have made up that story some years ago and saved yourself a great deal of embarrassment?"

"Do you actually expect us to believe that?" asked another, with a sneer.

Disappointed, angry, Phaethon turned again toward home. Having a father was as bad as not having one, if you could not convince other people of his existence.

But his mother was ready to help him out of this difficulty. Looking at him proudly, she said:

"No father would be ashamed to acknowledge you as his son. Tomorrow morning you may go to Apollo, and ask him whether what I have told you is not the truth."

The impatient boy could scarcely wait for the morning to come, and long before daybreak, while the stars and moon were still to be seen in the sky, he started off toward the East, traveling as rapidly as he could. At last he came to the gorgeous palace of the Sun and was admitted within the doors to the very throne-room of his father. There, on the diamond-studded throne, sat the radiant god, wearing a purple robe and bearing on his head the crown of beams.

"Who are you," he asked, "who have come here to my palace? It is almost time for me to set out on my day's journey and I have not long to talk with you."

Impulsively Phaethon poured out the story of his wrongs, and ended with a plea that his father would give him some sign by which he might convince his skeptical comrades. Apollo laid aside the beams from about his head, which were so dazzling that the youth could not approach closely, and called the boy to him.

"To be sure you are my son," he declared, "a son whom any father might be proud to own. I am willing to give you any proof of the fact, and I swear by the River Styx—and that is an oath which even the strongest of the gods would not dare to break—that I will grant you any wish which you may ask of me.

This was precisely what Phaethon had hoped for, but had hardly dared to expect, and it did not take him long to give his answer.

"There is one thing," he declared, "which will really be a proof. Let me drive for one day your great chariot across the sky; then no one who sees me can doubt that I am your son."

Now Apollo was very sorry for the rash promise which he had made.

"Choose something else, my son," he begged; "what you have asked for is not safe. You can have no idea of the dangers of the path across the heavens. The road at the beginning of the journey slopes upward so steeply that even my horses can hardly climb it; the middle of the road is so high above the earth that even I, myself, become dizzy when I look down; and the last part of the road slopes downward so rapidly that it is almost impossible to hold in the horses. If it is hard for me, think what it would be for you."

But Phaethon refused to think. He had set his heart on this one thing and this one thing he would have. He knew his father could not break the oath which he had sworn by the River Styx, so he persisted in his demand. At last, attended by the Seasons, the Days, the Months, the Years, and the Hours, Apollo led the way to where the sun chariot stood waiting. It was the most gorgeous chariot that Phaethon had ever looked upon—of gold and silver and precious gems; and his heart beat proudly that he was actually to have the guiding of the magnificent car for a whole day. The horses were led forth and fastened to the chariot, and Aurora, the goddess of dawn, threw open the doors of the East, through which the sun in its splendor was presently to rise. After a final plea, which Phaethon stubbornly resisted, Apollo anointed the boy's head with ointment so that he might not be scorched by the brightness of the beams, and then set the crown of rays on the young head.

"Remember, my son," he said, "do not drive too high or too low; a middle course is best. Above all, do not attempt to use the whip, for the horses are spirited; and hold tight to the reins."

Only half heeding his father's instructions, Phaethon sprang into the chariot, grasped the reins, and shaking them over his steeds, started out through the open door.

It did not take the horses long to feel that it was an unpracticed hand that grasped the reins, and, taking the bits in their teeth, they dashed out of the traveled road and wildly up the heavens. The courage with which Phaethon had started out did not last long. Below him—a dizzying, sickening distance below—was the earth and the sea. What if he should drop from this awful height! And there, when he looked about him in the heavens, were even worse sights;

the Big Bear and the Little Bear, the Scorpion and the Lion, the huge Crab—all of these seemed to be reaching out toward him as he dashed among them. Up, up, up, went the horses, and then as suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge. They came so close to the earth that mountains which for thousands of years had been snow-crowned lost their snow-caps and stood bare and brown; rivers were dried up; a great part of Africa was burned to a desert; and many of the people were scorched almost black.

Phaethon had long before this dropped the reins, and he stood shaking with terror. Cries came up to him from the earth, cries of pain and terror and fright from the people of the countries over which he was passing. But he was too much afraid for his own safety to worry about others.

The cries did, however, reach the ears of Jupiter, the king of the earth and heavens, where he sat on his throne on Olympus, and he, horrified, looked out upon the course of the wild boy. The other gods and goddesses gathered about him and besought him to save the earth.

"There will be no beauty, no freshness left," they cried. "There will be no cool springs and lakes for the nymphs to live in; no great trees and forests where dryads may shelter themselves."

"I call you all to witness! There is no other way to save the earth but this!" cried Jupiter, and he raised his arm and hurled a bolt of lightning at the luckless Phaethon.

Struck from the chariot, the boy fell headlong into a great river, while the horses trotted quietly across the remaining part of their course and disappeared into the doors of the West.

It may seem to us as at first we read this story through that it is simply a fairy tale, like those we have been used to hearing all our lives; but to the people who created the tale in the far-off country and the far-off time it was much more than a fairy tale. They could not understand the periods of drought which occurred sometimes and dried up vegetation and rivers, and made fresh lakes shallow and stagnant. Why should Apollo, the god of the sun, allow his chariot to cause such destruction? There was only one way to account for it—somebody else must be driving the chariot. And thus gradually grew up the story of the rash son of Apollo, who compelled his father to let him take his place and caused such great destruction thereby. The lightning-bolt which Jupiter hurled at the boy signified to them the thunder-storm which so often follows a dry period.

THE HORSES DASHED OUT OF THE TRAVELED ROAD

We are not to think that any one man or any hundred men ever said: "Let's invent an explanation of drought," and then made up this story. The tale grew up gradually, a little here, a little there, until it came to have the form in which we have just read it.

There is another nature story which is to the full as famous as that of Phaethon. It will be interesting to see, as you read it, whether you can get, in any degree, the meaning of the story. However, you need not be discouraged if you do not, for the tale is in itself interesting enough, even if we did not know that it had a meaning.

Story of Proserpina

Ceres, the goddess of agriculture, was one of the busiest of the deities. In the springtime, she had to go about from field to field all over the earth, attending to the sowing of the seeds; in the summer, she watched the growth of the grains and fruits; and in the autumn, she went about from place to place blessing the harvests. Her car bore her swiftly, and she so loved the helpful work she did that she never grew tired. Still, she was always glad to come back to her home and to her beautiful daughter Proserpina, whom she loved very dearly.

Like her mother, Proserpina had her duties to perform, though they were not as difficult as those of her mother. She had charge of all the flowers, and in the springtime, when she walked across the meadows, violets and daisies and buttercups sprang up in her footsteps. Naturally, she loved the flowers, and spent much of her time in the fields with her companions tending them and gathering them for wreaths.

One day, as the girls played in the meadows, they heard a strange rumbling sound and looked up hastily. A huge, dark chariot with dark horses and a handsome but gloomy-looking driver was coming toward them. The girls screamed in terror and started to scatter. But the driver stopped his chariot, leaped to the ground, and seizing Proserpina, bore her away with him in his chariot. The frightened girl called to her companions and to her mother, but the black horses carried them on too swiftly for any help to follow her. Meanwhile the stern-looking man explained to Proserpina that he was Pluto, king of all the regions below the earth; that he loved her and wanted her for his wife.

Proserpina answered:

"I must tell my mother; she will be wild with grief when she finds that I am gone and knows not where to look for me."

But Pluto shook his head.

"She would never let you go with me," he declared.

While they were talking thus, they had come to the margin of the River Cyane, which opposed their passage. Angrily, Pluto struck the ground with the great trident which he carried, and the earth opened and made him a passage back to his underground kingdom.

The darkness in which they found themselves after the earth closed behind them was delightful to Pluto, whose eyes were tired with the glare of the sun; but to Proserpina it was nothing less than horrible. All her life she had been used to living out of doors from daylight to dark; and now this was far, far worse than the blackest night she had ever seen.

"You will like it when you become accustomed to it," said Pluto, noticing that the girl trembled as she sat beside him.

Gradually the way grew lighter, though the light was white and ghostly—not like the beautiful golden sunlight of the upper world.

When they came at length to the huge palace of Pluto, he expected Proserpina to exclaim with delight over its gorgeousness; for Pluto owned all the gold and silver and gems that lay hidden in the earth and had made good use of them in decking his palace. But Proserpina was not used to gorgeousness. She and her mother had lived simply always, and the rich gems which she saw about her were less to her than a handful of fragrant flowers would have been. And all the jewel-studded lights, which to her seemed to serve only to make the gloom more noticeable, she would have exchanged for one look at the stars.

It was the same way with the food. All her life she had eaten but the plainest dishes—simple grains, fruits, bread and milk. And the rich food which Pluto ordered to be placed before her seemed so strange to her that she would not even taste it. This went on for several days, Pluto, in great distress, urging her to eat, and she as steadily refusing.

Meanwhile her mother had been almost distracted with fear and grief. The girls with whom Proserpina had been playing could tell her nothing except that a man in a black chariot had carried off her daughter. Who the man was, she could have no idea. She sought day and night through one country after another for her daughter. The sun, when he came through the doors of the East in the morning, saw her wandering on, stopping everyone to inquire for her lost girl; and the evening star found her still at her task. One day, as she sat for a few minutes resting on a stone, an old man with a little girl passed her. The goddess bore about her no signs of her divinity; she looked like a poor, worn-out, old woman, and they took pity on her and begged her to go home with them. At last she consented to do so, and as they walked the old man told her that his little son was very sick of a fever.

When they reached the house they found that the child had grown rapidly worse, that he was, in fact, almost dead. You may imagine the delight it caused when Ceres, taking the child in her arms, kissed him and thus restored him instantly to health. Then she asked that she might be allowed to take charge of the boy. Of course the family was only too glad to have so excellent a nurse; but the mother, over-anxious for the son in whose sudden recovery she could scarcely yet believe, determined to hide and watch what happened; and it was, indeed, a startling sight which she saw.

Ceres bathed the boy, murmured some magic-sounding words over him, and then, stepping to the hearth, raked a hollow in the glowing coals and laid the boy within it. The watching mother sprang forward with a cry and snatched her child from what she believed would have been its death. But what was her amazement, when she turned around, to see before her not the feeble old woman whom her husband had brought home, but the radiant goddess Ceres, with her hair of gold and a wreath of wheat and scarlet poppies. Ceres spoke sadly but not angrily:

"I would have given to your son," she said, "immortality. Now you, by your failure to trust me, have taken from him that gift."

And with these words, the goddess vanished.

Her search still continued, and finally, when it seemed that everything was in vain, Ceres became angry with the earth which had failed to aid her in her search and laid her curse upon it. Drought and famine, she declared, should extend over the whole earth; nothing green should grow; there should be no seedtime, no harvest, until her daughter should come back to her. In vain the people implored her, in vain tales of their suffering came to her ears; she, usually so gracious and kindly, was cruel enough now.

At length she found a clew. The river Arethusa, which comes up from the underworld, had seen in the kingdom of the underworld a queen who looked, she said, most like Proserpina. She was pale and sad, and the white poppies which she wore in her hair were very different from the bright flowers she had been so fond of wearing. But still, beyond a doubt, thought the river Arethusa, it was Proserpina. Ceres knew not whether to be glad or sorry. Her daughter was found, but found where? She went to the meeting-place of the gods on Olympus,which she had not visited since the loss of her daughter, and implored Jupiter to use some means to have her daughter brought to her. All the gods felt sorry for Ceres, and they felt sorry, moreover, for the people on the earth, whom Ceres' grief was causing to suffer. At length Jupiter summoned Mercury, the messenger of the gods, and sent him to the regions of the underworld.

"I will do my best," said the king of gods and men, "but the Fates are even stronger than I, and they have declared that if your daughter has eaten anything while she has been in Pluto's realm she may not again come back to the light of day."

When Mercury reached the kingdom of Pluto and stood before the king and the sad-eyed queen, he himself felt sorry for her and hoped that he should be able to take her back with him. When it became known, however, that Proserpina had eaten a few of the seeds of a pomegranate, Mercury shook his head in despair.

"It cannot be," he said, and he went sadly back to the assembly of the gods, leaving Proserpina more hopeless than before.

At length, however, the Fates agreed to make a decree less severe, and declared that though Proserpina must spend six months of every year with Pluto in the dark underground kingdom, the remaining six months she might spend with her mother on the earth.

You may imagine the delight of Ceres when it came time for her daughter to return to her for the first time. She stood anxiously at the door of her cottage, waiting, watching while the former companions of Proserpina stood about where they might welcome her. Suddenly there seemed to be a new freshness in the air; the grass in the meadows, long dry, grew green before their eyes, and purple violets and yellow buttercups started up all about them.

"She is come!" they cried, and sure enough, she was advancing toward them across the meadows, her hands outstretched, her garments blowing in the breeze, no longer the sad, white-faced queen of the underworld, but the old glad Proserpina who had left them long before.

This is a weather myth. Why, the old Greeks asked themselves, should the goddess Ceres, so kindly, so bountiful through a part of the year, withdraw all of her blessings through the winter months?

It must be, they declared, that she was grieved or angry about something; and gradually this tale grew up of the loss of her daughter and her long search. The descent of Proserpina each year to the underground regions meant the coming of winter, when no flowers bloomed and no seeds sprouted. The return to the upper world, on the other hand, marked the coming of spring.

There are some of these old myths which may possibly have meant to the Greeks more than they mean to us. The following story is to us but a story; we can see in it no figurative meaning. It is, however, possible that such a meaning may originally have existed. But the tale is interesting enough simply as a story:

The Story of Atalanta

The king of Boeotia had one daughter, Atalanta. While she was more beautiful than any other girl in her father's kingdom, she remained a maiden at home in her father's house, long after all her companions were married. And this was not because she lacked suitors. Young men, handsome, strong, rich, fearless, came constantly to her father's palace, seeking her in marriage, and it was not because the king refused his consent that they went away unhappy.

Atalanta herself was the cause of their unhappiness, for she had made a vow that she would not marry, but would devote her life to the chase, like the goddess Diana, whom she so much admired. It was hard, however, to be constantly refusing without having any good reason that was apparent, so she made up her mind to give a different answer to her suitors—an answer which would leave them no argument. Accordingly, when the next youth presented himself, she replied:

"I shall marry the man who can defeat me in a race; but everyone who tries and fails shall be put to death."

This may sound as if Atalanta was a very cruel princess, but her idea was simply to keep people from bothering her with the question of marriage. However, her resolution did not have the effect she expected, for there were still found young men who were anxious enough to have the princess for a wife to submit to the trial which she proposed.

Now, Atalanta could run as swiftly as the deer she hunted in the forests, and however much a youth might pride himself on his speed, he was certain to find it was no match for hers. A number of suitors had met their deaths by reason of their love for her, and the people of her father's kingdom were beginning to murmur among themselves at her cruelty. One day there acted as judge in one of the races a youth, Hippomenes, by name, who had never before seen Atalanta. As he took his place in the judge's seat, he said to himself, looking around at the crowd which had gathered to witness the race:

"How can any man be so foolish as to risk his life for the sake of this one girl when there are so many beautiful girls to choose from?"

But when he saw Atalanta step forward, ready for the race, he changed his mind; for never, he felt sure, had he looked upon anything so beautiful, and he found himself hoping that the youths who ran with her would be defeated.

ATALANTA'S RACE — From the painting by Poynter

And as she ran she looked even more beautiful. Her bright hair blew backward in the breeze, a lovely color flushed her face and her gracefulness in running was wonderful to look upon. Of course she won, as she always did, and the youths who had made trial of their skill with hers were mercilessly put to death. Even this, however, did not frighten Hippomenes.

"What glory," he said to her, "can there be in defeating weaklings like those who just ran with you? Tomorrow, if you will, I shall try my speed and endurance against yours."

As Atalanta looked at him, she felt that she would scarcely wish to defeat this young man, so handsome did he look, so brave, so worthy to be her partner. Still she only nodded her head and made up her mind that she would give him as hard a trial as she had given the others.

Now, Hippomenes knew, having seen her run, that he could never hope to conquer her in a fair race, but he thought:

"There are ways in which it can be managed. Every girl is curious, every girl likes beautiful things."

Accordingly, the next day when he took his place beside Atalanta in the starting line, he had in the front of his robe three beautiful golden apples. As the signal for starting was given, the two sped forward, side by side. For a moment it seemed as if he would actually outrun her, but with a fleet step she passed him. Instantly he seized one of his golden apples and tossed it a little ahead of her. She caught her breath, almost stopped, but her desire to win was strong; however, the beautiful golden sphere looked so tempting that she hastily stooped to grasp it. Running with all his might, Hippomenes threw a second apple, and again Atalanta slacked her speed and seized it, yet kept fairly ahead of her fellow contestant. Almost despairing, Hippomenes tossed slightly to one side of the course the third apple, the largest, ruddiest, most beautiful one of all.

This was too much for the princess. She stopped suddenly, her draperies whirling about her, stooped, and seized the apple. The delay was but for a second, although longer than on the two previous occasions, but that was all Hippomenes needed. He passed her and with a final rush, reached forward, and touched the maple goal. He had won. and the cheers of the people told that they were glad that at last their beautiful, haughty princess had been conquered.

And as Atalanta came toward Hippomenes and held out the hand in which lay the beautiful golden apples, all could see that she looked far more happy in her defeat than she had ever looked before in all her victories.

Some of the myths told by the ancient Greeks were on the border-land between mythology and history. It is probable, for instance, that the tale of the Argonautic Expedition (see *Jason* and *Argonauts*) had its rise in a voyage of discovery, although, of course, all historical reference to such a voyage is now lost. The story of the siege of Troy, likewise, the most famous of all the tales that have come down to us, was, probably, an outcome to some war which Greek chieftains waged with some people in Asia Minor. The innumerable legends which grew up around this conflict were used by Homer and Vergil as subjects for their great poems, and it is these poems, the *Iliad*, the *Odyssey*, and the *Aeneid*, which have made the story of the siege of Troy and all the wonderful happenings which were caused by it, so well known to us. Attempts at historical accuracy are mingled in all three of these poems with accounts of the part taken by the gods in human affairs.

The Trojan War

The original cause of this fierce conflict was simple enough. The sea nymph Thetis, at the time of her marriage with Peleus, invited to the wedding all the immortals, except one—Eris, the goddess of discord. If Thetis had thought, however, to avoid trouble by slighting Eris, she soon found her mistake; for the goddess, enraged at the slight, threw among the guests a golden apple on which were inscribed the words, "For the fairest." Juno, queen of the gods, Venus, goddess of love and beauty, and Minerva, goddess of wisdom and the arts, each claimed the apple, and they appealed to Jupiter. He, however, was unwilling to bring upon himself the wrath of two of the goddesses by deciding for the third. And he therefore sent all three to another judge.

The judge chosen in the delicate matter was Paris, son of Priam, king of Troy. At the birth of the prince it had been foretold that he would bring much trouble to his country, and in an attempt to avoid the outcome of the prophecy Priam had Paris exposed to die on the mountain side while he was but a child. A shepherd, however, who found the beautiful boy, brought him up as his son, and at the time that Paris was called upon to make his momentous decision he was acting as shepherd on Mount Ida.

The three goddesses appeared before him and stated their case, and not content to allow him to judge as his eyes directed, each of them offered him a bribe. Juno declared that if he decided for her, he should have power and riches; Minerva promised him fame in war; Venus, the most beautiful woman on earth as his wife. Paris was not influenced by this offer of Venus, for he had a wife, a beautiful nymph, Oenone. However, looking upon the marvelously beautiful face of Venus, he felt that he could not award the prize to anyone else. By this decision, he won for himself the hatred of Juno and Minerva.

Inspired by Venus, although he did not realize that fact, Paris shortly after journeyed to Greece, where he was entertained by Menelaus, king of Sparta. The wife of Menelaus, Helen, was the

THE ABDUCTION OF HELEN

From the painting by Drulsch

THE ABDUCTION OF HELEN

From the painting by D.ulsch

most beautiful of all women, and it was she whom Venus had promised to Paris.

Urged by Paris, and driven to a decision by Venus, Helen consented to leave her husband and journey with Paris to Troy. Menelaus, when he discovered the treachery of his guest and his wife, called upon all the chieftains of Greece to give him aid in punishing the one and bringing back the other. Most of them responded willingly enough to his call—Agamemnon, king of Mycenae and brother of Menelaus, Ajax, Diomede, and Nestor, the oldest and wisest of all the Grecian chiefs. Ulysses and Achilles did not wish to go, and various means had to be adopted to gain their aid; for all felt that without these two the expedition was certain to be a failure. Ulysses, the craftiest of men, would be able to give them counsel in many difficult places, and Achilles was looked upon by all as the greatest of all Greek heroes. He was the son of Peleus and Thetis, and might well be brave in the presence of enemies; for his mother had bestowed upon him a wonderful gift. She had dipped him, while he was young, in the River Styx, and had thus made his body invulnerable to any weapons; only one place, a spot on the heel by which she had held him, could be injured by mortal weapon.

It took several years for the Greeks to prepare for the expedition—to get ready the supplies, the arms, the provisions which would be required by so large an army. But finally everything was ready, and the chieftains with their thousands of followers assembled at Aulis in Boeotia, ready to embark. But here a vexatious delay awaited them. While hunting, Agamemnon, the commander-in-chief, killed a stag which was sacred to Diana, and the goddess of the chase would by no means allow him to go unpunished. She brought a pestilence upon the army and produced a calm which made it impossible for the vessels to leave port; and the soothsayers, after trying all their arts, declared that the wrath of the goddess could be placated only if Agamemnon would allow his daughter, Iphigenia, to be offered up as a sacrifice.

Agamemnon refused, absolutely, at first, but as there was no other way to appease the angry goddess, he finally sent for his daughter, giving as his reason that he wished to marry her to the hero Achilles before the expedition should set out. The princess was laid on the altar and the knife was almost at her throat, when the goddess, seeing her beauty and innocence, relented, and bore her away in a cloud to be priestess in a temple to Diana.

Favorable winds were now granted, and the fleet set sail for Troy.

Meanwhile, the Trojans had been preparing for the coming of the enemy. Priam, king of Troy, was an old man, and unable to lead his forces in battle, but his sons were strong, active men, and particularly was Hector a leader of whom any army might have been proud. Aeneas, a relative of Hector, was one of the strong defenders of Troy.

When the news spread through the city that the Greek fleet was approaching, the Trojan forces gathered on the shore, but the Greeks drove them back and easily effected a landing.

For nine years the struggle went on. First the Greeks would gain the advantage, then the Trojans; and by the close of the ninth year the affair seemed apparently at a standstill. The Trojans had withdrawn their forces within the walls of the city, and the Greeks were besieging them. At the beginning of the tenth year an event occurred which promised badly for the attacking forces. Achilles, the great pride of the Greeks, became angry with the leader, Agamemnon, on account of a real or fancied insult, and he left the struggle absolutely, taking refuge in his tents and withdrawing all of his forces. This was indeed a blow, and the Trojans might have profited largely by it had it not been just at this point the gods and goddesses began to take a part in the struggle. Juno and Minerva because their claims to beauty had been ignored by the Trojan Paris, took part against Troy, while Venus and Mars favored the Trojans. Jupiter remained, for the most part, neutral, though often one goddess or another was able to influence him.

Partly because of the withdrawal of Achilles, partly because Thetis, the mother of Achilles, angered at the slight to her son, had petitioned Jupiter to grant a Trojan victory, the forces of Troy defeated the Greeks utterly, in a battle, and drove them to their ships. A council of war was called, and Nestor, to whom all looked for wise counsel, declared that he could see no way out of the difficulty unless Achilles could be persuaded to return.

Agamemnon at last consented to humble himself before the hero and to petition his aid, and rich gifts were sent by the messengers who were dispatched to Achilles. The latter, however, was firm; he had been slighted and the Greeks might get along without his aid. He even announced that he was going to return to Greece at once.

The Greeks had built a rampart around their ships and the Trojans were besieging them there. Encouraged by the news that Achilles had refused to take part against them, the Trojans broke through the Greek ramparts and would have set fire to the ships had not Neptune offered aid to the Greeks.

There remained one last way of making a plea to Achilles. Patroclus, his relative and his dearest friend, was persuaded to go to him and to report the sorry state in which the Greeks found themselves. Even this, however, did not move Achilles, but he did finally consent to allow Patroclus to don his armor and to place himself at the head of the Myrmidons, Achilles' own special troops.

When he returned to the field, Patroclus found a fierce battle going on. He dashed into the midst of it as the head of his men, and the Trojans, terrified at the supposed sight of the one whom they so dreaded, fled in dismay, even Hector being obliged to flee.

The Trojans, however, rallied and returned to the conflict, and suddenly Hector and Patroclus found themselves face to face. The Greek writers who tell us the story cannot, apparently, bear the thought of Patroclus being really vanquished in fair fight by Hector, so they tell us that Apollo took sides against the Greek warrior, and deprived him of his helmet and his lance. At any rate, Hector obtained the advantage and Patroclus fell, mortally wounded by the Trojan's spear.

Achilles, when he heard of the death of the man whom, more than any other, he lo[illegible] was wild with remorse and anger. He w[illegible]t to rush unarmed into the fight against Hector, who had arrayed himself in the armor of Achilles which he had stripped from Patroclus. But Thetis, his mother, persuaded him to wait until she could get from Vulcan another and finer suit of armor for him.

Impatient at the delay, but recognizing the wisdom of his mother's request, Achilles spent the night in grief for his friend and in ragings against the slayer. In the morning the armor was ready, and a most wonderful suit it was, with its elaborate trimmings of gold. First Achilles proceeded to the council, where he became reconciled with Agamemnon, and then, urging all the Greeks to follow his example, he rushed forth to battle. The Trojans could not stand against the Greek forces, inspired as they were with new courage by the presence of Achilles, and they rushed back into the city.

Hector, however, remained without the walls, determined not to flee; but when he saw Achilles approaching in his flashing armor, with his spear poised, he became terrified and turned to flee. Around and around the walls of the city they fled, Achilles gaining not at all upon Hector; and it is uncertain how the race might have terminated had not Minerva interfered in it.

She assumed the form of Hector's bravest brother, and appearing at Hector's side, urged him to turn and defy Achilles, promising aid. Hector, much delighted, for it was far from being his desire ever to run from an enemy, stood to give battle and instantly hurled his spear with all his strength. Turning to ask his brother for another spear, Hector found that he was alone, and understood that he had been deceived by some deity. Now Achilles advanced upon him and launched his spear with such true aim that Hector fell to the field, mortally wounded. His last words were an appeal to Achilles to allow his body to be carried back to Troy and given proper burial rites, but Achilles answered him brutally. Tying the body of Hector by strong cords to his chariot he drove back and forth before the gates of the city in full view of the Trojan forces and of the grief-stricken parents of Hector. No pleas seemed to move him; he would have vengeance on the dead body of his enemy.

That night, however, the old king Priam went to Achilles in his tent and finally prevailed upon him to give up the body of Hector and let it be borne back to Troy. A twelve-day truce was pledged, that the Trojans might have time for the funeral ceremonies which they felt were the due of their dead leader.

Achilles himself did not live long after the death of Hector. One day, during the funeral ceremonies of Hector, the Greek hero saw a young woman who seemed to him the most beautiful and charming person he had ever seen. Eagerly he inquired who she was, and what was his dismay to learn that she was a princess of Troy, daughter of Priam and sister of Hector. However, he was not to be turned from his purpose; he had determined when first he set eyes on the maiden to make her his wife, and he immediately sent messengers to Priam declaring his desire. For some reason, Priam decided to look favorably upon his suit—perhaps because Achilles had yielded to his plea for Hector's body, perhaps because he thought that the Greek hero might influence his people in favor of the Trojans.

At any rate, a conference was arranged, and the parties met in the temple of Apollo. Paris had not been invited to be present, but he appeared during the course of the negotiations, and his coming meant no good for Achilles. Paris knew that this man was invulnerable in all but one spot, and it was at this spot in the heel of Achilles that he aimed his poisoned arrow. The arrow flew true to its mark, and Achilles fell, mortally wounded. Paris, however, did not enjoy his triumph long, for a Grecian chief in his turn shot Paris with a poisoned arrow. Thus died the man who had caused all the trouble, who had brought distress to two entire peoples and death to hundreds of brave men.

And now a prophecy came to the ears of the Greeks. There was in the city of Troy a statue of Minerva, supposed to have fallen from heaven. It was called the Palladium, and was looked upon as the guardian of the city. Until the Greeks should gain possession of this Palladium, the prophecy ran, they could not hope to capture Troy. At the risk of their lives, for the statue was well guarded, Ulysses and Diomede entered the city in disguise, stole the statue, and bore it off to the Grecian camp.

But even this did not seem to bring decisive victory to the Greeks. Their confidence in their own power was lessening, and they began to argue that if they could not subdue the Trojans with the aid of Achilles, they could never make head against them now. Here the crafty Ulysses came to their aid.

"If we cannot take the city by force," he declared, "we can do it by stratagem." And he laid a plan which all the Greek leaders declared to be certain of success.

First they allowed it to be noised abroad, so that it came to the ears of the Trojans, that they had given up the siege and were returning to Greece. And they did indeed, withdraw their ships and hide them behind a near-by island. They left something behind them, however—something which filled the Trojans, when poured forth out of the city gates and across the plain, with curiosity and amazement. This was a huge wooden horse, the purpose of which they could not guess. Had they known that it was hollow and full of armed Greeks, they would have left it on the sands, or have burnt it, but as it was they gathered about it and wearied themselves with conjectures as to its use.

"Let us take it into the city," cried some, "and present it as a gift to Minerva."

"Let us not touch it,". exclaimed others. "Who knows what harm it may do us?"

Most determined of all in his command that the horse be let alone was Laocoön, priest of Neptune.

"What would you do?" he cried. "Have you not learned that the Greeks are never to be trusted? For my part, I fear them even when they offer gifts." And with these words he struck the side of the horse with his lance.

Had the people been wise, they might have guessed the truth from the hollow sound and the clanking as of armor which followed the blow, but they could not quite persuade themselves to give up this curious object.

Meanwhile, another part of the scheme of Ulysses was put in action. A Greek was here dragged forward by eager Trojans, who declared that they had captured him and demanded that he tell his story. With apparent reluctance and terror, he replied to their questions. Yes, he was a Greek. His name was Sinon, and he had been cruelly treated by Ulysses, who had persuaded the Greeks to abandon him when they set sail from Troy.

"But do you know the purpose of the wooden horse?" cried his captors.

"O yes," replied the wily Sinon. "It was built to propitiate the goddess Minerva, who was angry at the theft of the Palladium."

"And why is it so huge?" asked the Trojans.

Again Sinon pretended to be reluctant to tell, but at length he said:

"They have deserved no good at my hands, and I will tell you the truth about the wooden horse. Calchas the prophet assured them that if the Trojans succeeded in getting the horse within their city they would assuredly triumph over the Greeks, and they built the horse large so that you could not get it through the gates."

While the people looked at each other, not quite convinced as to Sinon's good faith, a remarkable portent occurred. Out of the sea there glided two monstrous serpents, so terrible to look upon that all the crowd scattered in fright. The serpents, however, paid no attention to the crowd; they made their way at once to where Laocoön and his two sons stood. All struggles on the part of the three were unavailing; they were crushed to death in the coils of the monsters, and the people saw in this portent a sure sign of the displeasure of the gods at Laocoön's treatment of the wooden horse.

Without delay they dragged the huge horse into the city, forming a joyous procession about it and singing and dancing in triumph. But their triumph was short-lived. In the night the traitor Sinon let out the men who were shut in the horse's body, and they in turn opened the city gates to the Greek forces, which had returned under cover of darkness. Immediately the whole city was full of the enemy. Fires were started in every quarter; men, women and children were

THE GREEKS LEFT BEHIND THEM A HUGE WOODEN HORSE

put to death; and the few who escaped the sword took refuge in flight.

Troy had fallen, not through force but through treachery; and the long struggle was at an end.

This story of the siege of Troy is of necessity brief, but the full account is interesting enough to repay detailed study. Homer, in the *Iliad*, gives the story, in most fascinating form, of the last year of the war, from the time when Achilles becomes angry to the death of Hector. The story of the wooden horse, of the final fall of the city, of the wanderings of Ulysses and the Trojan Aeneas, are told in the *Odyssey* and the *Aeneid*. There are good translations, both in prose and in poetry, of these three wonderful old poems, and girls as well as boys will find much in them that is absorbing and delightful.

THE NEW PRACTICAL REFERENCE LIBRARY contains much on the subject of mythology, scattered through the five volumes. All of this material is made easily available by the Classified Index in this volume, all the titles pertaining to the subject being there grouped under the heading *Mythology*.

Outline

I. General Meaning

II. Divisions

1. Myths of explanation of questions asked by primitive man in regard to creation
   - a. What am I?
   - b. Whence did I come?
   - c. What is the world?
   - d. Whence came all nature?
   - e. Causes of light, darkness, life and death, etc.

2. Myths of entertainment
   a. Tales of adventure of gods and heroes

III. Origin and Theories
   1. Gods were mere men remembered after death by their great deeds
   2. Wise men invented them for the purpose of establishing law, through the gods appealing to mankind
   3. Inventions of poets, story-tellers, etc.
   4. Myths explained all physical phenomena

IV. Grecian and Roman
   1. Creation of all things explained by myths
   2. Planets as rulers of universe
   3. Universe divided and rulers take different abodes
   4. Abode of lesser deities

V. Scandinavian and Northern Mythology
   1. Explanation of creation
   2. Giant Ymir first created
   3. Bori, father of all gods, appears
   4. Earth then formed from Ymir by Bori's grandsons
   5. Twelve gods and twenty-four goddesses
   6. Gods beneficent and kind

VI. Egytian
   1. Many religious myths
   2. The stronger eventually led
   3. Distinctive belief, soul of man was immortal

VII. Comparison of Different Myths
   1. Points of resemblance
   2. Points of difference
   3. Underlying principle same throughout

Questions

What great benefits have accrued to the modern world on account of mythology?

The founding of what city famed in history is based on mythology?

Who was Achilles? Give the story of Hercules.

What was the foundation of mythology? What is its substitute in modern days?

What marked the decline of mythology? What effect would authentic history have upon it?

How does a people outgrow its mythology?

What are the three systems of interpreting the origin of myths?

Of what monsters was Uranus the father? Who was his wife?

Which of the Titans dethroned his father and what was the ultimate fate of all twelve?

What was the ancient conception of Jupiter?

What was the peculiar relation of Mars to the Romans? How is he represented in art?

Who were the parents of Apollo? What did he mean to the Greeks and Romans?

With whom did Diana come to be identified?

What are the varying accounts of the parentage of Venus?

Who was Mercury's mother? Over what did the god preside?

Who were Vesta and the vestal virgins?

What was the original number of muses?

Who was the muse of comedy?

What goddesses in northern mythology corresponded to the Greek fates?

What did Nemesis personify?

What animals were sacrificed to Ceres?

Who were the children of Ceres?

What is a common representation of Neptune?

What expedient did Ulysses use by which he and his crew escaped the Sirens?

What terrible fate befell all those who looked upon the Gorgons?

Into what inanimate object did Zeus change Niobe?

What was Acteon's harsh fate?

In what way was Diana associated with Endymion?

Of what was Psyche a beautiful personification?

Why was Orpheus an important figure in Greek mythology?

Of what was Aurora goddess?

In what way did Perseus escape an early death?

Through whose aid did Jason secure the Golden Fleece?

What famous riddle did Œdipus solve?

What oath were the suitors of Helen compelled to take?

How did Odin inform himself of what took place on earth?

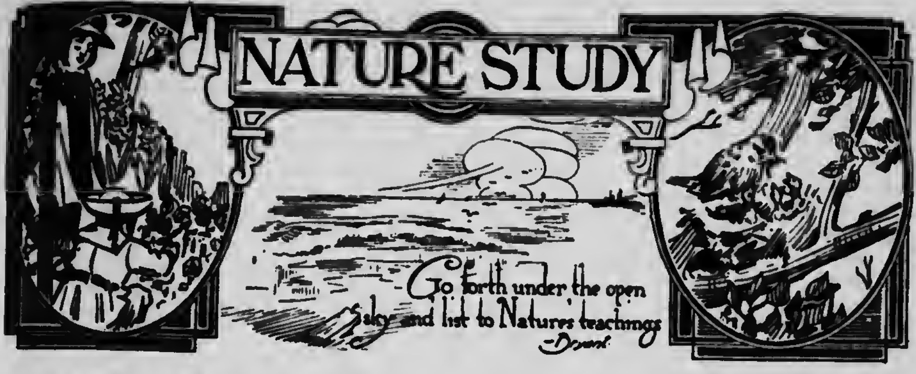
According to Norse mythology, which was the first of all things to come to life?

What is a vampire?

How is our word *tantalize* naturally derived from Tantalus?

Who dethroned Cronus and became ruler of the world?

What Greek god was identified with the Roman Jupiter?



Nature Subject to Man. Man's relation to plant and animal life was the first great factor confronting him in the problem of existence. He at first faced nature empty-handed; was given the injunction to "subdue the earth," and only in the accomplishment of this lay his safety. The earth had to yield him his living; good plants and worthless were to be recognized—the one to be cultivated and improved, the other to be fought and exterminated, so far as possible.

Animals that could be brought under subjection and made to contribute to the well-being of man in ways that he should discover were to be distinguished from those that defied him. How to render the latter less harmful was one of his problems. His progress from a state of savagery to the highly complex civilization he has reached is the history of his struggle with the mysterious forces of nature, during which he has assorted and classified the plants and animals, domesticated many of the species, and learned to distinguish among insects those which benefit and those which war upon man and his efforts.

Importance of Nature Study. Since the study of nature in its various forms has been the foundation of all the world's progress, it surely is of importance to us today. The loveliness of nature appeals to every normal mind; everyone of us, from the little child to the person of advanced years, is constantly framing questions and never satisfied until we get our answers. We are learning through observation and experimentation and in noting the results of the careful investigation of others. Enthusiastic men and women are continually announcing new discoveries and putting them into form for us to understand.

We wonder at the marvelous scheme of life around us and study its unfolding with ever deepening interest; it is no less a delight to the child to know those things in nature that are well worth knowing; before he is aware of it the lessons thus learned have instinctively taught him the wisdom of doing those things that make life well worth living. As his knowledge increases his sympathies broaden, his sphere of usefulness enlarges, he becomes better fitted to occupy his place in the world.

Suggestions for Study. The makers of The New Practical Reference Library recognized the importance some phase of this subject assumes in most courses of reading and in every carefully outlined plan for general study. The investigation of every phase of nature is quite naturally never attempted by any one person, yet some of its departments are constantly drawn upon by young people in many ways to furnish contributions to their classified knowledge. The General Index at the end of this volume justifies its presence there in connection with one's study of any topic, and in no other instance more fully than when nature study is under consideration. Literally hundreds of articles appear in alphabetical order in the volumes which in authoritative manner explain the facts of plant and animal life. There is, in addition, a good account of the general topic, under the heading *Nature Study*.

Let us bring together from the General Index those headings which refer to our subject, not forgetting that there are from five to scores of articles listed under each heading, and to each of these readers and students have ready access, in the orderly alphabetical arrangement of the books.

Birds. Children are interested in birds, and while they cannot classify the species and families, you, teacher or parent, will find such classification helpful in your work with the little people and useful in your own advanced study. Without mentioning one of the 221 different birds discussed in the six volumes we give below their divisions, as grouped in the Index, and one group can easily be studied without reference to any other:

BIRDS

Bee-Eaters	Runners
Birds of Prey	Scratchers
Blackbirds	Sea Birds
Cuckoos	Swallows and Allies
Creepers	Thrushes
Crows	Titmice
Finches	Waders
Fine-feathered	Warblers
Fishers	Waterfowl
Fly-Catchers	Weak-footed
Fossil	Weak-winged Divers
Parrots	Woodpeckers
Pigeons	Miscellaneous

Plants. The wonders of nature are nowhere more strongly emphasized than in the study of plant life. The subject is exceedingly broad; children are most interested in flowers, because attracted by beautiful forms and coloring; later they see other marvels in growing leaves and stalks, and the great diversity of plant life makes an appeal it is difficult to resist.

The New Practical Reference Library lists in its General Index more than six hundred specimens of plant life, and each is described in its proper alphabetical order in the volumes. The student, teacher or parent can quickly arrange a study plan based on any phase of plant life by examining the following table of sub-headings under which the hundreds of articles are appropriately grouped:

PLANTS

Animal-eating	Herbs
Aquatic	Medicinal
Creepers	Mosses and Lichens
Desert Plants	Nuts
Diseases of	Parasitic
Dye Plants	Fruits
Ferns	Fungus
Fiber Plants	Garden Vegetables
Flowers	Grains
Forage	Grasses and Sedges
Parts of Plants	Spice-yielding
Plant Products	Trees
Seaweeds	Tropical
Shrubs	Weeds
Small Fruits	Unclassified

Insects. It is a mistake to class all insects as injurious. Many are pests, it is acknowledged, but this is untrue of some. We often wonder what reason there can be for the existence of numerous species of insects; possibly we have not classed them as injurious, but at least we have maintained a strong prejudice against them. This has been frequently brought to our attention when an investigator, studying insect life, has proved that some particular object of our disapproval is of great benefit to man, in one way or another. For instance, we know that the ladybird, which is not a bird but an insect, protects vegetables from plant lice. So far as we yet know, the world would be better off without our great variety of insect life, but we may learn in time that our present views must be greatly modified.

Insects are very carefully classified in the General Index, and each one there named is described in these volumes in regular alphabetical arrangement. The following list of sub-headings will assist the investigator in preparing material for nature study along this particular line:

INSECTS

Ants	Butterflies and Moths
Bees	Flies
Beetles	Straight-winged
Bugs	

Extending our investigations farther, we find that it will profit us, in seeking a well-rounded view of nature study, to refer to the general articles on Zoology, Botany, Insects, Birds, etc., not forgetting to study the colored illustrations showing orders of birds and animals.

In the pages following we give several type studies—of plants, animals, birds, insects, ants, trees. The general form of each may be used in connection with other lessons relating to different members of the same species; thus the value of the studies is particularly emphasized.

Lessons on Plants

General Suggestions. 1. Let the lessons conform to the arrangement in your course of study, even though you think you might improve upon that arrangement.

2. Remember that children of the primary and intermediate grades are more interested in studying objects as wholes than they are in studying them by analysis. Do not attempt minute or extended analysis in these grades.

3. Lead the children to do the work under

your direction. Ask them to look for that which you wish them to observe and then give them the opportunity to tell what they saw.

4. Remember that through the nature-study lessons you can easily and logically correlate the other branches of study in the course. See that these lessons contribute to the work in language, number, geography and literature.

5. Enter into the work with enthusiasm yourself and the children will become enthusiastic. Study to make your questions and descriptions brief, pointed and plain. Do not use technical terms nor language that the pupils cannot readily understand.

6. Make all preparation for the lesson before calling the class, so that the lesson will begin promptly and continue to the end without interruption.

Selection of Plants. 1. In selecting plants for study in the primary and intermediate grades, bear the following points in mind:

First, the study of plants in these grades should take place in the spring and early summer because the plants which appear and blossom early in the season are more simple than those reaching maturity later.

Second, other things being equal, plants common to the locality should be selected. It is of great advantage if enough specimens can be secured to provide every pupil in the class with a plant.

Third, select plants large enough to have their parts easily recognized. Young children should not be called upon to observe minute objects.

Fourth, whenever possible, have the pupils collect the plants themselves. With children in the first and second grades this will have to be done under the direct supervision of the teacher or an assistant. Plants should be carefully removed from the soil, so that the roots will remain intact. Before distributing the plants for the lesson, hold the roots under water until all the soil adhering to them is washed off.

Illustrative Lessons

Parts of a Plant. The yellow adder tongue, also known as the dog-tooth violet, is an excellent plant with which to begin this study. The trillium, the hepatica, or liver leaf, the claytonia, or spring beauty, or a violet can also be used. Present the study according to the following plan:

1. Collect and prepare the plants.
2. Call the class and distribute the specimens.
3. Study the plant as a whole.

a. NAME. Does anyone know the name of this plant? Possibly some of the children do know its name. If not, give the name.

b. HABITAT. Under this head lead the children to tell you what they know about the place in which the plant grows. If they have helped to collect the specimens they can readily tell you in what places it is found. If they do not know where it grows tell them, and if the specimens can be found near the schoolhouse, go with them or have one of the older pupils go with them to find the specimens.

4. Study the parts of the plant. The children will be interested in the large leaves with their

DOG-TOOTH VIOLET

beautiful green and brown surfaces and in the single bell-shaped flower at the end of the stem which grows between the leaves. Let the lesson at first follow these lines of interest.

By skilful questioning learn what the pupils have seen.

How many leaves has the plant?

What is their color?

Are they colored alike on both sides?

What is the shape of the leaves?

To what are the leaves attached?

What is on the stalk which grows between the leaves?

How many flowers does each plant have?

What is the color of the flower?

What part of the plant grows under the ground?

What do we call this part?

What joins the root to the leaves?

5. COMMENTS. Answers to these questions will lead the children to see that the parts of the plant are root, stem, leaves and flower. The questions above are arranged to follow the children's interest instead of in the logical order that would suggest itself to the mature mind of an adult. By stimulating the child's interest in those parts of the plant which most easily attract attention, the teacher can easily direct his interest to the other parts which she wishes him to observe.

With the first or second grade class the work suggested above will be enough for one lesson, and the time devoted to it should be from ten to fifteen minutes.

Parts of the Flower. With a strong second grade class and with classes in the third grade and beyond, the parts of the flower can be studied with success. The extent of the study should be kept well within the capacity of the pupils, and it is seldom wise to analyze stamens and pistils with classes below the fourth grade.

Call attention to the size of the blossoms on the different plants.

Are they all the same size?

About how long are they?

What is their shape?

What is their color?

How many leaves has each blossom?

How do these leaves differ from those on the stem of the plant?

Are all the leaves of the flower alike?

What color are they?

What do you see in the flower-cup?

How many of these little organs can you find?

Are they all alike?

One or more flowers from specimens in the teacher's possession should be cut open to display the parts, as illustrated in the cut. If the class is far enough advanced in the work, parts of the stamen and pistil and the pollen can be touched upon in this lesson.

Other Lessons. The foregoing are types of lessons that can be given on other plants. As the work advances the lessons should extend to the study of parts in more detail, as the form, size and structure of the leaves and the way they are joined to the stem. The stem also should be studied, special attention being called to the difference in appearance of the portion above ground and beneath the surface. Lead the pupils to notice carefully the distinction between the bulb and the roots.

In the fall term these spring plants should again be considered, and a brief study made of the seeds. The plans presented above can be used in the study of any plant or flower. If the structure is complex the study need only be extended to include the new features. However, these complex structures should be approached with care. Teachers occasionally fail in nature study work because they attempt too much, or because they present subjects that are too difficult. It is far better to do a few things well and in so doing establish in the pupils the habit of close and systematic observation than it is to dissipate their energies on so many subjects that they acquire careless habits of study.

Lessons on Animals

General Suggestions. 1. Lessons on animals can be introduced as soon as the pupils have had enough lessons on plants to become accustomed to the plan of work.

2. All children love pets. A kitten, a dog, a canary, or possibly a rabbit or a squirrel, is doubtless enshrined in the heart of every child in the class. Be guided by this interest and let the first lessons be upon some animal with which the children are familiar.

3. If a squirrel or a rabbit can be kept in a large cage in the schoolroom or in an adjoining room a few days before the lessons begin, the children will become interested in the little animal and their observations will give them facts upon which to base their first lessons.

4. The chief object of these lessons in the primary grades should be to lead the children to become acquainted with the needs of the animals about them and to discover how they can contribute to these needs; also to teach them to be kind to these animals and to prevent unnecessary destruction of animal life.

5. The following lesson plans, based on the study of the squirrel, will serve as models for the study of any animal. The teacher should begin with the study of the animal most accessible.

The Squirrel

General Description. Because of their sprightliness and grace, squirrels are interesting pets. They do not like confinement and it is seldom safe to handle them, but under kind treatment and regular feeding, they will become quite tame and be very much at home about the grounds and house. Occasionally one becomes so friendly that it will sit on your shoulder and rifle your pockets in quest of nuts. All children are fond of squirrels and like to have them about their homes. The following lessons will be much more interesting if you can procure a tame

Can it run fast?

Study the feet. Are the forefeet and hindfeet alike?

Ask the children to compare the squirrel's forefeet with their hands. Does the squirrel use its forefeet as hands?

Why can the squirrel climb a tree so easily?

The most striking object about a squirrel is tail. Ask the children what the tail is used for.

A FOX SQUIRREL

squirrel for the children to observe. If this cannot be done ask them to watch a squirrel in the parks or about their homes.

Study the general structure. How many legs does the squirrel have?

Lead the children to see the difference between the forelegs and the hindlegs. For what are the hindlegs used?

Ask the children to compare the squirrel's forelegs with their arms. In what respects are they alike?

What uses does the squirrel make of its forelegs?

How does the squirrel walk?

Call attention to its size and shape. What gives it its bushy appearance?

They will need to observe carefully and at different times to discover all the uses of the tail.

Why can the squirrel jump so far without injury?

The squirrel's coat next needs attention. What color is it?

Does it contain hair of more than one color?

Are some parts finer than others?

Is it the same thickness in summer and winter?

What are squirrel skins used for?

Why are they valuable for this purpose?

It will require at least two lessons to discuss in a satisfactory manner the points suggested above.

Keenness of the Senses. Ask the children to observe the squirrel's head and notice how its eyes are placed. In how many directions do you think the squirrel can see at once?

In how many directions can you see at once?

Where are your eyes?

Does the squirrel need to see in more directions at once than you? Why?

Can the squirrel hear faint sounds?

Why do you think so?

Do you think it can hear sounds that you cannot hear?

What reason have you for thinking so?

If the children cannot answer these questions, ask them to watch the squirrel and see what they can discover. It may take them some little time to obtain all the information desired. In a like manner lead the children to compare the squirrel's sense of smell with their own. These comparisons will show that those senses upon which the squirrel depends for its safety are keener than the same senses in man. A few questions in connection with this topic will also lead the class to see that all animals which depend upon flight for safety, such as the rabbit and deer, have equally keen senses of hearing, sight and smell.

Habits. Ask the children to feed the squirrel nuts and kernels of corn, and see how it eats them. How does it get the kernel out of the nut?

How does it hold the nut?

What sort of front teeth has the squirrel?

Ask the children to examine the teeth of a dog or cat and notice how they differ from those of the squirrel.

What do the squirrels eat besides nuts and corn?

Do they eat meat?

By questions and observations you can easily lead the children to see that the teeth of any animal are adapted to its food.

Call attention to the squirrel's home and ask the children to discover where the squirrels make their nests, but caution them not to disturb the nests.

The ease with which the squirrel assumes different positions is very interesting, as is also the playfulness of these little animals.

Lead the children to discover what the squirrel does for food in the winter in places where there is no one to feed it.

From the information gained, lessons on thrift and industry may be drawn. Unless frightened, the squirrel is always happy. It is therefore a good example of cheerfulness.

Other Lessons. A rabbit, a kitten, a dog or some other animal with which the children are somewhat familiar should be taken up next. From the study of such animals as these, proceed to that of less familiar animals, as time permits.

Animals are more difficult to study than plants, and with classes in the primary and intermediate grades technical points and minute analysis should be avoided. In connection with the study of the squirrel, teach the children Emerson's famous poem:

THE MOUNTAIN AND THE SQUIRREL

The mountain and the squirrel
Had a quarrel,
And the former called the latter "Little Prig";
Bun replied,
"You are doubtless very big;
But all sorts of things and weather
Must be taken in together,
To make up a year
And a sphere.
And I think it no disgrace
To occupy my place.
If I'm not so large as you,
You are not so small as I,
And not half so spry.
I'll not deny you make
A very pretty squirrel track;
Talents differ; all is well and wisely put;
If I cannot carry forests on my back,
Neither can you crack a nut."

Lessons on Birds

General Suggestions. 1. An eminent authority on nature study says: "The way to a bird's heart is through its crop." Success in bird study depends upon our ability to approach the bird, and birds can be tamed only by feeding them. Some of the first lessons should be devoted to giving instructions about feeding and taming birds.

2. To be successful in this work, the teacher must have a much more extended knowledge than it will be possible to use in class. She must know the size, color and song of the bird, and be able to distinguish between the male and female, and in addition to these facts she must know the bird's habits, its haunts, what it feeds upon, how it apprehends its food, when and where it

BIRDS

GENERAL

1. Birds usually live in pairs, rearing their young in homes which they make themselves.
2. All birds lay eggs from which young are hatched.
3. The young of the higher orders are naked when they break from the shell; some of the lower species are covered with hair or a full suit of feathers.
4. Some of the smallest birds, in their migrations, may cover in a single flight distances ranging from 500 to 2000 miles.

THE SEVEN ORDERS

Order	1. Raptores, Birds of Prey	2. Insessores, Perchers.	3. Scansores, Climbers.	4. Rasores, Scratchers.	5. Cursores, Runners.	6. Grallatores, Waders.	7. Natatores, Swimmers.
Members	Eagle, vulture, hawk, owl.	The most numerous. All singing birds.	Parrot, woodpecker, toucan.	Fowl, grouse, pheasant, pigeon.	Ostrich, emu, cassowary.	Crane, heron, snipe, sandpiper.	Duck, goose, gulls.

Peculiarities

1. Birds of Prey.
   a. The eagle. The noblest and most courageous of birds. Ascends higher than any other bird.
   b. Hawk. Fish hawk. Feeds on fish. Nests in high trees and cliffs.
   c. Vulture. Usually cowardly. Great powers of vision. Valuable scavengers. Gorge themselves eating.
2. Perchers. The most numerous group. Muscles so arranged as to prevent their falling while asleep. When sitting the toes are bent and cannot be opened until the bird rises.
3. Climbers. About 300 species.
   a. Parrot. Some known to live 90 years. South American parrot the talker.
   b. Woodpecker. Tongues long, slender, with a barbed horny tip. Tap trees for insects. The sapsucker bores holes around the tree.
   c. Toucan. Noted for its enormous bill. Live in flocks, one acts as watchman. Are easily tamed.
4. Scratchers. Cock and hen familiar examples.
   Grouse.
   Nests on the ground. The young leave the nest almost as soon as hatched.
   Pheasant. Not natives of United States. The common pheasant a native of Asia. Prized for their beauty.
5. Runners.
   a. Ostrich. Largest of birds. Male stands 7 or 8 feet. Timid bird. Has great speed. In captivity male and female sit upon the eggs in turn.
   b. Emu. Australian bird. Feet three-toed. Kicks with great force.
   c. Cassowary. Native of New Guinea. Stands five feet. Feathers like long hairs. Cannot fly, but a great runner.
6. Waders.
   a. Crane. Long neck and stilt-like legs. Lives in marshes. After eating stands on one foot dozing
   b. Heron. Lives in swamps and along shallow rivers. Found everywhere.
   c. Snipe. Narrow long bill, eyes set far back. Flies in a zigzag way when aroused.
   d. Sandpiper. About 30 species. Search mud for worms. Change their plumage with change of seasons.
7. Swimmers. Web-footed.
   a. Duck. Deep-sea duck dives to great depth for food.
   b. Goose. In the spring fly in V-shaped flocks. Return south as cold approaches.
   c. Gulls. Live along sea-coast and waters of the interior. Catch fish and follow ships, feeding on all kinds of flesh.

nests, when the young appear, how long the fledglings remain in the nest and the dangers they are subject to when they leave the nest. The teacher should be able to show the children how they may assist the young birds in escaping these dangers. At this stage many bi. ls perish from the want of proper care Moreover, only young birds can be tamed.

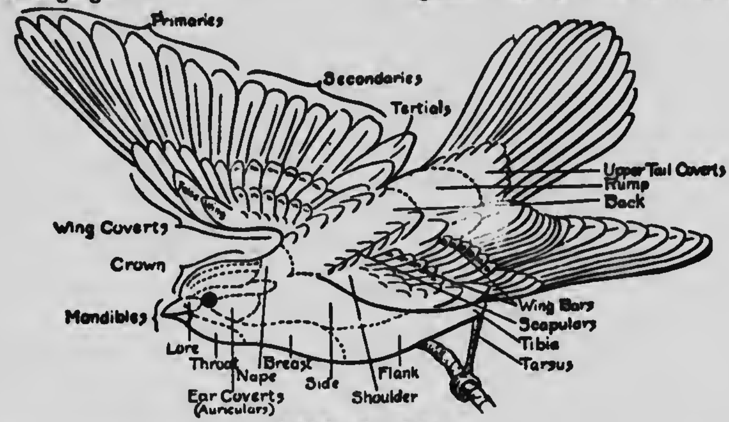
3. Bird study is pre-emimently an outdoor exercise, and but little time can be profitably spent upon it in school.

4. Time spent in class should generally be devoted to hearing reports and giving directions for further observations. When the study of a bird has been carried far enough for a review, this should be given as a class exercise. The review should then be written, thus furnishing a good drill in language.

Besides the school record, each pupil should keep a record for himself. Give complete and careful directions for observing birds. This work is usually more successful when the pupils make their observations alone or in companies of not more than two or three. Birds are easily frightened by noises or by the approach of any living thing that they consider an enemy. Your directions should include the following points:

a. In studying birds one should wear clothing of a dull color. Shades of brown which harmonize with the color of the ground and trunks of trees are the most desirable. White and bright colors which attract attention should not be worn.

b. One must move quietly and cautiously, taking the greatest care not to frighten the bird. In general, the bird can be approached more successfully if the observer pretends not to see it and appears to be in search of something else.



PARTS OF A BIRD

5. Valuable information relating to the study of birds will be found in the articles *Birds*, *Egg* and *Nest*, in the NEW PRACTICAL REFERENCE LIBRARY; also in articles describing the different birds, such as *Bobolink*, *Robin*, *Swallow;* the color plates *Common American Songsters* and *Orders of Birds*, with the article *Birds; Birds' Eggs*, with the article *Egg*, and *Birds' Nests*, with the article *Nest*, will give both teacher and pupils excellent ideas of the color and form of the objects illustrated. These articles and color plates should be frequently consulted.

Directions for Observations. 1. All children are interested in watching for the return of birds in the spring. Ask them to report the first birds they see. Keep a record of these reports, as follows:

The first crow, March 1.

The first robin, March 10.

2. Insist upon careful observation and train pupils to describe only what they see. It is very easy to imagine that we see what we are looking for, even when it is invisible.

3. The opera glass is a convenience but not a necessity, but some work, such as Chapman and Reed's "Bird Guide" or Chapman's "Handbook of the Birds of Eastern North America" is indispensable. Two or three books of this type should be in every school library.

4. Pupils should carry pocket notebooks in which to record their observations on the spot. Otherwise some valuable points will be omitted.

Parts of a Bird. The diagram above shows the parts of the bird, with the names attached. Since the terms there used are found in all bird books, the pupils should become familiar with them, but with the younger children, attention should be called to the most prominent parts only, as head, wings, tail, etc.

1. A live bird, a mounted specimen or the skin of the bird should be compared with the diagram and the children be asked to name the corresponding parts. Let the first lessons be on the parts most easily recognized, as the head, mandibles, wings, legs and tail. Measure the specimen from the point of the beak to the end of the tail.

How long is it?

Spread the wings and measure them from tip to tip. What is the distance?

How does this distance compare with the length?

2. Begin the second lesson with a review of the preceding one to make sure that the pupils remember what they observed. From the review proceed to a study of the more minute parts. Do this in a systematic manner. To illustrate: take first the parts of the body; head, nape, breast, beak and rump. When these parts have been learned, proceed in a like manner with the wings, tail and legs. Classes above the fifth grade should be able to distinguish and name all these parts, and an occasional exercise in connection with the other lessons will enable them to do so.

3. The adaptation of structure to the life of the bird is of special interest. Lead the older classes to see the difference in the beak of a bird of prey and that of one which feeds upon insects and fruit; also the difference in the food of these birds. Figures 1–9 show the chief types represented in our common birds.

Figure 1, scratchers, such as the turkey, common fowl, grouse.

Figure 2, pigeon and doves.

Figures 3 and 4, birds of prey, such as the hawk, owl, buzzard.

Figure 5, parrots.

Figure 6, cuckoos and kingfishers.

Figure 7, woodpeckers.

Figure 8, swifts and humming birds.

Figure 9, perching birds.

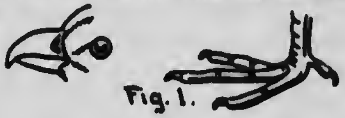


Fig. 1.


Fig. 2.


Fig. 3


Fig. 4.

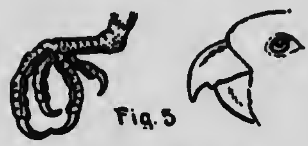


Fig. 5


Fig. 6.


Fig. 7.

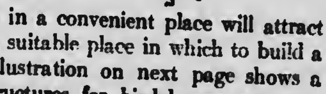


Fig. 8.

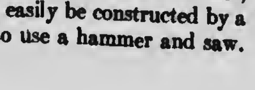


Fig. 9

Protection of Birds. The chief purpose of these lessons should be to increase the children's interest in and love for birds, to impress upon them the value and importance of the birds to the farmer and gardener, and to enlist their services in protecting the birds and in inducing them to return to the same nesting places from year to year. The following are some of the means that can easily be employed to this end:

a. Encourage the children to feed the birds, especially when they first return in the spring, and to provide them through the season with plenty of fresh water. A running fountain in the garden or yard, at which they can drink, is always a source of attraction to them. In nearly every locality there are birds which remain through the winter, and by feeding these regularly they are induced to remain about the buildings and yard and become quite familiar.

b. Provide nesting places. Any small structure which provides shelter from the sun and storms and is in a convenient place will attract the birds as a suitable place in which to build a nest. The illustration on next page shows a number of structures for bird houses, any one of which can easily be constructed by a boy who knows how to use a hammer and saw.

c. Protecting young birds from cats and other enemies and also seeing that they are fed. Many of these birds are practically helpless when they first leave the nest, and in this condition easily fall a prey to cats or other animals which feed upon them. These young birds have not learned to feed themselves when they leave the nest, and unless fed by the parents, many of them perish from starvation. If the young bird found in this condition is approached carefully and fed, it is at once tamed, but if frightened at the first approach of the children, it is probable that it can never be tamed. No better work to give children practice in patience and gentleness can be found than that of looking after and caring for these helpless fledglings.

BIRD HOUSES

Outline

I. General Description
- (1) Size and shape
- (2) Feathers
- (3) Flight
- (4) Endurance
- (5) Development of the senses

II. Anatomy
- (1) Skeleton
- (2) Muscular system
- (3) Organs of sense
- (4) Organs of circulation
- (5) Respiratory system
- (6) Digestive organs

III. Classification
- (1) Birds of prey
  - (a) Buzzard
  - (b) Condor
  - (c) Eagle
  - (d) Falcon
  - (e) Hawk
  - (f) Kite
  - (g) Owl
  - (h) Vulture
- (2) Perchers
  - (a) Blackbird
  - (b) Crow
  - (c) Cuckoo
  - (d) Finch
  - (e) Paradise-bird
  - (f) Thrush
  - (g) Warbler
- (3) Climbers and creepers
  - (a) Parrot
  - (b) Woodpecker
  - (c) Toucan
  - (d) Wren
  - (e) Mouse-bird
  - (f) Trogon
- (4) Scratchers
  - (a) Bustard
  - (b) Grouse
  - (c) Pheasant
    - (1) True pheasants
    - (2) Turkey
    - (3) Chicken
- (5) Runners
  - (a) Apteryx
  - (b) Cassowary
  - (c) Emu
  - (d) Ostrich
  - (e) Road runne
- (6) Waders
  - (a) Crane
  - (b) Flamingo
  - (c) Heron
  - (d) Ibis
  - (e) Snipe
- (7) Swimmers
  - (a) Auk and penguin
  - (b) Duck

(c) Goose
(d) Gull

IV. Birds' Eggs
(1) Composition
(2) Size
(3) Shape
(4) Color

V. Nests
(1) Position
(2) Shape
(3) Material

VI. Special Characteristics
(1) Migrations
(2) Song
(3) Brilliant plumage
(4) Kinds of food
(5) Mating
(6) Care of the young

Questions

Name three general characteristics that distinguish birds from other animals.

What orders of birds are already provided with feathers when they are hatched?

What advantage are feathers to these young birds?

Have birds any teeth? Ears?

How is their food digested?

Can the birds that flit from bush to bush cover long distances in a single flight?

Why are the muscles which move the wings very strong?

Why do some of the bones contain air cavities?

Of what use is the tail in flying?

What is the wing? How is it formed?

What is remarkable about the eyes of a bird?

Which senses are the most acute? Which are dull?

What kinds of birds are the best singers?

Do both male and female generally sing?

Why does not the perching bird fall when asleep?

What is meant by the "homing instinct"?

In what way do birds benefit the farmer and fruit grower?

Do they injure his crop in any way?

What are the seven principal groups of birds?

Name at least three well-known bird families under each group.

To what group do the following families belong: Eagle, hawk, crow, parrot, crane, pheasant, wren, thrush, snipe, goose?

To what family does the turkey belong? Sandpiper? Robin? Sparrow? Meadow lark? Peacock? Magpie? Nightingale? Lark?

Where do water fowl generally build their nests?

What bird will never leave her nest until she has safely covered the eggs with leaves?

What is peculiar about the kingfisher's nest? Where is it built?

Of what does the robin build a nest?

Why is the "tailor bird" so called?

What is the shape of the weaver's nest?

Where does the meadow lark generally build its nest?

What are the parts of an egg?

Of what is the shell composed? The white?

How is the bird nourished while in the shell?

How long does it take for a hen's egg to hatch?

Which end of a bird's egg is the more highly colored?

How does the shape of eggs, like the hen's, which are laid on the ground, protect them from blowing away?

Where are the eggs of sea birds gathered and used for food?

Lessons on Insects

General Suggestions. On page 17 in the article *Agriculture* we have shown something of the damage done yearly by insects. Assisting the pupils to gain a knowledge of the habits of these insects and of the means of destroying those whose ravages cause widespread destruction to crops and trees is some of the most practical work that the school can do. Therefore the chief ends to be sought in lessons on insects should be the gaining of a knowledge of their life history, and along with this an understanding of practical means for preventing their ravages. In this work the following suggestions will be helpful:

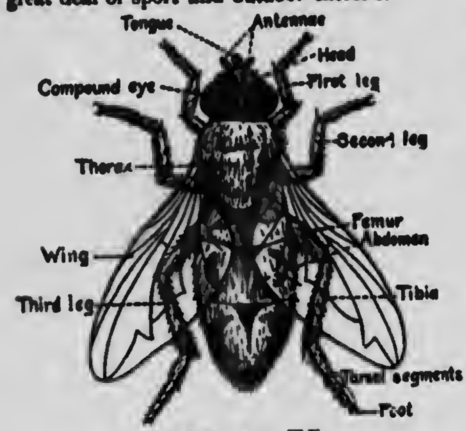
1. Only a little work of this sort should be attempted by children below the fifth grade, and this should be of the most general character.

2. In beginning the study, select insects large enough to enable the pupils readily to see the principal parts. The grasshopper, butterfly or moth are good specimens for the first lessons.

3. Place a number of the insects to be studied in a cage where the children can observe them for a few days before beginning the lessons.

The cage can readily be made by taking a box and cutting away a part or all of one side and covering the opening with a wire screen, being sure that the meshes are fine enough to prevent the escape of the insects. A few perches should be placed in the box, and the one having it in charge should see that the insects are kept supplied with fresh leaves from the plants upon which they feed. A daily sprinkling of these leaves will provide all the water necessary.

4. Prepare an insect net. To do this, procure four or five feet of No. 12 wire from a hardware store. Bend it around a flower pot or some other cylindrical object so as to form a loop about a foot in diameter, crossing the wire six or eight inches from the end and giving it two firm twists. Clamp this loop into a vise and twist the ends closely together. Take a broom handle or any other stick of similar size and fasten the twisted end of the wire to this handle. Procure about a yard of tarletan or cheesecloth, and make a conical bag having a mouth the size of the loop. The bag should be at least two and one-half times as deep as the frame is wide, so that it will lap over easily when the insect is caught. With a little care and skill one soon becomes expert in capturing insects with this little apparatus, and it furnishes the children with a great deal of sport and outdoor exercise.



PARTS OF A FLY

5. Provide yourself with a magnifying glass. A small microscope costing less than a dollar will answer for all ordinary purposes. The glass should be kept where it can be used by the pupils when they need it.

6. Accustom yourself to handling insects without aversion. The teacher who cringes at the appearance of a June bug or screams at the sight of a caterpillar will never succeed in giving lessons on insects, because instinctively the pupils will acquire the teacher's attitude.

7. Begin the lessons with some insect which the children are accustomed to handle, as the grasshopper or butterfly. Proceed from the study of this insect to that of another nearly as familiar and in this way lead the children by easy steps to the study of any insect that you desire to take up.

Parts of an Insect. The accompanying diagram shows the parts of an insect. It should be used in the same manner as the diagram showing the parts of the bird.

1. If possible, procure a number of large flies, so that every pupil in the class can have a specimen. Collect the flies without injuring them before distributing them to the class. If large flies cannot be obtained, the common house fly will answer the purpose.

2. With the specimens in hand, ask the children to observe the three parts into which the body of every insect is divided: head, thorax and abdomen.

3. Next call attention to the other prominent parts: legs, wings, eyes, etc.

How many legs does the fly have?

To what parts of the body are they attached?

Do all insects have the same number of legs?

The answer to this question should be left for the children to discern by examining a number of insects.

Are all the legs the same length?

Can you see any reason for the difference in length?

How many parts has each leg?

Compare these with the parts of your legs.

What sort of a foot does the fly have?

Why can the fly walk upon the ceiling and upon the vertical surface of glass?

How many wings does the fly have?

To what part of the body are they attached?

Do all the wings have the same structure?

Do all insects have wings?

Do all winged insects have the same number of wings?

How do the wings of the butterfly compare with the wings of the fly in size and structure?

Use the magnifying glass in finding answers to these questions.

Study the head in the same manner. Lead the children to observe the structure of the eyes and the tongue. Place a drop of molasses or milk where a live fly can get at it, and see how it eats.

Danger from Flies. The practical purpose of the study of the fly is to impress upon the

INSECTS

GENERAL FACTS AND CLASSIFICATION

I. General Facts.

1. The most numerous class of animals and called insects because of the three divisions of the body—head, thorax, and abdomen—divided distinctly from each other.
2. Never more than three pairs of legs in a perfect insect.
3. The wings are expansions of sections of the thorax.
4. The antennae—a pair of feelers on the head. The eyes, usually compound.
5. Breathes through pores along the sides of the body.
6. Produced from eggs. The three stages of metamorphosis:
   a. The larva. Remains in this state for a time eating heartily.
   b. The pupa. The state of rest, coming to a perfect insect. In some species it is enclosed in a silk cocoon.
   c. The imago.
   Emerging from the pupa, the fully perfected form.
   All insects do not pass through these three forms.
7. Some possess unusual beauty, and some, remarkable intelligence.

II. Classes.

1. [illegible]eroptera.
2. The Orthoptera.
3. The Hemiptera.
4. The Coleoptera.
5. The Diptera.
6. The Lepidoptera.
7. The Hymenoptera.

PARTICULARS.

1. The Neuróptera.

a. So called because of the network appearance of the ribs of their wings.
b. Head distinct from thorax; the antennae generally slender.
c. Have no stings.
d. Examples: Springtails, May flies, dragon flies, ant-lions, scorpion flies, caddis flies.

2. The Orthóptera.

a. The young bear a strong resemblance to their parents.
b. Have four wings lying straight along the body.
c. About 10,000 species.
d. Examples: Crickets, cockroaches, grasshoppers, katydids.

3. The Hemíptera.

a. Usually called bugs, destructive and loathsome.
b. The metamorphosis incomplete; the young do not resemble parents.
c. The mouth adapted for sucking, live on blood and juices of plants.

4. The Coleóptera. The beetle.

a. The largest order, 150,000 species.
b. Pass through a regular metamorphosis, their pupa state lasting sometimes for several years.
c. Different in size, shape and characteristics. Various methods of defense.

5. The Díptera.

a. Two-winged insects. Two families—the fly and the mosquito.
b. The eggs of mosquitoes laid in stagnant fresh water, 200 to 400 to a mass.
c. Only the female proboscis fitted to pierce the skins of animals.
d. The life-history of the mosquito during the summer from 11 to 14 days.
e. Transmission of disease by mosquitoes.

6. The Lepidóptera.

a. The moths and butterflies.
b. Wings covered with minute hairs or scales, and their mouths adapted to sucking.
c. Their larvae injurious to vegetation.

7. The Hymenóptera.

a. The gauze-winged insects.
b. Mouth formed for biting and sucking.
c. The abdomen of the female usually formed with a sting or saw, as in the case of the bee and certain species of ants.

class the fact that this insect is a constant source of danger to health.

1. Ask the class to study the habits of the fly.

Where are flies found in the largest numbers?

On what do they feed?

After the fly crawls over the garbage and other filth what is the condition of its feet?

When one of these insects flies from the garbage to the dinner table, what does it carry?

When this fly crawls over the food, what does it leave upon it?

These and similar questions will awaken new trains of thought in the minds of many children who have always considered flies harmless.

2. Attention should be called to the rapidity with which, under favorable conditions, flies multiply.

Where does the fly lay its eggs?

When the eggs hatch, what do they form?

Upon what do the maggots feed?

How long before they become flies?

How many broods will be produced in the summer? See the article *Fly*, in Volume II.

In connection with these lessons, means of preventing the multiplying of flies and of excluding them from houses should be discussed.

Life History of Insects. Pupils in the older classes should learn how to study the life history of insects. These studies will require a series of lessons extending through the season and frequently through the year. The study may begin with the egg or with the mature insect, but it must continue until the cycle is completed. To illustrate: if the study begins with the mature insect, it must continue until the mature insect of the next brood is produced.

The only way to prevent the damage caused by noxious insects is first, by knowing their life history, and second, by knowing how to destroy the existing broods and how to prevent the multiplying of these insects in the future. The Colorado beetle or potato bug, the codling moth and chinch bug and the gypsy and brown-tail moths and the cankerworm are good examples of insects that should be studied in this way. See *Agriculture*, page 13; also articles on these and various other insects in regular alphabetical arrangement in these volumes.

Lessons on Trees

Importance. "Next to the earth itself the forest is the most useful servant of man. Not only does it sustain and beautify the land, but it also supplies wood, the most widely used of all materials. Its uses are numberless and the demands which are made upon it by mankind are numberless also."—Gifford Pinchot.

Notwithstanding the value and usefulness of our forests, the American people have been exceedingly prodigal of them, and millions of acres of forests which should have been preserved for future generations have been ruthlessly destroyed. All too late they are beginning to realize the damage done, and both state and national governments are taking strenuous measures to protect the forests that remain, and to secure forestization of some of the regions from which the forests have been removed. The school can and should do much toward assisting this movement.

General Suggestions. 1. Thousands of young trees are destroyed every year through thoughtlessness. Children as well as adults engage in this destruction. Attention, therefore, should frequently be called to the importance of preserving and caring for these trees.

2. Success in securing the children's interest in caring for trees will depend upon the teacher's ability to secure the interest of each child in some particular tree. A good way to do this is to ask each pupil old enough to engage in the work at the beginning of the fall term to select a tree which he may call his tree for the year. The tree chosen may be in the schoolyard, by the roadside, near the child's home or in any other place where it can be frequently seen.

3. From the study of this particular tree lead each child to study trees in general. The first lessons in the fall should have this end in view.

4. Observations upon which the study of trees may be based require time. It is not wise to give lessons upon this subject daily. Usually one lesson a week is all that should be attempted. More may be given if the time at the teacher's disposal and the ability of the class warrant, but in all cases the pupils should be given opportunity to prove by their own observations the facts discussed in the lesson.

Fall Study of Trees. Preparation for Winter. In the study of natural objects it is wise to begin with the study of conditions that prevail at the time that the lessons are given. This is particularly necessary in the study of trees.

Call attention to the autumn tints as they gradually appear.

Ask the children to collect and bring to school leaves of different colors. How many different kinds of trees are represented in the collection?

Do all leaves from the same sort of trees have the same color or varying shades of that color?

What is the prevailing color of the leaves of the oak? Of the maple? Of the beech? Of the sumac?

Can you tell the sorts of trees in a forest by the color of the leaves in the autumn?

If the trees to which attention is called in the above paragraph are not common to the locality, those that are common should be selected and they will answer equally well.

The answers to the last question cannot be given offhand, but by frequent observation the children will be able in time to judge quite accurately the prevailing species of trees in any woods from the general appearance of the leaves in autumn.

Some Causes and Effects. Another question which will require thought is: Why do the leaves change color, wither and fall? Of course, only

FIGURE 1

the older pupils can pursue this line of thought very far, and it may be well to let it stand before the class through the entire season, as they follow the putting forth of the leaves and blossoms and the developing and ripening of the fruit.

Do all trees shed their leaves in winter?

What trees in your locality do not?

Discussion of these facts will enable you to divide the trees into those which shed their leaves, or deciduous trees, and those which do not shed their leaves, or non-deciduous or evergreen trees. It will be interesting to have the class compare the kinds of leaves from the two classes of trees.

Of what advantage is it to the deciduous trees not to have leaves in the winter?

Winter Study of Trees. Several lessons can be devoted to plans of branching. When the trees are free from leaves these plans can be easily seen. Two general plans of branching are found; one, in which the trunk extends through the crown to the highest point in the tree, as in Figure 1. The pine and the beech are familiar examples of trees having this plan of branching.

The second plan is seen when the trunk divides into a number of large branches, from each of which other branches extend, as shown in Figure 2. The elm and the apple are good illustrations. Spend one or two lessons in discussing the rela-

FIGURE 2

tion of these plans of branching to the shape of the tree.

What shaped crowns do the evergreens have?

What shaped crown does the elm have?

The Arrangement of Buds and Branches. Ask the children to study the arrangement of branches on the evergreens. A pine, spruce or balsam will answer the purpose. They will discover that the branches are arranged around the trunk in whorls.

What does this arrangement have to do with the shape of the tree?

Have the pupils bring to school small branches from the elm, the maple, the apple tree and cottonwood. Other trees common in the locality will answer as well. Perform the following experiment with the branch from each tree. Stick a pin in the bud near the lowest end of the branch. Fasten a white thread to this pin, extend this thread to the next bud, then to the next, and so on, winding it around the branch as may be necessary to reach each successive bud. Continue until a bud practically over the first is reached.

How many buds were passed?

How many times did you wind the string around the branch?

The answers to these questions will vary with the different branches, and the experiments will reveal the following facts: first, that on some trees the branches appear opposite each other; secondly, that on most trees the branches appear on alternate sides of the stem; thirdly, that this alternate arrangement varies in different species of trees.

STUDY OF STRUCTURE OF BUDS. The same branches may be used for this purpose. If placed in water for a few days, in a warm room, the buds will swell and their parts can be easily seen.

What is the purpose of the scales and of the gum-like substance found on some buds?

If possible. procure some buds from the horse chestnut. What is the purpose of the cotton-like substance in these buds?

STUDY OF THE BARK AND WOOD. Have some pupil procure a section of the branch at least one inch in diameter. A large branch is better. The section should be at least six inches long. First study its external appearance.

What is the color of the bark?

Examine the end of the branch. From this, how many layers of bark can you discover?

How are the layers of wood arranged?

What is the dark portion in the center?

Split the branch through the center. Smooth the surfaces with a plane or sharp knife. From the study of these surfaces, how many layers of bark do you discover?

If you have an opportunity to secure a section of the trunk of a tree, six inches or more in diameter, you can teach the pupils to pursue their studies still further. Saw one end of the section off with a fine saw, then smooth the surface with a draw knife or plane. When this is done, ask the pupils to note and count the rings or layers of wood, showing that each layer represents a year's growth. How old is the tree? Split the section through the center and smooth and examine the surface of one piece. Can the annual growth be traced on this surface? These sections make very fine cabinet specimens, and where they can be obtained without destroying the tree for the purpose may be preferred to the specimens which are described a little later in this article.

FIG. 3
SECTION OF A BRANCH

How many kinds of wood are there in the branch?

How do these kinds of wood compare with each other in color?

Following these exercises, ask the children how many trees they know by the appearance of the bark. It is well for each to make a list of the trees he can recognize in this way.

A very pleasant and valuable exercise connected with the study of trees is the beginning of a school cabinet of native woods. The specimens should be at least four inches in diameter and may be cut in the form shown in Figure 3, or one end may be slanting. The specimens should be sound and thoroughly dried, and then the exposed surfaces should be smoothed and oiled or varnished, so as to bring out the coloring and graining of the wood. In the spring and summer leaves of these trees may be pressed and the flowers and fruit gathered and mounted. If these are placed on stiff cardboard the card can be put in the cabinet back of the specimen showing the kind of wood. Thus there is a complete exhibit of each tree in the locality.

Spring and Summer Studies. EARLY BLOSSOMS AND FRUIT. Ask the class to watch the trees in the spring and notice which ones put forth their blossoms before the leaves appear. Samples of these different blossoms should be gathered and brought to class for study. Blossoms are small and it is not wise to attempt to study their different parts at this time. The chief thing is to notice the different forms. Good trees and shrubs to compare are the soft, or red, maple and the willow, as the two typical forms of blossoms are produced by these trees. Ask the pupils to follow the development of the seeds

FIGURE 4

on these trees and to notice also the way in which the seeds are scattered.

How soon do the maple seeds germinate?

STUDY OF LEAVES. Ask the class to observe what trees put forth their leaves first.

Which ones put forth their leaves next?

Which are the last?

When the leaves are fully developed, ask the children to bring leaves from the elm, maple and oak. Compare these in size, form and structure. This comparison will show that leaves of deciduous trees are constructed on two general plans: first, the plan having one large rib known as the midrib and seemingly the extension of the leaf stalk, extending through the leaf from the base to the apex, as illustrated in Figure 4, which shows the leaf and blossom of the elm. The second plan shows several large veins or ribs radiating from the end of the leaf stalk, as shown in Figure 5, which is an illustration of the maple leaf. After these plans have been studied, pupils should be asked to find as many diffreent trees and shrubs as they can, having these different sorts of leaves. They will discover in their search that the shape of the leaf in all cases depends upon its plan of veining, or the arrangement of the large veins or ribs.

Some trees do not produce their fruit early in the season. This is particularly true of those that bear nuts, such as the oak, beech and hickory. Children should be encouraged to watch these develop through the summer and to gather specimens of fruit as soon as they are ripe. These specimens will furnish material for lessons next fall.

Planting Trees. The great purpose of lessons on trees should be to secure such an interest in them on the part of the children that they will want to care for those about the school and their homes, and that they will also want to increase the number by planting others. This may be done in one of two ways: first, by planting the seeds of the trees; second, by transplanting the trees taken from localities where they are not needed.

FIGURE 5.

The children will be greatly interested in planting seeds of trees, such as the seed of the maple. If there is a school garden a small section may be set apart for this purpose. The soil should be made mellow to the depth of twelve to fourteen inches and the seeds placed in it with only a slight covering of earth, the general rule being to make the covering equal in depth to the diameter of the seed. If these seeds cannot be planted in the school grounds they can be planted in flower pots or boxes. After planting, the soil should be thoroughly wet and be kept reasonably moist until the seeds germinate. It is interesting to care for these young plants through the season and notice how fast they grow. If carefully protected from injury, the second year they will grow still more rapidly and in a short time become large enough to transplant. Children who watch the growth of trees from the seed in this way become acquainted with their appearance and from this knowledge are able to protect thousands of young trees which are destroyed through ignorance.

Teachers should thoroughly understand transplanting of trees and be able to give practical lessons on it. This can usually be done most successfully by directing the pupils in planting one or more trees in the schoolyard. Most arbor day manuals contain specific directions for this work. However, the following points, taken from *Tree Planting on the Prairies*, Bulletin No. 1, Forestry Branch, Department of the Interior, are so plain and practical that they are here reproduced for the benefit of those who wish more extended directions than are usually found in these manuals. This bulletin is excellent authority and those who carefully follow directions here given may feel sure of success.

How to Plant the Trees

Preparation of the Soil. Thorough preparation of the soil should precede the planting. Where blocks or belts are to be formed, the ground should be plowed and prepared as for a garden crop. Clay soils are best plowed the previous fall, in order that the ground may weather over winter. On such soil subsoiling is beneficial, and should precede the planting by at least one season. Just before planting time the ground should be pulverized with a roller or harrow. If the planting is to be done in rows, the ground should be marked off lengthwise and crosswise and the trees set at the intersections. It is sometimes desirable to mark off the ground only one way and run furrows the other. In arid regions the furrows may be deepened into trenches, so that rain water which falls on the surrounding ground may be drained to the tree. On the other hand, in regions having a copious rainfall it will frequently be necessary to plant the trees on a raised portion or mound of earth in order to keep the soil dry enough for them to thrive. The holes should be dug large enough to contain all the roots fully spread out, and deep enough to allow the tree to stand about three inches lower than it grew as a seedling.

Time and Manner of Planting. South of the thirty-seventh parallel, fall planting is safe and often advantageous. North of this, spring planting should be the rule, as fall-planted trees can scarcely develop sufficient roots to sustain themselves during the winter. The most successful nurserymen practice early planting for deciduous trees, beginning operations as soon as the ground ceases freezing. Evergreens are not planted until later; some even wait until the young growth is starting. If possible, planting should be done on a cool, cloudy day. Unless the day is very moist, the trees should be carried to the planting site in a barrel half filled with water, or a thin mixture of earth and water, and lifted out only as they are wanted. Even a minute's exposure to dry air will injure the delicate roots—the feeders of the tree.

The roots should be extended in their natural positions and carefully packed in fine loam soil. It is a good practice to work the soil about each root separately and pack it solid with the foot. As the hole is filled, the earth should be compacted above the roots and around the stem, in order to hold the tree firmly in place. The last two inches of soil should be very fine, and should lie perfectly loose. It will serve as a mulch to retain the moisture.

Trees should be planted neither in very wet nor in very dry soil. If the soil is wet, it is better to wait until it is drier. On the other hand, if good cultivation has been maintained the year previous to planting, the soil is not likely to be so dry that trees will not start. Besides insuring a supply of moisture, such cultivation puts the ground in good physical condition for planting.

With this treatment, watering will scarcely ever be necessary. If it is, the holes may be dug a few days beforehand and filled with water. They should be refilled as the water soaks away until the soil is fully moistened. A thorough irrigation, when that is possible, is still better. As soon as the soil becomes somewhat dry the trees should be planted. While it is a common custom to water at the time of planting, those who do no watering are usually the most successful. Even in the semiarid regions some successful growers apply no water, but keep up an excellent system of cultivation, thereby retaining the soil moisture.

The spacing of the trees is not so important in school-ground planting as in forest plantations, yet is is worth consideration. The trees should not stand so near together as to produce long, slender poles; on the contrary, short, thick trunks are desirable, to support large tops and withstand heavy winds. From 8 to 12 feet apart will be suitable spacing distance. Where large blocks are to be planted the trees may be closer, but it is scarcely ever desirable to plant them closer than 6 by 6 feet.

Why Trees Die in Transplanting. To many persons it is a mystery why trees die after being transplanted. They do not die without cause, however, and when one begins to wither something is wrong. Oftentimes the result is not to be noticed until weeks after the injury; in other cases it is apparent in a few days. After the injury has been done it can be overcome only by the subsequent growth of the tree. All the assistance that can be given is to make the surroundings of the tree favorable for growth. The following are some of the causes of death among transplanted trees:

Loss of Roots. The loss of the principal part of its root system when the tree is being taken up is a great shock to its vitality, and frequently causes its death. A very large part of the root must be cut off, for usually the space surrounding the tree is filled with fibrous rootlets, myriads of which can scarcely be detected with the naked eye. Almost all of these are lost, as well as many of the larger roots. Mr. D. C. Burson, of Topeka, Kan., last year dug up and measured as much as he could of the root system of a vigorous Hardy Catalpa seedling that had grown from May till November. This six-months-old seedling showed over 250 feet of root growth. By the methods in common use only a fifth, or perhaps as little as a tenth, of the root is taken up with the tree in transplanting. Such loss throws the root out of balance with the top. If the top is not shortened, or in some way protected, the leaves may evaporate more moisture than the roots can provide, resulting in the death of the tree.

Exposure Before Planting. With proper subsequent treatment a tree can endure the loss of many roots, but instead of the needed protection it often gets much unnecessary exposure to sun and dry air. This may be in digging, packing, shipping, unpacking, or any other of the various handlings which it undergoes between its removal from the ground and subsequent planting. On a warm day in March the writer saw a bundle of trees in shipment across the plains of Texas without the slightest covering. Before the destination was reached the roots became withered and almost dry, having suffered a hundred times more exposure than the ordinary tree can stand without injury. Not many persons would be guilty of such gross neglect, but the fact remains that exposure causes the death of more trees in transplanting than any other single cause. Exposure can usually be easily prevented, and no one who persists in neglectful practices can hope to be successful.

Failure to Plant Well. The failure to pack the soil tightly about the roots is a common error in planting. It causes injury in two ways: It leaves the tree unstable, to be rocked to and fro or even blown down by the wind; it also prevents the first growth of rootlets from absorbing food. This they cannot do unless good, fine soil is firmly packed around them. Clods will not pack snugly. Likewise manure or litter of any kind mixed with the soil may prevent firm packing. Anything that prevents the soil particles from coming into close contact with the roots is sure to be injurious. Another error is in shallow planting. This allows wind and water to lay bare the roots, and in a short time the tree dies. Crowding the roots into too small a hole is a similar difficulty. Such errors are more often due to lack of experience and skill than to haste. The unskilful planter will hardly plant well, however slowly he may go.

Wet Soil. Trees are often injured by being planted in wet soil. Whether the excessive moisture is a permanent or a temporary condition is likely to make little difference in the results. If it is permanent the water prevents the air from reaching the roots, while if it is only temporary the trampling of the soil over them causes it to stick together so that on drying it becomes baked, leaving them impacted in a hard lump of earth which excludes the air. Excessive air currents in the soil cause injury by drying the roots, but a constant permeation of the soil by the air is necessary to supply oxygen. This process is precluded by either the saturation or the baking of the soil. Undrained pockets occur here and there even in well-drained fields, and are always difficult to deal with in tree growing.

Drying Out of the Soil. Another cause of death is the drying out of the soil. Summer droughts are not unknown in any part of the country, and are very frequent in parts of the Mississippi Valley and on the Plains. Occasionally they are so intense and long continued that it is difficult to make recent transplanted trees survive, even when carefully planted and cultivated. In such a time, those which are poorly planted and cultivated are almost sure to die. Frequently, too, weeds and grass grow up in the plantation and draw off the moisture, thereby greatly diminishing the supply for the young trees.

On a school ground there is likelihood of the trees being injured by the trampling of the soil. The pupils will naturally wish to play among them, and unless they are restrained the soil will soon become compacted. It then dries out very quickly, and in time of drought the trees are sure to suffer, and may be killed. By proper care and kindly suggestion, the children can be persuaded to help the tree in its struggle for life by keeping away from it until it is well rooted.

When We Plant a Tree

HENRY ABBEY

What do we plant when we plant the tree?
We plant the ship which will cross the sea;
We plant the mast to carry the sails;
We plant the plank to withstand the gales,
The keel, the keelson, the beam, the knee:
We plant the ship when we plant the tree.

What do we plant when we plant the tree?
We plant the houses for you and me;
We plant the rafters, the shingles, the floors;
We plant the studding, the lath, the doors,
The beams, the siding, all parts that be:
We plant the house when we plant the tree.

What do we plant when we plant the tree?
A thousand things that we daily see;
We plant the spire that out-towers the crag;
We plant the staff for our country's flag;
We plant the shade from the hot sun free—
We plant all these when we plant the tree.

Lessons on Dogs

General Description. Most experts believe that the dog is descended from the wolf. There is one difference, however, which should be noticed: the eye of the dog of every breed and country has a circular pupil, but the wolf has a narrow, oblique pupil, more like a slit. Young wolves have been trained to follow and recognize their masters just as the average boy trains his dog. There are instances on record of domesticated wolves who recognized their masters after eighteen months and even two years. Thus we see that there may be a marked similarity in the relations between man to wolf and man to dog.

The dog has been almost universally the most intimate friend of man. The annual overflow of the Nile which makes cultivation of the valley possible comes at the same time as the appearance of a certain star above the horizon. The ancient Egyptians called this Sirius, or the "dog-star"; they associated the faithfulness and watchfulness of the dog with the star which appeared as a blessing on their industry. Some nations, especially the Hebrews and Hindus, regarded the dog as unclean. In Mohammedan and Hindu countries the most degrading epithet that could be applied to anybody was "dog." This epithet seems to be due to their hatred of their enemies rather than to a dislike of the dog: when the Israelites saw that their Egyptian enemies worshiped the dog, their hatred of the Egyptians made them think of the dog as an enemy. So, too, the Mohammedan or the Hindu, who saw the affection of the Christian for his dog, disliked the dog just as much as he disliked the dog's master.

Until the beginning of the Christian era the dog seems to have been used only as the defender of the home and a friend and companion of the master. Now he was trained to pursue other animals. Whether this training developed the peculiarities of the "hunting dog" or whether only dogs that showed these peculiarities were chosen for training, is not important. The fact remains that for many years dogs were roughly classed as "sporting" and "non-sporting." The swiftness and the highly developed power of scent are most noticeable in the sporting dogs, such as the pointers, setters and terriers. It is not unlikely that all dogs sprang from one common source, but climate, food, and cross-breeding caused variations which in turn led to further breeding for special purposes. These variations have made some dogs better fitted for some purposes than any other dogs and so the breeding has gone on till there are now about two hundred breeds of domestic dogs.

Characteristics. There will be no difficulty in interesting the children in the subject of dogs. Urge them to notice the different points of dogs. Let them treat the dog not merely as an object of study but as a friend. No better lesson than unselfishness and kindness toward weaker creatures can be taught children. Let them see for themselves that a dog appreciates a kind deed as much as the child does. Every child has seen a dog wag his tail with pleasure at the sight of his master. What effect does a scolding have on the dog?

Watch a dog eat. Does he gnaw or bite?

Study the head and muzzle. The different shapes will help to identify the breeds.

Notice the size and shape of the teeth.

Differences in the shape of the ears are noticeable. The ear which droops over at the top is called a button ear. What are some other shapes of the ear?

Compare the position of the eyes with the position of the eyes in a rabbit.

Are all dogs' eyes of the same color?

Is there any difference between the forefeet and hindfeet of a dog? How many toes are there on each foot?

Each child should observe one dog for several days. This is a much better method of teaching the habits of a dog than a general explanation.

Let the child see that the dog is able to care for himself in a great many ways. Surely every child has seen a dog bury a dry bone at some time or other. Why is it that another dog occasionally finds the bone?

Have all dogs an equally developed sense of smell? Of hearing?

Kinds. There are so many kinds of dogs that it is impossible for the child to learn even the names of all of them. But he should know the chief classifications and some of the characteristics of each. Under the separate headings of spaniel, wolfhound, etc., will be found descriptions which will be of great assistance in this study.

Name some of the breeds of large dogs. What characteristics make them especially useful to man?

Most of the small dogs are merely companions. What are some of them?

Where are wild dogs found?

Why are bloodhounds so named?

What other animals are included in the family to which the dog belongs?

How do dogs compare with other animals in intelligence and affection?

From what does the St. Bernard dog derive its name? For what is it famous?

What dog was used by Landseer as a subject for one of his famous paintings?

What are some of the traits which make the Newfoundland dog popular?

Which is the most celebrated of all strains of shepherd dogs? What characteristics especially fit it for the care of sheep?

What is the chief use to which the Eskimo dog is put?

What is the most distinguishing feature of the greyhound? From what is the name probably derived?

What special sense marks the difference between the hound and the greyhound?

The Dog as a Friend. We know that the dog has always been the companion and friend of his master. A dog will recognize his master's step or his voice; even if the dog cannot see or hear him he will recognize the scent. No other animal is so faithful to man; man appreciates and returns the devotion of the dog. One of the noblest tributes to the dog is part of an address to a jury made by Senator George Graham Vest during the trial of a man who had shot a fine dog belonging to a neighbor. The eulogy is so remarkable for its simplicity and dignity that we quote it in full:

"Gentlemen of the Jury: The best friend a man has in this world may turn against him and become his enemy. His son or his daughter, that he has reared with loving care, may prove ungrateful. Those who are nearest and dearest to us, those whom we trust with our happiness and our good name, may become traitors to their faith. The money that a man has he may lose. It flies away from him, perhaps when he needs it most. A man's reputation may be sacrificed in a moment of ill-considered action. The people who are prone to fall on their knees to do us honor when success is with us may be the first to throw stones of malice when failure settles its cloud upon our heads. The one absolutely unselfish friend that man can have in this selfish world, the one that never deserts him, the one that never proves ungrateful or treacherous, is his dog. Gentlemen of the jury, a man's dog stands by him in prosperity and in poverty, in health and in sickness. He will sleep on the cold ground, where the wintry winds blow and the snow drives fiercely, if only he may be near his master's side. He will kiss the hand that has no food to offer, he will lick the wounds and sores that come in encounter with the roughness of the world. He guards the sleep of his pauper master as if he were a prince. When all other friends desert he remains. When riches take wings and reputation falls to pieces, he is as constant in his love as the sun in its journey through the heavens. If fortune drives the master forth an outcast in the world, friendless and homeless, the faithful dog asks no higher privilege than that of accompanying him to guard against danger, to fight against his enemies. And, when the last scene of all comes, and death takes the master in its embrace, and his body is laid away in the cold ground, no matter if all other friends pursue their way, there by his graveside will the noble dog be found, his head between his paws, his eyes sad but open in alert watchfulness, faithful and true even to death."

For the very reason that the dog stands so close to man, we should study him; not only one dog, but all dogs. To help the student in this study is the purpose of the following outline:

Outline

I. Description
- (1) Structure
- (2) Size
- (3) Characteristics

II. Uses
- (1) Companionship and protection
- (2) Hunting
- (3) Work

III. Classification
- (1) Wolfhounds
  - (a) Eskimo
  - (b) Sheep-dog and collies
- (2) Greyhounds
  - (a) English
  - (b) Scotch deerhound
  - (c) Russian
  - (d) Lurcher
  - (e) Italian
- (3) Spaniels
  - (a) Setter
  - (b) Retriever
  - (c) Newfoundland
  - (d) St. Bernard
  - (e) Poodle
- (4) Hounds
  - (a) Bloodhound
  - (b) Staghound
  - (c) Foxhound
  - (d) Harriers
  - (e) Pointers
- (5) Mastiffs
  - (a) English mastiff
  - (b) Bulldog
  - (c) German boar-hound
  - (d) Great Dane
  - (e) Pugdog
- (6) Terriers
  - (a) Fox terrier
  - (b) Scotch terrier
  - (c) Skye terrier

Lessons on the Ant

An Absorbing Topic. There are few things in the animal or insect world that furnish more interesting material for study and investigation than the ant. In the pages that follow, we have aimed to develop many of the characteristics of these tiny insects, and believe that teachers, pupils and parents may use the lessons to great advantage. It is hoped that what may be learned here may serve as a basis for further investigation and independent research. We are asking the student and reader at the outset to provide a temporary home for the ant, such as we shall describe, and to study the ant at close range; one will then be better prepared to understand the later explanations in this article, and will develop, at the same time, zest for the work.

Simple Material Required. There will be no difficulty in securing a variety of specimens of ants for purposes of study, but some trouble will be experienced in finding specimens of a size to render careful observation a matter of ease. The ant is a very small insect; the largest of the species cannot successfully be studied without the use of a magnifying glass. Such a glass—a common microscopic lens—may be purchased for less than fifty cents, and possession of one of these is strongly recommended.

A Temporary Home for Ants. Every boy and girl who is interested in securing first-hand information about the life of ants will construct an observation house, or temporary home, for them which can be kept in any room of a residence without the slightest misgiving on the part of any member of the family. Indeed, it is quite likely that your enthusiasm in the work will spread to the entire household before the investigation has proceeded far.

If you were a learned scientist you would call this temporary home or nest a *formicarium*, which is a Latin term derived from *formica*, which means an *ant's nest* or an *ant hill*. It is easily constructed. Secure a glass tumbler, as deep as possible but of a width not exceeding three inches. In this place a portion of an ants' nest which you may find in your back yard, filling the tumbler about half full. Let your specimen contain as many of the little inhabitants as possible. You cannot hope to preserve the form of the nest, so make no attempt to do so. One of the interesting things you are going to observe is the rebuilding of this nest. In order to arrive at just conclusions and to draw correct inferences in the study of ants it is necessary that their circumstances and surroundings should be, as far as possible, those of nature. This artificial home should be of sufficient dimensions to insure to the little people perfect freedom or action and to enable them to meet the demands of their domestic economy and to obey with precision every prompting of instinct. In order that their movements and performances may be registered by you, as the faithful expressions of the exercise of their instinct, they should be perfectly free to act in any direction and in any manner that the suggestion of their nature may dictate.

A TEMPORARY HOME FOR ANTS
A Formicarium

The illustration herewith will help the youthful investigator in preparing every detail necessary to successful observation and study. The glass, with its contents, should be placed in an encircling trench filled with water, to prevent escape of the insects.

Ants very much dislike light in their nests, probably because it makes them feel insecure, yet this statement must not be accepted as meaning that they always shun the light. At times, they seek the light with every manifestation of pleasure, but their nests are so arranged that light is excluded. This is doubtless for sanitary and protective reasons. Such an arrangement is demanded in order to promote the health of the colony, to provide safe retreats in case of heavy rains or violent causes of disturbance, to forward the development of the young, which are very sensitive to changes and degrees of temperature, and to make preparation for their long winter sleep. The different species of ants pass the winter months in suitable chambers many inches below the surface of the ground. Therefore, in preparing the new home for your captives, wrap a dark cloth around the tumbler and remove it only for purposes of observation. Leave the top usually uncovered. Place on top of the material in the tumbler a few fine crumbs of bread, part of a pulverized nut meat and possibly a drop or two of honey.

Within a day or two you should be able to answer most of the following questions, if you have been observing:

1. What change has been wrought in the appearance of the nest?

2. Under your magnifying glass do you note differences in the appearance of the little inhabitants?

3. Have you seen ants carrying tiny burdens up from the depths and depositing them for a time in the sunshine and warmth and later returning below with them?

4. Have you noticed any ants with wings engaged in work?

5. To what extent have you observed that ants are attracted by light and heat?

6. Have you noticed any dead members of the colony?

For your encouragement we are going to answer the above questions. Note whether your experience coincides with the views we set forth. If not, continue your inquiries and submit your ant home to various experiments:

1. The portion of the ant hill thrown into the tumbler has assumed new forms; there are winding avenues and little grottoes visible, and we may assume that the same formations extend to those sections which are not visible to us. The ants have constructed their home.

2. There are three kinds of ants; doubtless all of them are represented in your tumbler. They are males, females and workers. We shall learn that males and females have wings at one stage of their existence but do not possess them all their lives; the workers are wingless.

3. If you have noted these tiny burdens you doubtless wonder what they are. The ants per-

forming this service are the workers; the burdens are eggs. These are continually carried back and forth from the depths below to the sunshine and to the warmth. In the process of development of the ant from the egg you will learn later that before the insect assumes its final form it is called larva and pupa; the same devotion is shown in the care of these.

4. You may look wherever you can find nests of these insects but will never discover a winged ant working.

5. To prove that ants are attracted by light because of the heat with which it is associated, place a candle close to the glass home in order to illumine its chambers. The glass becomes warm and thus a source of heat. The ants flock to that part of their new home, and even if you remove the source of the heat the glad and willing movements of your little friends are not checked but are still directed to those chambers of their home which were recently illumined but are now again in comparative darkness. If you leave the ants near a fire for some time, the side nearest the heat is always crowded with ants, even though a screen intervenes. The screen does not admit luminous rays to their home but it is transparent to radiant heat. Place your glass in the sun, and the ants are certain to be attracted to the surface, where they manifest signs of pleasure and satisfaction; when the sunbeams fall upon the screen which covers the sides of the glass vessel the ants gather in the chambers and passages below, and bring up with them not only the *larvae* and the *pupae*, but the eggs also, that all may benefit by the genial warmth.

6. What disposition is made of the dead? In their artificial home there is not an excellent opportunity to show the ants' veneration for their dead but you may possibly learn something about it if you will place a little square box made of paper (not over one inch square and about one-fourth of an inch high) on top of the nest. It is likely to be used for a cemetery. Further on in this study we shall describe an ant funeral.

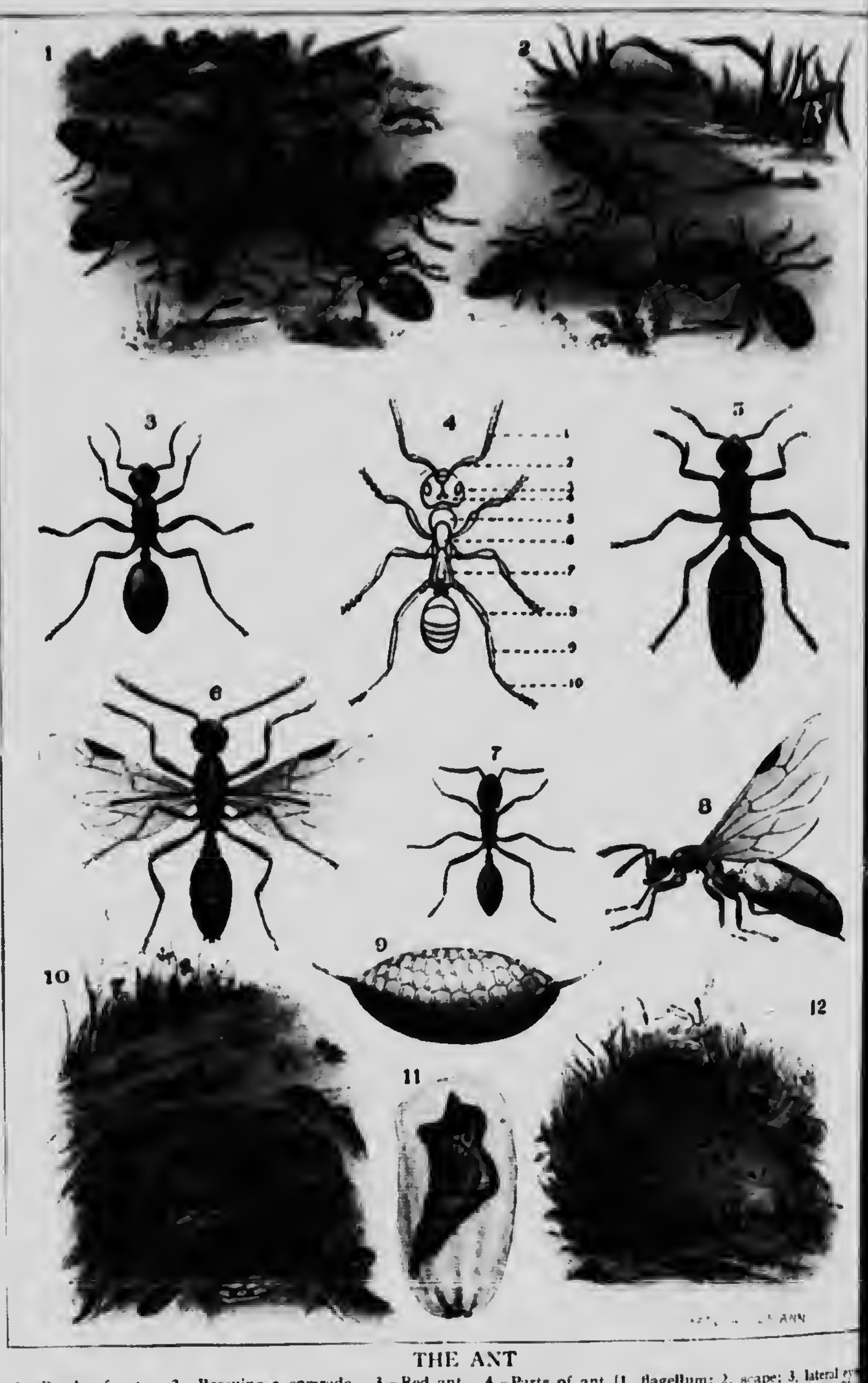
The things you have already observed regarding these wonderful insects will prepare you for a brief discussion of ants which will be more readily understood because of the things thus far learned.

Males, Females and Workers. In every species of ants there are three distinct kinds of members in each community—the males, the females and the workers; the latter are sometimes called neuters, and they abound in much greater numbers than the other two. Every colony has at least one queen; as a rule, several. These latter are larger than other ants, are frequently more deeply colored and have very delicate wings with scaly flounces. Every queen presides over a colony of from one thousand to two thousand or more ants. The male ant of many species is winged, as is also the female. Their courting and mating is carried on in the air, with every opportunity for romance; certainly there is known to be choice and selection as among human beings. The female loses her wings as soon as her season of egg-laying begins; the male dies by the time his progeny reach their natural form, and long before full growth is attained. The workers are charged with the safety of the eggs, later of the little ants in the progressive stages of development, and still later with that of the ants too young to protect themselves. The workers show very tender care and solicitude for the young, in this virtue not being excelled either in the animal or insect world. Besides, the workers perform every other kind of labor in their community. The males and females do not labor at all.

Meaning of Hard Words. There is a strong temptation to skip all words of a technical nature in ordinary reading and study. Especially are young people likely to do this. It is not right. You possibly follow this practice because "the words are hard," and because you "cannot understand them, anyhow." May we show how you are in error in this?

The technical words in any text are there because very long ago there was the best of reasons for applying them. They are derived largely from the Latin and the Greek, and most of them were applied when those languages were solely used by scholars. Later, when new discoveries necessitated new terms, the same languages were drawn upon, that uniformity and good order might be continued. We must conclude early in our scientific investigations that these terms cannot be altered to suit our convenience, so, whenever we find a new word, let us patiently examine it. It will soon be a common word in our vocabulary.

As an illustration, did you have much trouble with *formicarium*, printed in the third paragraph of this lesson? It was pronounced by you in the most natural way, with the accent on third syllable, and we told you from where the word came. This was done as a matter of encouragement, for you might not have searched for the



THE ANT

1—Battle of ants. 2—Rescuing a comrade. 3—Red ant. 4—Parts of ant [1, flagellum; 2, scape; 3, lateral ey[illegible] 4, ocelli; 5, prothorax; 6, mesothorax; 7, metathorax; 8, femur; 9, tibia; 10, tarsus]. 5—Black ant, female. 6—Bl[illegible] ant, male. 7—Worker. 8—Black ant, female, with wings. 9—Portion of eye, highly magnified. 10—Cross sec[illegible] of ant hill. 11—Cocoon. 12—Exterior of ordinary nest or hill.

... and derivation, although any good ... would offer full explanation.

... you read many lines further you are ... find the word *antenna*, with its two ... *scape* and *flagellum*. The first word ... on the second syllable, and its last ... sounded like long *e*; the second is ... exactly as spelled; the third is ... the second syllable, with the *g* soft; ... them carefully. We explain the ... *antenna* in the text; *scape* is a ... from the Latin, and means *stem* or ... you learn why? *Flagellum* is from ... our English cognate is *flagel-* ... means *to whip*. Can we imagine, ... the flagellum is something that whips ... striking things with which it ... There you have it; the ... slender part of the *antenna*, the ... from the body. From the definition ... the office this little organ per- ... more fully explained later.

... we may analyze with some ... read about the ant's eyes you ... *ocelli*. Your dictionary says ... the singular being *ocellus*. ... Latin, and in form indicates ... which gives us for a definition, ... namely, a little farther on, ...

... such names is extremely inter- ... them easily, if not too ... Note the remaining names ... the ant in the colored plate ... of each.

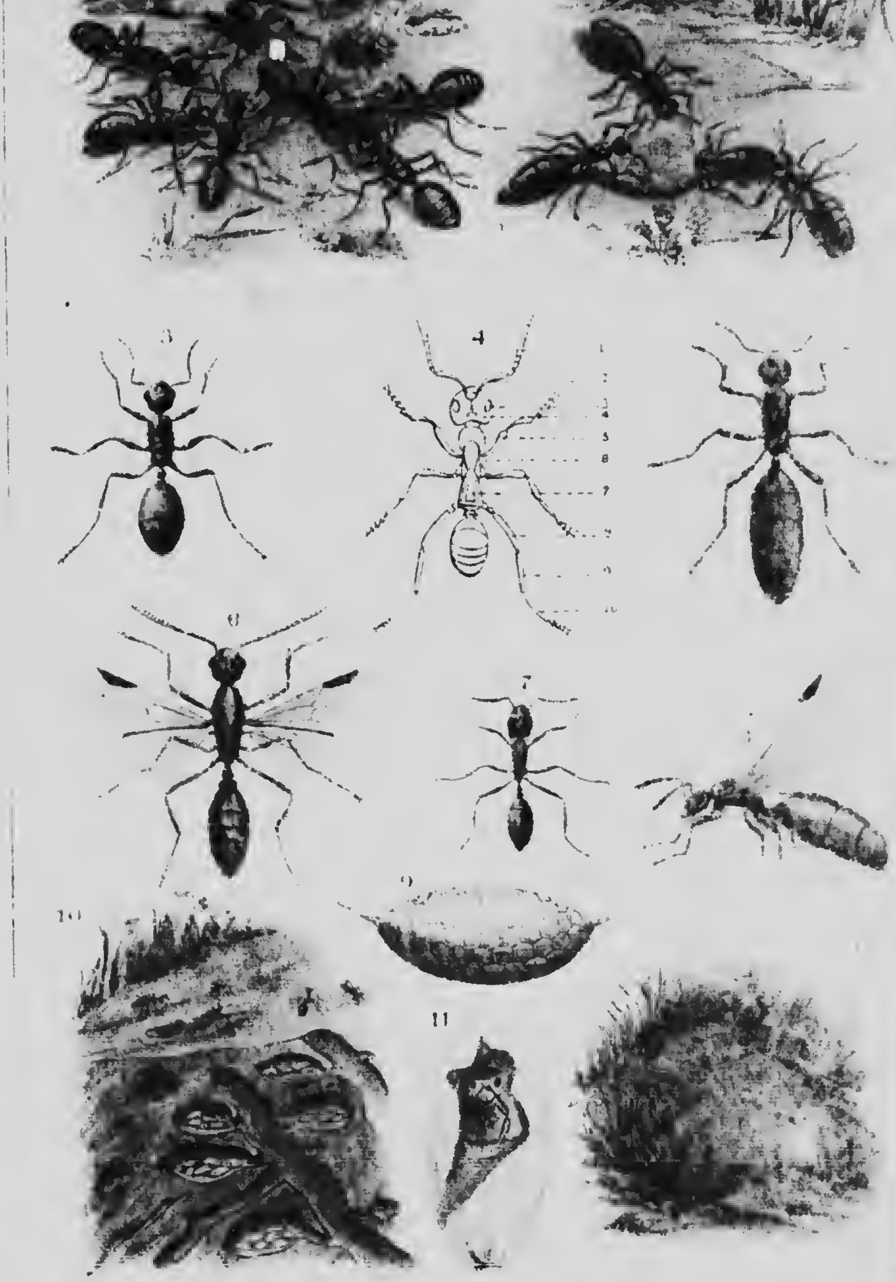
... **Ant.** Good illustrations of the ... workers are shown in the ... The diagram of the parts ... referred to frequently. Use ... on the inhabitants of your ... more important parts, and ... to identify and know them ...

... is a wonderful organism. ... under the microscope we ... which you know in all ... formed of a fine network ... arrangement to the cells of ... eyes are immovable, hence ... each in fact being an eye ... able to see in as many ... lenses in the eye. They ... human beings are able ... possess the power we enjoy ... the lens so as to adapt the sight to meet the object of vision. The outer surface, or *cornea*, and the optic nerve are always at the same distance, so the ant is unable to see near objects. This is doubtless the reason why they are furnished with the sensitive and delicate feelers, with which they may, like a blind man with a stick, feel things close at hand where they are unable to see.

In nearly all species of ants there is one of these compound eyes on each side of the head, set far back where we would naturally expect to find ears. Most species, in addition, have three simple eyes, called *ocelli*, on the exact top of their heads. In one species of ants no eyes have been discovered. These insects seem to have no settled dwelling-place, but are always on the march searching houses for their prey, and crossing streams by forming floating bridges of their own bodies. They must be guided in their movements entirely by scent, which fact is true in great measure of every variety of ant. The ant vision seems very imperfect, and we know their sense of smell is most acute. You may test their vision by relieving an ant of a burden it is carrying; remove that burden only a very short distance and you will find the insect will have great difficulty in finding its lost treasure, though no obstacle intervenes to hide it from view.

We referred above to the feelers, or ... They are long jointed horns fixed into ... sockets not far from each other, and located ... the places where we would naturally expect ... eyes. The word *antennae* indicates the ... number; the singular number is *antenna*, ... means *feeler*, or *horn*. Each horn of the ... is in two parts, the one nearer the head ... the shorter. The other has, as a rule, ... divisions, fitting into each other like ... looking like a string of polished beads, ... three being formed into a club. ... feet through your microscope. These ... be moved in any direction at the will ... little owner. They in no way hinder ... they are placed well ... the organs ... Since you are so well acquainted with ... *antennae*, you will ... shorter arm is called ... *scape*, and ... with the eleven divisions, ...

Now pause ... it has been ... difficult words ... to continue ... words in connection ... you have ...



THE ANT

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meaning and derivation, although any good dictionary would offer full explanation.

Before you read many lines further you are going to find the word *antenna*, with its two divisions, *scape* and *flagellum*. The first word is accented on the second syllahle, and its last syllable is sounded like long *e;* the second is pronounced exactly as spelled; the third is accented on the second syllahle, with the *g* soft; pronounce them carefully. We explain the meaning of *antenna* in the text; *scape* is a derivation from the Latin, and means *stem* or *shaft;* can you learn why? *Flagellum* is from the Latin, and our English cognate is *flagellate*, which means *to whip*. Can we imagine, then, that the *flagellum* is something that whips or beats around, striking things with which it comes in contact? There you have it; the *flagellum* is the slender part of the *antenna*, the one farthest from the body. From the definition you almost know the office this little organ performs, but it is more fully explained later.

One more word we may analyze with some care. When we read about the ant's eyes you will find the word *ocelli*. Your dictionary says it is plural in number, the singular being *ocellus*. This is from the Latin, and in form indicates the diminutive, which gives us for a definition, *little eye*. See how nicely, a little farther on, this applies.

The study of such names is extremely interesting; you can master them easily, if not too many are attempted. Note the remaining names in the diagram of the ant in the colored plate and trace the meaning of each.

Parts of the Ant. Good illustrations of the male, female and the workers are shown in the accompanying plate. The diagram of the parts of an ant should be referred to frequently. Use your magnifying glass on the inhabitants of your ants' house, locate the more important parts, and be able at all times to identify and know them by name.

The eye of the ant is a wonderful organism. If we examine the eye under the microscope we find the outer surface, which you know in all eyes as the *cornea*, is formed of a fine network of lenses similar in arrangement to the cells of the honeycomb. The eyes are immovable, hence the number of lenses, each in fact being an eye to enable the little people to see in as many directions as there are lenses in the eye. They cannot turn their eyes as human beings are able to and they do not possess the power we enjoy of altering the form of the lens so as to adapt the sight to meet the object of vision. The outer surface, or *cornea*, and the optic nerve are always at the same distance, so the ant is unable to see near objects. This is douhtless the reason why they are furnished with the sensitive and delicate feelers, with which they may, like a hlind man with a stick, feel things close at hand where they are unable to see.

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Now pause for a moment and reflect how easy it has been for you to master these seemingly difficult words. It will prove no more irksome to continue an inquiry into the remaining hard words in connection with the color plate. When you have completed this study you will be so interested in the general subject of ants that wider reading and research will surely follow.

Social Life of Ants. You may have to go beyond the artificial home of the ant which you have installed in your house to learn of the more intimate relation these insects bear to one another. You must have opportunity for broader observation. Could your investigation proceed far enough you would be inclined to the belief that the ant colony has a complex system of civilization, lacking little except written laws and constitution. They certainly have laws, strict and impartial, which are rigidly enforced.

If you have watched your temporary ant-hill you may have noticed how happily the members of the community seem to live together; there is harmony everywhere. The little people help each other when in need or in difficulty. When one is hungry another feeds it; when one is sickly another ministers unto it; the smaller workers of frail build or not so robust as others are borne along in the grasp of their more stalwart neighbors. When a burden is too heavy for one to carry, another comes to its aid. When separated a little while from each other the joy of the little people at meeting knows scarcely any bounds. You will not learn it from your colony, but whenever it happens that the food supply in an ant home is scarce, an unwilling victim is sacrificed to maintain the rest of the colony, in which event a foraging party unites to promote the common welfare by dragging a struggling captive to his death. This fact has often been witnessed.

Whether ants have a language by which they may communicate with each other has been decided in the affirmative. It is a silent language, yet easily translated. When alarm spreads through a colony intelligence is immediately conveyed from chamber to chamber. When it is desired to communicate the cause of fear or anger ants strike their heads against the members of their community nearest to them; these, in the same way, convey the intelligence to others, until the whole colony is in a ferment, and measures of defense are quickly taken. The *antennae*, or feelers, are their chief organs of speech. By their means useful discoveries are reported, the hungry ask for food, and with them the military tribes are placed in marching order and rallied for a contest.

There is a species of ants that is always held in slavery by other species or tribes; other species are warriors and do nothing but fight. Not all ants are slave-owners, but those species known as slave-owning ants capture their prisoners in battle and keep them in subjugation as effectively as once did the Roman legions.

An Ant Funeral. Knowing that ants are cleanly in their habits, that they spare no pains to free their community from all impurities, and that they venerate their dead, we may assume that ant communities observe burial rites. This has been proved a great many times by actual observation, and the student of this lesson will be much interested in reading the complete details of one funeral witnessed not long ago:

One day a little boy about four years of age threw himself down on a grassy mound to rest. Shortly after his parents were startled by sudden screams; going at once to his relief it was discovered that he was covered with large ants, on whose nest he had laid himself down. Numbers of the ants were still clinging to him with their forceps and continued to sting the boy. The parents relieved the lad of his tormenters and killed them. At length about twenty were thrown dead on the ground.

Within half an hour one of the parents returned to the same spot and saw a large number of ants surrounding the dead ones. It was determined to watch the proceedings closely, and the person followed four or five that started off toward a hillock a short distance away, in which was an ants' nest; this they entered, and in five minutes they reappeared, followed by others; all fell into rank, walking regularly and slowly two by two, until they arrived at the spot where lay the dead bodies of their comrades. In a few minutes two of the ants advanced and took up the nearest dead body; then two others, and so on, until all were ready to march. First walked two ants bearing a body, then two without a burden; then two others with another dead body, and so on, until the line was extended to about forty pairs. The procession moved slowly, followed by an irregular body of about two hundred ants.

Occasionally the two laden ants stopped and laid down the dead body; it was taken up by the two walking unburdened behind them, and thus by occasionally relieving each other they arrived at a sandy spot near the water. The body of ants then commenced digging with their jaws a number of holes in the ground, into each of which a dead ant was laid; then they labored on until all the graves were filled.

This did not quite conclude the remarkable circumstances attending this particular funeral. Six or seven of the ants had attempted to run off without performing their share of the task of digging; these were caught and brought back, whereupon they were at once attacked by the body of ants and killed upon the spot. One single grave for them was quickly dug and they were all dropped into it.

A Battle Between Ants. There appear to be occasions in ant life when conflict between species and varieties cannot be prevented. Battles between ants are not at all rare, and many have been witnessed with profound interest. Our great American naturalist, Henry D. Thoreau, once witnessed a battle of this kind, and it cannot better be described than in his own language:

"One day when I went out to my wood pile, or rather my pile of stumps, I observed two large ants, the one red, the other much larger, nearly half an inch long, and black, fiercely contending with one another. Having once got hold they never let go, but struggled and wrestled and rolled on the chips incessantly. Looking further, I was surprised to find that the chips were covered with such combatants, that it was not a *duellum*, but a *bellum*, a war between two races of ants, the red always pitted against the black, and frequently two red ones to one black. The legions of these Myrmidons covered all the hills and vales in my wood yard, and the ground was already strewn with the dead and dying, both red and black. It was the only battle which I have ever witnessed, the only battlefield I ever trod while the battle was raging; internecine war; the red republicans on the one hand ... he black imperialists on the other.

"On every side they were engaged .. combat, yet without any noise that I cou.. hear, and human soldiers never fought so resolutely. I watched a couple that were fast locked in each other's embraces, in a little sunny valley amid the chips, now at noonday prepared to fight till the sun went down, or life went out. The smaller red champion had fastened himself like a vise to his adversary's front, and through all the tumblings on that field never for an instant ceased to gnaw at one of his feelers near the root, having already caused the other to go ... the board; while the stronger black one dashed him from side to side, and, as I saw on looking nearer, had already divested him of several of his members. They fought with more pertinacity than bulldogs. Neither manifested the least disposition to retreat.

"It was evident that their battle-cry was 'Conquer or die.' In the meanwhile there came along a single red ant on the hillside of this valley, evidently full of excitement, who either had dispatched his foe, or had not yet taken part in the battle; probably the latter, for he had lost none of his limbs, whose mother had charged him to return with his shield or upon it. * * * He saw this unequal combat from afar—for the blacks were nearly twice the size of the red—he drew near with rapid pace till he stood on his guard within half an inch of the combatants; then, watching his opportunity, he sprang upon the black warrior, and commenced his operations near the root of his right fore-leg, leaving the foe to select among his own members; and so there were three united for life, as if a new kind of attraction had been invented which put all other locks and cements to shame.

"I should not have wondered by this time to find that they had their respective musical bands stationed on some eminent chip, and playing their national airs the while, to excite the slow and cheer the dying combatants. I was myself excited somewhat even as if they had been men. The more you think of it, the less the difference. * * * For numbers and for carnage it was an Austerlitz or Dresden. * * * There was not one hireling there. I have no doubt that it was a principle they fought for, as much as our ancestors, and not to avoid a three-penny tax on their tea; and the results of this battle will be as important and memorable to those whom it concerns as those of the battle of Bunker Hill, at least.

"I took up the chip on which the three I have particularly described were struggling, carried it into my house, and placed it under a tumbler on my window sill, in order to see the issue. Holding a microscope to the first-mentioned red ant, I saw that, though he was assiduously gnawing at the near fore-leg of his enemy, having severed his remaining feeler, his own breast was all torn away, exposing what vitals he had there to the jaws of the black warrior, whose breastplate was apparently too thick for him to pierce; and the dark carbuncles of the sufferer's eyes shone with ferocity such as war only could excite. They struggled half an hour longer under the tumbler, and when I looked again the black soldier had severed the heads of his foes from their bodies, and the still living heads were hanging on either side of him like ghastly trophies at his saddle-bow, still apparently as firmly fastened as ever, and he was endeavoring with feeble struggles, being without feelers and with only the remnant of a leg, and I know not how many other wounds, to divest himself of them; which at length, after half an hour more, he accomplished. I raised the glass, and he went off over the window sill in that crippled state.

"Whether he finally survived that combat, and spent the remainder of his days in some Hôtel des Invalides, I do not know; but I thought that his industry would not be worth much thereafter. I never learned which party was victorious, nor the cause of the war; but I felt for the rest of that day as if I had had my feelings excited and harrowed by witnessing the struggle, the ferocity and carnage, of a human battle before my door."

Lessons from the Ant. We have added a good deal to our scientific knowledge from the foregoing lesson outline on the ant, and have found the theme so interesting that the investigation is likely to be continued in books devoted solely to the subject. In addition, we have learned something else, and something which can in a direct way be applied to ourselves. Human beings are not always models of propriety; their everyday actions cannot always be commended. Observers have never discovered an instance where the personal life of the ant is a matter of reproach; it lives under system; the laws of the species are rigidly enforced, as we know from the good order always apparent; it is a hard worker, and there is instant punishment meted out to the one that shirks; there is marked care and affection for the young; the spirit of willing helpfulness prevails; personal cleanliness is a cardinal principle.

When Solomon, in calling attention to certain virtues, said, "Go to the ant, thou sluggard consider her ways and be wise," he paid a worthy tribute to this immense throng of happy laborers.

Questions

Does the male ant do any work?

What are the household duties of the female?

What is done with the larvae on warm days?

Do ants tunnel under rivers and build bridges?

Of what does each community of ants consist?

Which members are wingless?

What are some of the duties of the workers?

Why are some of the workers known as soldiers?

Where and how do most American ants build their nests?

Do they require food in winter?

Why do ants sometimes herd lice on plants?

How do they draw the sweet fluid from these parasites?

What are some of their acts which show wonderful intelligence?

How do some species dispose of their dead?

Why is the *umbrella* ant so called?

How does the *honey* ant come by its name?

Name some of the peculiarities you have noticed in your observation of ants.

What are white ants?

Proportionately, how much stronger would you say ants were than some of the large animals like the bear, the elephant?

Bees

Method of Study. The general suggestions for lessons on insects and the special directions for studying the fly make it unnecessary to repeat these instructions for the bee. The same method of study should be used, for the familiarity of the pupil with one insect will be of great help in enabling him to study another. There is the obvious difficulty that small children should not be allowed to handle bees. In small classes the teacher may need only a single specimen, which all the pupils may study together. In larger classes, especially if the children are older, they may be divided into groups. For class-room work a dead bee will be fully as useful as a live one. Extreme care should be taken that none of the children are exposed to the dangers of a sting. If a neighboring beekeeper happens to have an empty hive he will probably be glad to show it to the class, so that they may study something more than the anatomy of the bee. The opportunities offered and the good judgment of the teacher or parent must determine how extended the study may be. The following outline and questions have been prepared to help both pupil and teacher to gain a thorough knowledge of the bee and its habits.

Outline

I. General Description
- (1) Insect
- (2) Characteristics
  - (a) Hind feet dilated
  - (b) Hairs of the head feathery
  - (c) Tongue adapted to sucking liquids
- (3) Habits
  - (a) Feeding

(1) Larvae
(2) Adult
(b) Use of their senses
(1) Especially sight
(2) Touch
(3) Smell
(4) Hearing
(5) Taste

II. Classification
(1) Solitary
(a) Carpenter
(b) Digger
(c) Cuckoo
(d) Leaf-cutter
(e) Mason
(f) Potter
(g) Parasites
(2) Social
(a) Bumblebee
(b) Honeybee

III. Solitary Bees
(1) Only perfect males and females
(2) No wax-making power
(3) Nests
(a) Many burrow in the ground
(b) Hollow stems of shrubs or dry wood
(c) Earthen cells above ground

IV. Social Bees
(1) Bumblebees
(a) Classes
(1) Male
(2) Female
(3) Neuter or worker
(b) Live in communities
(1) Only for a season
(2) Female founds new colony each spring
(3) Seldom over 200 in a colony
(c) Males die during winter
(d) Only enough honey for the season's needs
(2) Honeybees
(a) Classes
(1) Queen
(a) Largest body
(b) Fully developed
(c) Lays eggs
(2) Male or drone
(a) Smaller than the queen
(b) Dies or is killed by the workers after a few months
(3) Worker
(a) Undeveloped female
(b) Smaller body than male and queen
(c) Largest class
(d) Gather the honey
(e) Feed the young
(f) Rulers of the hive
(b) Nest
(1) Made of beeswax
(2) Divided into cells
(a) For queens
(b) Drones
(c) Workers
(c) Eggs
(1) Laid by the queen
(2) Size
(3) Shape
(4) Color
(5) Hatch in three days
(d) Organization of a colony
(1) Controlled by the workers
(2) Dependence of the other classes
(3) Swarming and formation of new colonies

Questions

To what great class of animals does the bee belong?

About how many species of bees are known?

What are the two great divisions?

Name five kinds of solitary bees.

To which division does the bumblebee belong?

What is a swarm?

What is a drone? Why so called?

What is a worker? What are its functions?

How long does it take for the eggs to hatch?

How many queens are there in each swarm?

By what means is the queen-bee developed from the ordinary larva?

What distinction is made between the eggs that give birth to workers and those that give birth to drones?

Is any distinction made between the eggs from which queens are to be developed and those from which drones and workers are to develop?

Which is the most numerous class of bees?

How are the larvae fed?

When are the larvae sealed up in the cell?

How long a period elapses before the adult bee emerges?

When is a new queen allowed to appear?

What becomes of the old queen?

What do the bees do in winter?

What is the food of bees?

How is it obtained?

How is it stored?

What plants furnish the best honey?

What are some of the enemies of bees?

Butterflies

Like the fly and the bee, the butterfly belongs to the insect family. With experience already gained in the study of these other insects, the butterfly should present little difficulty. Many specimens can be found in every part of the world; a little watchfulness and care will probably enable the teacher and pupils to secure several different kinds. The greater the difference, the more valuable the specimens will be for study.

To study the life history of a butterfly we should properly begin with the egg. Unfortunately the pupils may not always be able to find eggs; in that case, they may begin with the second, or caterpillar stage. Teachers and parents will find that the children will take a lively interest in the development of the caterpillar. A caterpillar may be kept in a glass

LIFE HISTORY OF A BUTTERFLY
1. Eggs, highly magnified. 2. Caterpillar. 3. Chrysalis. 4. Butterfly.

case, set in a sunny place; if he is fed and given a twig and leaves to build a cocoon, the class may soon see him spin himself into his retreat and finally emerge a perfect butterfly. Let the children keep a record of daily observations of any changes they may notice. Not only will they be interested in the caterpillar, but they will, unknown to themselves, be learning how to observe carefully and systematically. Incidentally the teacher will find many opportunities to teach the lesson of kindness to animals.

The accompanying illustrations should be of value to all who study the butterfly; the four states in the life of the swallowtail, one of the commonest North American butterflies, are clearly shown. It is not necessary to give detailed instructions as to the order in which the different phases of the subject may be considered, but the following outline and questions are suggested in the hope that they will enable the student to see the field of study at a glance and devote himself to it in a systematic way.

Outline

I. General Description
- (1) Insect
  - (a) Different from moth
    - (1) Shape of antennae
    - (2) Position of wings at rest
    - (3) Time of day when it flies
- (2) Anatomy
  - (a) Head
    - (1) Antennae
    - (2) Eyes
    - (3) Tongue
  - (b) Thorax
    - (1) Legs
      - (a) Number
      - (b) Structure
    - (2) Wings
      - (a) Number
      - (b) Structure
  - (c) Abdomen
- (3) Color, size and form
  - (a) Variations
    - (1) Due to sex
    - (2) Due to climate
- (4) Habits
  - (a) Feeding
  - (b) Hibernation
  - (c) Migration

II. Classification
- (1) North America
  - (a) Brush-footed
  - (b) Metal marks
  - (c) Blues, coppers and hair-streaks
  - (d) Swallowtails
  - (e) Skippers
- (2) Arctic Regions
- (2) Temperate zones
- (4) Tropics

III. Life History
- (1) Eggs
  - (a) Where deposited
  - (b) Number
  - (e) Time required for hatching varies

(1) According to species
(2) Locality
(3) Season
(2) Caterpillar or larva
(a) Definition
(b) Duration of this stage
(c) Anatomy
(1) Head
(a) Antennae
(b) Eyes
(c) Mouth
(2) Body
(3) Organs
(d) Food
(e) Method of self-defense
(f) Molting
(3) Chrysalis or pupa
(a) Apparently lifeless
(b) Protected
(1) By cocoon
(2) By chrysalis
(c) Duration of the stage
(4) Butterfly or imago

Questions

To what great division of animals does the butterfly belong?

In what respects is the butterfly different from the moth?

What are the three parts of the butterfly's body?

What are the antennae? Ocelli?

What is the position of the tongue when not in use?

To what part of the body are the legs and wings attached?

How many legs has a butterfly? How many wings?

What is the structure of the wing? What are the usual shapes?

To what is the brilliant coloring of the wings and body due?

On what do butterflies feed? How is this food obtained?

What are the principal causes of variations in color and size?

Where are the largest varieties found? How large are they?

Name the five principal classes of butterflies found in North America.

Where are the eggs deposited?

How long is the period of incubation? Is it uniform in all climates and in all seasons?

What is the larva?

What is the duration of this stage in temperate climates? In cold regions?

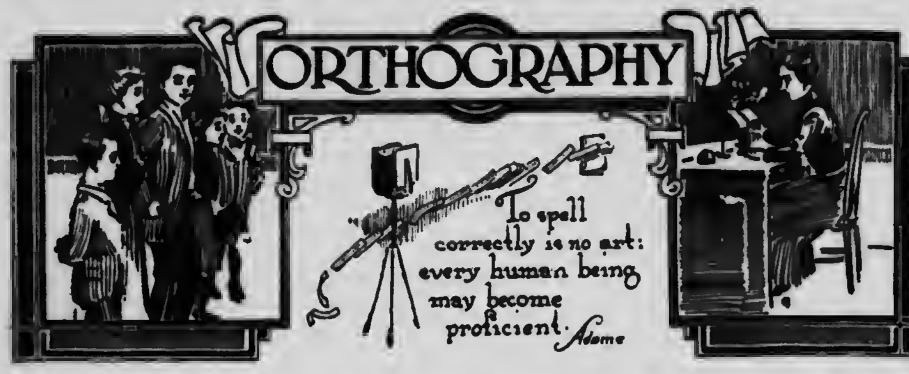
How do caterpillars attach themselves to leaves or branches?

How does the insect breath during the pupa stage?

What is a chrysalis?

What is the appearance of the imago when it emerges from the chrysalis?

How long before it is ready for flight?



Definition. The word *orthography* is derived from two Greek words, *orthos*, which means *straight* or *correct*, and *graphein*, which is the Greek for *to write*. Orthography, then, may be understood as a branch of the art of speaking and writing correctly; however, the subject is confined to *words*, not to sentences or paragraphs, and relates to *spelling* alone. We are studying orthography when we seek to learn the sounds a word contains, to know how to divide it into syllables, and to pronounce it correctly, every letter given its proper sound and accent placed on the proper syllable.

The mastery of this subject, in most particular detail, is the work of the expert in the department of language, but the general principles—entirely sufficient for the average man or woman—may be easily understood, and such a grasp of orthography is plainly necessary if one would speak and write correctly those words we ordinarily use. Unless one knows how the various letters in the written alphabet stand for the sounds in the spoken language, and is acquainted with the general rules for combining letters in the formation of words, he will always be liable to embarrassing errors in pronunciation and spelling and must be decidedly at a disadvantage in both his social and his business life. To meet the needs of the general reader who wishes to make an elementary study of orthography, the essentials of the subject are set forth in the following paragraphs.

Sounds and Symbols

Diacritical Marks. In the English language there are many more spoken sounds than letters to represent them. The letters are twenty-six in number, and one of these is not really needed; there are forty-three sounds, most of them very important and not difficult to utter, while a few express tones seldom sounded correctly in our speech. The letter with which we could dispense is *c*, for its soft sound, as in the word *ice*, and its hard sound, as in *call*, might well be represented by the letters *s* and *k*.

As there are forty-three sounds in the English language and only twenty-six letters to represent them, it is evident that a single letter must serve to represent more than one sound. The various sounds of a letter as used in different words are represented by means of symbols, or signs, placed either above or below the letter, as a guide to pronunciation. When once the exact tone demanded by a symbol is learned, the ability to pronounce correctly has been acquired.

Classification of Sounds. According to the kinds of sounds that they represent, the letters of the language are divided into two classes, known as vowels and consonants. Vowels are open sounds made by an unobstructed passage of the breath through the vocal organs. The letters that indicate these sounds are *a*, *e*, *i*, *o*, *u* and sometimes *w* and *y*. Consonants are sounds formed by a stoppage of the breath in the mouth or the throat.

Sounds are said to be *vocal* when they have a tone or voice quality, and *aspirate* when they are merely breath sounds. The vowels are pure vocal sounds since they have tone qualities that are expressed without any obstruction. In the case of several of the consonants, however, the tone quality is suppressed or obstructed by the organs of speech, and the sounds are therefore known as subvocals. When two vocal sounds are combined, as in *oi* in *voice*, the resulting sound is known as a diphthong.

In the paragraphs which follow, all the sounds of the vowels are classified and explained by proper diacritical marking; in each instance, the sound of the letter as marked is indicated by examples of words in common use.

Vowels

A vowel sound is a free and uninterrupted sound of the voice. The various vowel sounds are modified by changed positions of the tongue and lips. A study of the following paragraphs will enable you always to pronounce any word found in the course of your reading.

The Vowel A. There are eight sounds of the vowel *a*; each is explained below.

(1) The long sound of the letter is called its name letter. In the words—

āge māy plāte

the long sound of the vowel is represented, and the sound is denoted by a straight line above the letter, called a *macron*.

(2) The short sound of *a* is heard in the words—

măt hăm plăid

and is represented by a curved mark directly above the vowel called a *breve*.

(3) There is a broad sound of *a* heard in—

ạll cạll stạlk

and it is always represented by two dots, called a *dieresis*, placed below the vowel. The former spelling of this name is *diaeresis*.

(4) One of the common sounds in *a* is heard in—

ärm fär pälms

and is called the "Italian" sound of the letter, because characteristic of that language. It is heard as well in the Spanish and German. The mark is the dieresis above the *a*.

(5) The soft Italian sound is heard in—

ȧsk pȧss bȧth

and the single dot above the vowel is its mark. The sound is about midway between the short sound, as in *pat*, and the Italian sound, as in *barn*.

(6) A sound of *a* which is like the short sound of *o* appears in—

wạs whạt swạn

and demands a single dot below the vowel.

(7) A sound of *a* very similar to the short sound of *e* (see below) is noted in—

senate village

and the mark is called the suspended bar and is placed under the vowel.

(8) A somewhat difficult sound of *a* appears in—

câre pârent

About the easiest way to explain this sound is to say that it is nearly equivalent to the sounds of *a* and *e* short, run together. The mark above the letter is called a *circumflex*.

The Vowel E. The three sounds of the letter *e* are graphically illustrated below:

(1) The long, or natural, sound is heard in—

ēve ēra stēam

The mark is the macron, above the letter.

(2) The short sound of the letter *e* is found in the words—

mĕt ĕnd friĕnd

and the distinguishing mark is the breve.

(3) In a fairly large list of words such as—

ẽrr hẽr fẽrn

the vowel has the same sound as *u* in *urge* and *i* in *sir* (see below). The diacritical mark denoting this sound is called a *tilde*, or *wave*. *Tilde* is pronounced in two syllables, til'de. The name comes from a foreign language, the Spanish, where it is used over the letter *n* to denote a following sound similar to *y*, as in *canon*.

The Vowel I. (1) The long sound, or name sound, of *i* is heard in—

īce tīe ītem

The distinguishing mark is the macron.

(2) The short sound of *i* is heard in such words as—

bĭt tĭn skĭm

and, as in all other short sounds, the distinguishing mark is the breve.

(3) In a considerable number of words *i* takes the sound of other letters; in—

machïne quarantïne

the sound is that of long *e*, and the mark is the two dots above the letter. In

fĩr sĩr stĩr

the tilde denotes the same sound as uttered in *u* in *urn* and *burn*.

The Vowel O. The sounds of o are marked with the same devices as the preceding vowels.

(1) The long, or natural, sound of o is heard in—

ōar fōe tōne

and the macron is used above the letter.

(2) The short sound of *o* is used in such words as—

nŏt lŏt spŏt

and its distinguishing mark is the breve.

(3) In a large number of words such as—

mọve prọve

the sound is the same as though *oo* were present; as, *proof*. When this sound is to be uttered and there is but one o, the dieresis is used below the vowel. In such words as—

mōōn sōōn

if it is desired to use a mark of pronunciation the double macron is used above the letters.

The Vowel U. (1) The long sound of *u* is heard in—

ūse dūty cūbe

and is distinguished by the macron above the letter.

(2) The short sound of *u* appears in—

bŭt sŭn stŭmp

and its mark is the breve.

(3) A common use of *u* is found in such words as—

ûrn ûrge

and the vowel is marked with the circumflex.

Diphthongs. A diphthong is a sound produced by running together two vowel sounds in the same syllable. It is called a *proper diphthong* if both vowels are sounded. Examples are *oi* in the word *oil*, *oy* in *boy*, *ou* in *out*, and *ow* in *cow*. An *improper diphthong*, or *digraph*, is merely a union of two vowels in the same syllable, only one of which is sounded. An example is found in the words *rain*, *teach*, *audible*.

Triphthongs. A triphthong is a sound produced by running together three vowels in the same syllable. Technically, a proper triphthong would be one in which all three of these vowels are sounded, but there is no such instance in the English language. The only triphthong is the improper, or *trigraph*, in which three vowels appear in the same syllable but only one of them is sounded. Examples of the improper triphthong, or trigraph, are found in the words *adieu* and *beauty*.

Vocal Equivalents. The teacher, parent or student will find much help in learning correct pronunciations of words if the following table of vowels and their equivalent sounds is studied until it is thoroughly understood.

Consonants. The consonant sounds of the alphabet are best learned by observing how the letters they represent are sounded in spoken words. The following table of aspirates and subvocals will materially assist one to master these sounds:

TABLE OF ASPIRATES

f	as in far
h	as in hand
k	as in kind
p	as in pen
s	as in sin
t	as in tip
th	as in through
sh	as in shore
ch	as in chick
wh	as in whirl

TABLE OF SUBVOCALS

b	as in band
d	as in dead
g	as in gun
j	as in joy
l	as in lip
m	as in men
n	as in none
ng	as in sung
r	as in tar
th	as in then
v	as in vain
w	as in went
y	as in yacht
z	as in zinc
z	as in treasure
si	as in version

In the spelling of English words we occasionally use a letter whose sound in the word is that of another letter or other letters. As an illustration, in the word *onion*, the first *n* is sounded as though it were *ny*. Other equivalents will be noted in the following table:

TABLE OF VOCAL EQUIVALENTS

ạ	as in whạt	ŏ
ä	as in liär	ĕ
ê	as in thêre	â
ẹ	as in thẹy	ā
ï	as in police	ē
ĩ	as in fĩrm	ẽ
ô	as in ôught	ạ
ȯ	as in sȯme	ŭ
ŏ	as in tailŏr	ĕ
ọ	as in tọ	o͞o
ọ	as in wọrld	o͝o
ụ	as in mụle	o͞o
ụ	as in fụr	o͝o
ȳ	as in crȳ	ī
y̆	as in badly̆	ĭ
ỹ	as in mỹrtle	ẽ

SUBVOCAL AND ASPIRATE EQUIVALENTS

ç	as in miçe	s
c	as in catch	k
ġ	as in ġin	j
ṉ	as in piṉk	ng
ñ	as in oñion	ny
ş	as in phaşe	z
x	as in box	ks
ẋ	as in eẋact	gz
ph	as in sylph	f
qu	as in quick	kw
qu	as in croquet	k

Syllabication and Accent

Consonant and vowel sounds are combined in groups known as syllables, and these groups are in turn united to form words. Sometimes a single vowel may form a syllable, but a consomust cannot be thus used alone; it must always be combined with a vowel. The syllables of which a word is formed must be carefully noted, for in pronunciation one of the syllables of the word is distinguished by special emphasis or accent, and the others must be clearly enunciated; and in writing it frequently happens that the parts of a word must be separated at the close of a line, thus requiring a proper division into syllables. A general rule for the division of a word into syllables is that if two consonants occur between two vowels, one goes with each vowel, and that when but one consonant comes between two vowels the consonant usually goes with the second vowel. When a word consists of but one syllable, pronunciation depends wholly upon correct utterance of the sounds of which the word is composed; but when there are two or more syllables, proper placing of the accent becomes one of the essentials of pronunciation.

Spelling

Learning to Spell. Quite as important as correct articulation of the sounds that form a word and the proper placing of the accent, is accurate spelling of the word. The ability to spell correctly is cultivated largely by means of careful observation in one's reading and by persistent efforts to be exact in spelling words both orally and in writing. Especially is this true of those who use English, since our language is usually lacking in uniformity in the matter of spelling. However, there are several rules for spelling that are so generally appreciable as to be of much value to those who do not readily retain in memory the exact form of words. Among these rules the following may be stated as the most important:

Rules of Spelling. Words ending in *ie* usually drop the *e* and change *i* to *y* in adding the suffix *ing;* as, lie, lying.

Words ending in *y*, preceded by a consonant, change *y* to *i* when a suffix beginning with a consonant is added; as, bounty, bountiful.

Words ending in *y*, preceded by a vowel, retain the *y* in adding a suffix; as, joy, joyous.

Monosyllables and words accented on the last syllable, ending in a single consonant, preceded by a single vowel, double the final consonant before a suffix beginning with a vowel; as, hit, hitting; begin, beginning.

Words ending in silent *e* drop this final *e* when a suffix beginning with a vowel is added; as, residue, residuum.

Words ending in *e* usually retain this final letter when adding a suffix beginning with a consonant; as, resolute, resoluteness.

When a syllable is added to a word ending in a double consonant, this consonant is usually retained; as, still, stillness.

Nouns regularly form their plurals by adding *s;* as, table, tables.

However, when the singular noun ends with a sound that does not unite with *s*, *es* is added; as, church, churches.

Nouns ending in *y* preceded by a vowel form their plurals by adding *s;* as, monkey, monkeys.

When final *y* is preceded by a consonant, *y* is changed to *i* and *es* is added in forming the plural; as, city, cities.

Some nouns ending in *f* or *fe* change the *f* or *fe* to *v* and add *es* to form the plural; as, shelf, shelves.

Nouns ending in *o*, preceded by a consonant, sometimes form the plural by adding *s* but more frequently by adding *es;* as, solo, solos; motto, mottoes; potato, potatoes.

ROOT WORDS AND DERIVATIVES. Interesting recitations in the formation of derivatives from root words may prove of much assistance in teaching children to analyze the building up of words when they find difficulty in spelling them. A root word may be chosen and as many derivatives as possible formed from it by adding prefixes and suffixes. The same lesson may prove doubly profitable by defining the root word and showing the changes in significance after the addition of the prefixes or suffixes. The following is offered as a suggestive exercise:

TRACT—DRAW

Tract-or	or=that which.
Tract-ion	ion=act of.
Tract-ile	ile=may be.
Tract-able	able=able to be.
Abs-tract	abs=away from.
At-tract	at=near to.
Con-tract	con=together.
De-tract	de=away from.
Ex-tract	ex=out of.
Pro-tract	pro=out.
Re-tract	re=back.
Sub-tract	sub=from under.
Attract-ive	ive=tending to.
In-tract-able	in=not....able=able to be

Explanation. A tractor is an instrument which draws.

Traction is the state of being drawn or the act of drawing, as the traction of a muscle.

Gold is a tractile metal, as it may be drawn out in thin strips.

A tractable person is one easily drawn to a proper course of conduct.

An abstract manner results when the mind is drawn away from surrounding objects.

To attract people we must have power to draw them to us.

To detract from value is to lessen or draw away from it.

An extract from a book is a part which is drawn out of it.

A protracted meeting is one which is drawn out or extended beyond the usual time.

When a statement is retracted it is withdrawn —"taken back."

When a number is drawn from under or taken away from another we subtract it.

That which tends to draw one to it is attractive.

An intractable student is one who is not easily drawn to discipline.

Painting among the Greeks. The Greeks had a pretty legend about the beginning of drawing and painting in their country. A girl whose lover was going away, and who was broken-hearted at losing him, saw his shadow cast upon a wall and drew a line about it, that she might have the semblance of him with her always.

Painting never grew to the importance in Greece that sculpture attained, but it assumed two characteristic forms, besides the painting of pictures. These were the decoration of vases and the coloring of statues. Great numbers of vases have been found, mostly in tombs, and these give us a very clear idea of what the vase painting was. Some of the figures on the earliest, crudest vases are simply outlines of men and of animals roughly drawn, showing little lifelikeness. Later the art grew, and some of the vases which are decorated with pictures representing stories from mythology are really exquisite.

It is only comparatively recently that it has been known that the Greeks used to color their statues. From most of the recovered sculpture the coloring has worn off, and thus the finders have always taken it for granted that white was the original color. It was not the common practice, apparently, to use a flesh color on the statues, though rare examples of that have been found; but the hair and lips and eyes and clothing were painted. Care was not always taken to make the colors lifelike; horses were sometimes made blue, and lions red.

We possess almost no fragments of Greek pictures, but ancient writers have left assurance that the Greek painters were masters of form, composition, color, light and shade, and perspective. An old story, which is interesting even if not true, is told of a contest between Zeuxis and Parrhasius. The one who painted the most lifelike picture was to have a prize. When the judges had gathered, Zeuxis presented his painting—a beautiful bunch of grapes. So lifelike were they that the birds came and tried to eat them, and the judges exclaimed "Zeuxis has won! He has deceived the birds." But Parrhasius advanced to show his picture, which was apparently covered by a curtain. "Withdraw the veil," said Zeuxis, "that we may see the picture." But when he reached out to touch it, he found that the curtain was the picture, and the judges awarded the prize to Parrhasius, who had deceived even his competitor.

Roman Painting. The Romans really had no art of painting that amounted to anything. They copied Greek works and produced some feeble ones of their own, vivid in color, but with small artistic value. When the buried city of Pompeii was excavated many of these wall paintings were found, but they changed in no way the estimate already placed on Roman art.

Beginnings of Painting in Italy. But if Italy had nothing artistic whereof to boast in Roman times, she had later more than any other country. The first Italian painter who really developed an individuality and who made even a distinct attempt to make his figures lifelike was Cimabue, who lived in the thirteenth century. The story goes that once as he was walking in the mountains, he saw sitting on the ground while his sheep rested around him a shepherd boy. The boy had in his hand a piece of slate, upon which he was scratching with a lump of coal. Cimabue, always interested in anything relating to drawing, approached and examined what the boy was doing, and found that he had drawn a lamb, very like those which lay about him. Much impressed, Cimabue begged for and obtained permission to take the boy to his studio and train him as his pupil. This shepherd boy was Giotto, the first great modern painter. He understood by no means all which painters who followed him regarded as the great principles of art; for instance, he knew little about perspective. But the people he painted looked like real people, with feelings and intelligence, and in that way he was far ahead of anyone who had preceded him.

Filippo Lippi. It seems that each great painter added something which brought the art of painting nearer and nearer perfection. Thus Fra Filippo Lippi, though he by no means equaled some of his predecessors in composition, excelled in the treatment of single figures and in costumes. Whether he was painting saints or madonnas he used as his models just the people he passed on the street every day, making no changes even in their costumes. His people are human and strong, and when a picture is supposed to look like a loving mother it looks like one. Filippo Lippi was an interesting character. Left an orphan, he was taken to a convent and brought up there, and in 1421, when he was twenty-one years old, he became a monk. He was never, however, a monk in anything but outward forms. Browning has a very dramatic poem on this old Italian painter.

Botticelli. Filippo Lippi's most famous pupil was Botticelli, who possessed much of his master's vigor, with a tenderness and a daintiness that the older painter had not had. All of his pictures are a little sad, as if the artist were unable to associate perfect beauty with radiant happiness.

Leonardo da Vinci. One of the most extraordinary men who ever lived was Leonardo da Vinci, who was born in 1452. He was unusually handsome and graceful, strong and active, and so winning in his manner that everybody loved him. He loved all living things, and stories are told of how the birds used to perch on his shoulder without fear. Besides possessing all of these attractive characteristics, he had talents which would have made half a dozen men famous. He was one of the greatest painters that the world has ever seen, he was a sculptor, an engineer, an architect, a scientific investigator, an inventor. One of the things which strikes a person first about his paintings is that they look modern. Filippo Lippi's and Botticelli's pictures, beautiful as they are, look a little strange to our eyes; we need to familiarize ourselves with them before we see their beauties. But Leonardo's have nothing "old-fashioned" about them.

His most famous painting, considered by critics one of the twelve greatest paintings of the world, is the "Last Supper." This was painted on the wall of a church at Milan, and as the wall was plastered, and the material used was distemper, the wonderful picture scaled and faded until little of its beauty remained. Just of late, however, some very skilful work has been done toward restoring the picture, and if the scaling and fading can be prevented in the future the people will have a chance to see the masterpiece in something like its original beauty. Leonardo da Vinci spent four years in the production of this painting, and to everyone who knows it it has seemed unnecessary for any other painter, no matter how great, to attempt the same subject. Christ has just said to his disciples, "One of you shall betray me," and they have broken up into excited groups.

Another great picture of Leonardo's is the "Mona Lisa." This is a portrait of the wife of a Florentine man named Del Giocondo, and the picture, regarded as the greatest portrait ever painted, is often called "La Gioconda." The hands are very beautiful, and the face, while not beautiful, has a wonderful, inscrutable smile, which makes it always mysterious and interesting. While painting the portrait, on which he worked at intervals for four years, Leonardo had music played, that the rapt expression might not fade from the face of the lady. The "Mona Lisa" was sold to Francis I of France for four thousand gold florins, and was one of the chief glories of the Louvre, but in 1911 it was stolen.

Andrea del Sarto. Another interesting Italian artist was Andrea del Sarto, known as the "Faultless Painter." Browning has a wonderful poem, a dramatic monologue supposed to have been spoken by Andrea, in which we see what he himself regarded as the great failing of his art—the lack of soul.

Behold Madonna!—I am bold to say
I can do with my pencil what I know,
What I see, what at bottom of my heart
I wish for, if I ever wish so deep—
Do easily, too—when I say, perfectly,
I do not boast, perhaps: yourself are judge,
Who listened to the Legate's talk last week,
And just as much they used to say in France.
At any rate 'tis easy, all of it!
No sketches first, no studies, that's long past:
I do what many dream of all their lives,
—Dream? strive to do, and agonize to do,
And fail in doing. I could count twenty such
On twice your fingers, and not leave this town,
Who strive—you don't know how the others
    strive

To paint a little thing like that you smeared
Carelessly passing with your robes afloat,—
Yet do much less, so much less, Someone says,
(I know his name, no matter)—so much less!
Well, less is more, Lucrezia: I am judged.
There burns a truer light of God in them,
In their vexed beating stuffed and stopped-up brain,
Heart, or whate'er else, than goes on to prompt
This low-pulsed forthright craftsman's hand of mine.
Their works drop groundward, but themselves, I know,
Reach many a time a heaven that's shut to me,
Enter and take their place there sure enough,
Though they come back and cannot tell the world.
My works are nearer heaven, but I sit here.
The sudden blood of these men! at a word—
Praise them, it boils, or blames them, it boils, too.
I, painting from myself and to myself,
Know what I do, am unmoved by men's blame
Or their praise either. Somebody remarks
Morello's outline there is wrongly traced,
His hue mistaken; what of that? or else,
Rightly traced and well ordered; what of that?
Speak as they please, what does the mountain care?
Ah, but a man's reach should exceed his grasp,
Or what's a heaven for? All is silver-gray
Placid and perfect with my art: the worse!
I know both what I want and what might gain,
And yet how profitless to know, to sigh
"Had I been two, another and myself,
Our head would have o'erlooked the world!"
No doubt.
Yonder's a work now, of that famous youth
The Urbinate who died five years ago.
('Tis copied, George Vasari sent it me.)
Well, I can fancy how he did it all,
Pouring his soul, with kings and popes to see,
Reaching, that heaven might so replenish him,
Above and through his art—for it gives way;
That arm is wrongly put—and there again—
A fault to pardon in the drawing's lines,
Its body, so to speak: its soul is right,
He means right—that, a child may understand.
Still, what an arm! and I could alter it:
But all the play, the insight and the stretch—
Out of me, out of me! And wherefore out?
Had you enjoined them on me, given me soul,
We might have risen to Rafael, I and you!
Nay, Love, you did give all I asked, I think—
More than I merit, yes, by many times.
But had you—oh, with the same perfect brow,
And perfect eyes, and more than perfect mouth,
And the low voice my soul hears, as a bird
The fowler's pipe, and follows to the snare—
Had you, with these the same, but brought a mind!
Some women do so. Had the mouth there urged
"God and the glory! never care for gain.
The present by the future, what is that?
Live for fame, side by side with Agnolo!
Rafael is waiting: up to God, all three!"
I might have done it for you. So it seems:
Perhaps not. All is as God overrules.
Beside, incentives come from the soul's self;
The rest avail not. Why do I need you?
What wife had Rafael, or has Agnolo?

The poem gives us, too, what was probably one great reason for Andrea's weakness—his love for the selfish, wicked woman who was his wife. He used her face as a model in painting his madonnas, but while she was a beautiful woman her face had none of the sweetness or tenderness needed for a madonna.

Michelangelo. Like Leonardo da Vinci Michelangelo was painter, sculptor, architect. He himself chose sculpture as his profession, and for a long time refused to consider himself a painter at all. But other people had more faith in his powers than he had himself, and Pope Julius II chose him to paint the ceiling of the Sistine Chapel in the Vatican. Michelangelo protested in vain—the pope would have his way. We may imagine the great man shut up in the Chapel with his problem—what theme was wonderful enough to use for such an undertaking? Finally he planned to represent the world from the creation of man to the flood. At first he intended to have other painters work from his designs. but they could not satisfy him, and at length he decided to do all the work himself. The ceiling paintings. of which the "Creation of Man" is regarded as the greatest, occupied him for about four years, and when we consider that in doing this work he was for the most part forced to lie on his back we can see what a tremendous task it was that the pope had set for him.

Later, the successor of Julius ordered Michelangelo to paint one more picture for the Sistine Chapel on the end wall by the altar. This picture, which it took the artist almost eight years to complete, was the "Last Judgment," probably the most famous single painting in the world. It contains three hundred fourteen figures, which represent almost every conceivable physical attitude and expression and the various mental and moral states.

Correggio. Correggio, if we may believe the reports, was in his way as remarkable as Leonardo or Michelangelo, and for this reason: They received the best of training in their art, and visited all the art centers; Correggio lived and died in a little town near Parma, and there is nothing to show that he ever visited any city but Parma or that he had any efficient teaching. Some authorities say that he probably never saw a great painting besides his own, but there is one interesting story which says that he once, after having long desired it, saw a picture of Raphael's. He studied it carefully, and then exclaimed, not boastingly but with intense conviction, "I too am a painter." There were some things which Correggio seemed to understand better than anyone who preceded or followed him, notably the treatment of light and shade. Some people today criticise Correggio's pictures as being too sweet, and lacking in depth; but his "Night," with the darkness of the manger partly dispelled by the light which comes from the Christ-child, will always remain a favorite.

Raphael. Raphael, unlike Leonardo and Michelangelo, was not a sculptor or an architect, but just a painter. But he was perhaps the most versatile painter that ever lived. He could paint a sacred scene for an altar piece of a church, a portrait, a study from classical mythology, or a historical scene all superbly, and yet each in so different a manner that even a critic could scarcely tell that they came from the same hand. Most famous of all his paintings is the "Sistine Madonna," the best known and best loved of all madonnas.

The same pope who had engaged Michelangelo to decorate the Sistine Chapel decided to employ Raphael to redecorate a series of rooms in the Vatican. These had already been frescoed by great artists, but the pictures were destroyed and Raphael was given free hand. Over a window appears the "Deliverance of St. Peter," a painting which in its treatment of light and shade rivals Correggio. But the two greatest paintings which the rooms contain are the "Disputa," which shows the Christian saints fascinated by a glorious vision of God, Christ, the Holy Spirit, and the great characters of scripture; and the "School of Athens." This latter painting represents an assembly of the great philosophers, poets and men of science of Greece. The remarkable thing is that Raphael, who was not a philosopher, should have been able to give this brilliant Grecian civilization such exact representation.

His great painting of the "Transfiguration," by some critics regarded as the greatest painting in the world, was unfinished at the artist's death. The upper group, Christ, Moses and Elias above the mount, and the middle group, Peter, James and John upon the mount, were completed, but the lower group of the demoniac, his parents and the people was not finished. Raphael's body was laid out in his studio, by the side of his unfinished masterpiece, and all Rome flocked to the place to do honor to the "prince of painters."

Picture Study. Picture study serves as a delightful recreation in school, provided the study is so presented that it appeals to the children. To be successful the teacher should heed the following suggestions:

1. Choose simple pictures of subjects which the children can understand and which appeal to their own experiences.

2. Remember that pictures representing action are of greater interest to children than those which represent repose.

3. The picture should be large enough to enable the objects represented to be easily seen.

4. The pictures should possess artistic merit as to both color and form. Cheap colored paintings and pictures poorly drawn should be avoided.

5. If possible, give the children the opportunity to live with the picture several days before beginning the study.

6. When the picture is first placed before the children give a brief description of it.

7. During the study call attention to and ask questions about only those features which the children can understand and enjoy.

8. Do not attempt a complete analysis.

9. Do not moralize. If the picture has a moral the children will find it.

10. Give a brief and interesting sketch of the artist, calling attention to at least one or two of his other works.

The "Melon Eaters." This is the picture of some street urchins who lived in the city of Seville, Spain, a long time ago. From their surroundings we should judge they had gone into the country for vegetables, and when returning had loitered by the way. Their clothing indicates that they are from poor families, but the expressions on their faces show them to be contented and happy.

Notice the attitude of the boy about to eat the piece of melon. How eagerly his gaze is fixed upon it! The expression of the other boy indicates that he is enjoying the sport as much

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as his companion. Possibly the first boy is about to attempt to swallow his piece of melon on a wager. At all events, the second boy is so interested in what his companion is doing that he has delayed eating his own share.

The dog is likewise interested in the sport. See how eagerly he is watching his master, and his wistful expression indicates that he also would like to share in the feast.

Notice the perfect proportions and the natural pose of the figures. The details of the vegetables in the foreground and the shrub at the right combine to preserve the balance of the picture. All these features prove that this picture is the work of a great artist. We cannot study it without seeing in our imagination the young man Murillo wandering about the streets and market places of his native city and making careful study of its child life—life which he portrayed with such vividness and strength.

This picture is of interest to children, especially to boys of the age of those of this reproduction. Its reality to life, the action expressed, and the composition all appeal to the child. Moreover, this is a work of the greatest Spanish painter. These conditions make it especially suitable for school use.

Questions. How many boys in the picture? Are they brothers? Why do you think so?

Which boy owns the dog? Why do you think so?

Where do you think these boys have been?

Where are they going?

What objects in the picture lead you to form this opinion?

Where are the boys seated?

What are they doing?

Are they having a good time? Why do you think so?

What is the dog doing?

What do you think he wants?

What do you like in the picture? Why?

Have you seen any other pictures by this artist? Can you name them?

The Artist. For a biographical sketch, see *Murillo* in Volume IV. The following additional facts should be used to lend interest to the study. Others can be added if time and opportunity permit.

When a young lad, Murillo was accustomed to decorate with his sketches whatever objects came in his way.

Murillo's parents were poor, but they clearly recognized the artistic talent which their son showed at an early age, and placed him under the care of his uncle, who was a printer and a draughtsman, and under whom he obtained his early training.

Murillo early learned to paint pictures of the children frequenting the streets and market places of the city of Seville, showing their many grotesque sports and pranks. The picture used in this study is one of these sketches.

When Murillo was twenty-two his uncle removed to Cadiz. Murillo remained in Seville and supported himself for a time by painting inexpensive pictures for the public fairs. Though hastily executed, some of these pictures reveal the strength and skill of the artist to a remarkable degree.

Murillo merited and won the love of Seville, and his home became the resort of artists and lovers of art.

Murillo's most famous paintings are on religious subjects. One of these, the "Immaculate Conception," was sold in 1852 for over $120,000, the highest price that had been paid for a painting up to that time.

Murillo is described as a pious, patient, brave man. He worked incessantly, sold his paintings for a high price and acquired a large fortune.

The Gleaners and the Angelus. The two pictures shown here are among the world's famous paintings. The first one, "The Gleaners," shows a part of a harvest field on what is, apparently, a large farm. In the background are farm buildings, haystacks, a wagon, and figures of workers; in the foreground, three peasant women, in simple peasant costume, are bending down to pick something from the ground. What is there in that to make a picture beautiful and famous?

That is the very question which some people asked when the artist, Jean François Millet, began to produce his pictures of peasant life. Classic pictures of the Greek gods, portraits of high-born gentlemen and ladies in gorgeous raiment, idealized shepherdesses with snowy flocks—these they could understand and appreciate; but there was nothing lovely in peasant life. As Millet continued to produce his paintings, however, the critics began to realize that there was something about them which they had not grasped at first, and that was a perfect sympathy with peasant life, which made the paintings not so much pictures as glimpses of real life.

Now how did it happen that a great artist had so perfect a sympathy with the lowest class of the French people? A little study of his life will show us that Millet was himself of peasant family, and spent his boyhood working in his father's fields. Although it is possible that no one noticed the difference, the boy must have been different from the other boys about him; he saw things which they never saw, things which he was afterward able to put on canvas and thereby enable other people to see them. And very early he found that there was something besides working in the fields in which to interest himself. In an old Bible which was almost the only book in the peasant's hut in which they lived there were some old engravings which stirred his ambition, and he began to spend all of his leisure hours—and they were none too many—in drawing. His father, unlike many peasant fathers, did not discourage his son in an attempt to be something which his father had not been, but took some of his drawings to a painter in Cherbourg and asked him to accept the boy as a pupil. The artist at once recognized the boy's talents, and promised to receive him in his studio; but in a very short time the older Millet died, and the oldest son, then twenty-one years of age, returned to the field and took up his father's work.

Circumstances afterward became a little better, so that the young man was able to go to Cherbourg, and later to Paris to study. At the very first he did not confine himself to the subjects which later won him fame, but painted "The Golden Age," "Oedipus Unbound," and other classical pictures. Recognition of his great genius was very slow, and he suffered the most extreme poverty; but we are glad to know that before he died he knew that his work was appreciated, and gained by his art enough so that he was no longer really poor.

Now we can see why Millet was able to paint with such sympathy and exactness his three gleaners. These women are not workers in the harvest-field; their "gleaning" does not mean helping to get in the bounteous harvest. From the earliest times there has existed in certain countries a sort of an unwritten law which declares that after the harvesters have gathered in the grain the poor peasants may come into the fields and pick up for their own use what is left. The Book of Ruth, in the Bible, is chiefly built around this custom, and we find many references to it throughout history.

The lower picture, "The Angelus" may mean even more to us than "The Gleaners." This, too, deals with an old custom, which still prevails in some Catholic countries. At morning, noon and evening the church bells are rung to remind people to stop in their work and say a prayer. This prayer is a brief one beginning "The Angel of the Lord," and is called the Angelus, from the Latin word for angel. In the picture, the bell is just sounding from the church spire far in the distance, and the two peasants at work in the field have stopped their work and bowed their heads to pray. A soft, evening light fills the picture, and we can tell from the attitude of the peasants that it is no mere formal prayer which they are repeating. The atmosphere of reverence is over the entire picture. These two paintings of the great peasant artist of France well repay study.

Study of "Aurora." The following study of "Aurora," by Guido Reni, can be made to serve two purposes: It may help to instill a love of pictures into the minds of the children, and it may be of great assistance in teaching language or composition work.

First, if possible, let each child have a copy of the picture in his own hands that he may study it carefully. Second, let each child tell, as fully as possible, what he sees. Then the following series of questions will help to bring out the points of the picture. Some of the questions the children can answer themselves from their observation, but a number of them the teacher will have to answer for them.

1. What is the name of the picture? "Aurora."
2. Why is it so named? "Aurora" means "Dawn," and this is a picture of the dawn of the morning.
3. Which is Aurora in the picture? The draped figure that is leading.
4. Who was Aurora? The Greeks believed that she was the goddess of the morning, who went ahead of Apollo, the sun god, scattering flowers in his way and opening for him the doors of the morning.
5. Who is riding in the golden chariot? Apollo, god of the sun.
6. How many horses are hitched to the chariot? Four. (If the children cannot discover four horses let them count the noses).
7. Has Apollo any other attendants besides Aurora, in this picture? Yes, there is Lucifer, the torch-bearer, called son of the morning, and the graceful figures of the Hours.
8. Which way is Aurora looking? At Apollo, to see whether he is ready to have her open wide the gates of morning.
9. Are they traveling on the earth? No, on the clouds. You can see the earth below.
10. Are they traveling slowly or rapidly?

THE GLEANERS (ABOVE)

THE ANGELUS (BELOW)

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Why do you think so? (Call attention to the horses' manes, and other signs of action.)

11. Which is the most beautiful face in the picture?

Is there anyone in the picture who has nothing to do?

12. By whom was this picture painted? Guido Reni. He was born at Bologna in 1575 and died in 1642. His father, who was himself a musician, hoped that his son would be a musician also, and the boy studied music for some time. He finally made up his mind, however, that he would never be happy unless he became a painter, so his father allowed him to have an artist's training. He painted many other pictures, some of them very beautiful, but this is the best known of all his paintings.

13. Where is the original painting? On the ceiling of a palace at Rome. (Explain that when these beautiful paintings are on the ceiling, looking glasses are placed below them so that people can see them more easily.)

14. Have you any questions that you would like to ask about the picture?

Now let each child give a description of the picture, or let the whole class compose the description orally and then allow each child to write it out. Studies similar to this may be made of any picture.

Questions

What is oil painting? Water color? Fresco? Enamel? How produced?

How and on what were the early paintings of the Egyptians, Greeks and Romans executed?

How many centuries before Christ was painting practiced in Egypt? Was the art closely related to religion? In what relation was it held to sculpture and architecture?

Was any attempt made by the Egyptian artists to imitate nature?

Of what great historic value are these early Egyptian paintings? Give three reasons for your answer.

By whom were the principal works of Roman art produced?

Describe the conditions of Roman painting for the first three centuries after Christ.

What were the Catacombs? How were they built? Decorated? Protected? Inhabited?

AURORA

By what art in the Catacombs did the early Christians indicate their religious devotion?

What characterized the Umbrian school?

What was striking about the Florentine school?

When did art in the United States take on an individuality of its own?

What are the strikingly distinguishing marks between American art of 1855 and 1900?

Name five well-known American painters, with a great painting from each. For what was Whistler noted?

What are the twelve greatest paintings in the world; by whom, where found, and when produced?

What discovery of the Van Eycks produced a revolution in the art of painting?

By what process are mosaics made?

What are the only examples of pure Grecian painting?

What was the Byzantine influence on painting?

PAINTING

ANCIENT

Egypt

1. First historical notice in the nineteenth century B. C.
2. The most flourishing period, between 1400 and 525 B. C.
3. The art the offspring of religion.
4. Paintings found mainly on the walls of tombs and temples, mummy cases, rolls of papyrus.
5. Representative of public events, sacrifices and ordinary affairs.
6. Under supervision of priests. No knowledge of perspective.

Greece

1. Painting and sculpture subordinate to architecture
2. Its birth about 400 B. C., by Cimon of Cleonae.
3. Polygnotus, 460 B. C., the founder of historic painting. His principal works: The Taking of Troy, and Visits of Odysseus to Hades.
4. Apelles, the most celebrated of Grecian painters. Contemporary with Alexander.

Rome

1. N[illegible] a painter worthy of note.
2. Specimens in fresco and mosaic in tombs and baths of Rome and at Pompeii.
3. Under the influence of Christianity for three centuries painting was practiced secretly in the catacombs.
4. After the establishment of Christianity in the state, churches were adorned with paintings.
5. Byzantine decorations. In mosaic.

MEDIEVAL AND RENAISSANCE

1. Giovanni Cimabue, called the father of modern painting. The first to give individual life, grace and movement to figures.
2. The Florentine School.
   a. The most decorative of all Italian painting.
   b. The work of the Van Eycks, Hans Memling.
   c. Verrocchio, the master of Leonardo da Vinci, and Ghirlandajo, the master of Michelangelo.
   d. Leonardo da Vinci, head of the Florentine School of the sixteenth century.
   e. Michelangelo, architect, sculptor, painter.
   f. Fra Bartolommeo and Andrea del Sarto, the best colorists of the school.
3. The Venetian School.
   a. Arose under the influence of Giovanni Bellini.
   b. The school became supreme in its use of color.
   c. Titian, chief of Venetians, ranks with the masters of the other schools.
4. Umbrian School. Characterized by intense religious sentiment.
5. The Roman School.
   a. A continuation of the Umbrian.
   b. Centers about the great Raphael, the prince of painters.
6. Correggio, head of the Lombard School, unrivaled for grace, harmony, light and shade.
7. The Renaissance in Germany.
   a. Dürer. One of the first to excel in etching and the most celebrated master north of the Alps.
   b. Hans Holbein, one of the greatest of German painters. Excelled in pictorial effects.
8. In the Netherlands.
   a. Lucas van Leyden. The most important painter of the early Dutch School.
   b. Rubens, the greatest exponent of Italian art in Flanders. Van Dyck, his chief pupil.
   c. Rembrandt, the most famous of the Dutch painters.
9. In Spain.
   a. Velasquez, chief of the early Spanish painters.
   b. Murillo, the most important Spanish painter of religious subjects.

MODERN

England

1. Hogarth, the first native painter of note. Turned directly to nature.
2. Reynolds and Gainsborough, distinctly original.
3. Turner pre-eminent in a school of water-colorists.
4. Best known later artists: Constable, Rossetti, Morris, Leighton, Watts, Landseer, Alma-Tadema.

France

1. David, the great reformer. The return to the study of the antique. Gros and Guerin his pupils.
2. Gericault. Broke with the school of David.
3. Ingres, Delacroix, Delaroche. The most distinguished names of romantic style.
4. Exponents of modern French landscape art: Decamps, Rousseau, Corot, Millet.
5. Painters influencing art of the present time: Regnault, Lepage, Meissonier, Bouguereau, Constant, Gérome,

Germany

1. Remained stationary during eighteenth century.
2. Overbeck. Chief of the revivalists.
3. Cornelius. One of the greatest of modern German painters.
4. Schnorr von Carolsfeld.
5. Lessing. Alm, Menzel, Vautier, Makart.

Russia

1. Has made great advance since 1850.
2. Swedomsky, historical painter.
3. Verestchagin, a traveler artist.

United States

1. Followed Great Britain in art and literature [illegible] 1825.
2. [illegible] furnished the largest exhibit except France
4. The best known painters: West, Stuart, Allston, La Farge, Sargent, Vedder, Whistler, Moran.

TWELVE GREAT PAINTINGS

1. The Transfiguration—Raphael, 1520.
2. Sistine Madonna—Raphael, 1516.
3. Last Judgment—Michelangelo, 1534-1541.
4. Communion of Saint Jerome—Domenichino, 1614.
5. Descent from the Cross—Rubens, 1612.
6. Descent from the Cross—Volterra, 1541.
7. Last Supper—Da Vinci, 1498.
8. Assumption of the Virgin—Titian, 1516.
9. Immaculate Conception—Murillo, 1678.
10. Aurora—Guido Reni, 1609.
11. Beatrice Cenci—Guido Reni, 1599.
12. The Night—Correggio, 1522.

SUGGESTED FOR BLACKBOARD OUTLINE

Introduction. Never before in the history of our country has there been a time when attention to health and the means for securing and preserving it were so general as at the present day. As a people we are beginning to realize the importance of the proper care of the body. We have been brought to this viewpoint by the conditions of living which our industrial system has forced upon us. Physical culture, therefore, is not only beneficial to all, but it is to many absolutely essential to the preservation of health.

Some Causes of Poor Health. Nearly one-half of the people of the Dominion are living in cities, and many of this number are crowded into tenements where they are partially or wholly deprived of pure air and sunlight—the best agencies for the preservation of health. Moreover, many men and women are engaged in occupations which confine them for long hours in such positions as to cause a constant strain upon some organs, while leaving others inactive. Unless these people take exercise calculated to strengthen these inactive organs, the system becomes unbalanced and health fails.

Poorly ventilated factories, stores and dwellings, occupations which prevent free exercise of the respiratory muscles, in many instances prevent proper purification of the blood and lead to disease. For all these reasons physical culture becomes a necessity.

Some Reasons for Our Failures. Life is a battle in which victory goes to the strong. We see many failures in life because of physical weakness, and in numerous instances this weakness can be traced to neglect of proper physical training during the period of childhood and youth. In other instances physical weakness is due to the individual's neglect of proper exercise, his failure to obtain sufficient sleep, his carelessness in regard to ventilation, and his excessive indulgence in highly seasoned food and in stimulants.

Under the heading "Physical Culture," we aim to present in a clear and simple manner a discussion of the progress which the scientific world has made in recent years in the direction of health culture. Civilization is advancing by leaps and bounds. Man is conquering the forces of nature, and in no field of investigation has advancement been more rapid than in that of the prevention of disease and in general health building. Some of the greatest scientific minds of Europe and America have been long engaged in working out laws of health, and now fixed principles may be laid down by which humanity seems destined to be restored to its rightful heritage—perfect health.

Present Conditions. Problems still remain to be solved, but there are many universally accepted rules by which a systematic course of physical improvement may be prescribed for general guidance. The leading universities of the world have awakened to the importance of health culture and disease prevention, and are establishing departments under one name or another for studying and disseminating knowledge about these subjects. Wealthy philanthropists are giving their means and time to sustain scientific study of disease, and the result is of incalculable value to the race. The public schools have joined in this movement and in many schools physical instruction for both pupils and teachers is regarded as an important part of the work.

Few people today have the time or the inclination to review technical and exhaustive health treatises, or to analyze tables of laboratory or training-camp experiments, and are therefore deprived of knowledge of great value.

Health Not a Matter of Luck. Many parents are still living in the belief that health is a matter of good or ill luck; that illness comes to us as the result of divine displeasure or indifference. Probably they do not know that there are definite laws of health, just as there are laws of business or government. Perhaps they think there are too many complicated influences such as heredity, environment, accident, temperament, germs and other intangible forces for good or ill for them to reckon with. Others say, "Oh, I'll leave those matters to the family physician. If the children get ill it is time to send for the physician." We quite agree that a skilful physician is one's best friend in time of sickness. The physician and surgeon have a very important mission in the world, and it is one of the noblest attributes of a noble profession that it is concerning itself as much with the prevention as with the cure of disease.

Action Necessary. But why wait till illness actually comes before concerning yourself with the question of health? Why not build up and fortify your system and the systems of your children against the attack of germs? Why not attain such degree of vitality and power of resistance to disease that you no longer live in terror of drafts, wet feet and contagion? Why not give the children of the land such a degree of vigor that they will go through life enjoying every minute of existence and be able to overcome cheerfully obstacles and discouragements which crush others not so well prepared?

A Lesson from the Greeks. The ancient Greeks, in this respect, were far ahead of us today with all our boasted civilization. The care of the body then was of equal importance with the cultivation of the mind, and through systematic habits of exercise and diet, the Greeks attained a perfection of mind and body, a harmonious adjustment of the mental and physical that made them the wonder and admiration of the pagan world, and even today we must go to the Greek statues and the Greek philosophers for our highest ideals of physical and intellectual perfection. The Greek tutors and parents understood better than we of this enlightened age the necessity of giving the mind a healthy, vigorous body from which to derive its power, and the almost universal success they achieved in bodily training shows how well they understood the principles on which such training should be based.

Weakness and Disease Result from Cause. It is to be regretted that a large per cent of the ills of humanity is due to ignorance of the laws of health. Thousands of school children struggle for an education under serious disadvantages of physical weakness, if not of actual disease, when the trouble lies wholly in the mode of living adopted or permitted by the parents. This condition is simply the result of the law of cause and effect, a law which is never suppressed in nature. If children are weak, nervous, anemic, irritable, stupid or inattentive, there is a reason for it, and the parent should trace back this reason from effect to cause. The suggestions on the following pages are designed to assist not only parents but all others to apply the health principles in a practical way.

Many parents say that their children are not [illegible] well and strong. Then it is the duty of such parents to keep their children in that condition. However, we should bear in mind that their vigor may be more apparent than real. Big biceps and a bigger appetite do not always indicate vital power. Muscular development secured at the expense of the nervous system is a menace rather than a safeguard. *Keep ever in mind that endurance and resistance to disease are things to be desired.*

What Power of Endurance Indicates. A boy or man may have a fine physique; he may be able to lift great weights, and yet be vulnerable to disease germs. The test lies in endurance. Endurance means the power to sustain work for a great length of time without undue fatigue or exhaustion. *Fatigue comes from the accumulation of body wastes.* High power of endurance indicates that the body is comparatively free from these wastes or poisons.

Endurance has been one of the secrets of success of the world's great men, such as Washington, Napoleon, Gladstone and ex-President Roosevelt, whose achievements are so recent that they are easily recalled. Yet this man of iron will and almost unlimited endurance was at one time in poor health and obliged to remove to the plains and live for a while in the open air. However, while in certain cases a change of climate or scene is beneficial, you can begin, right in your own home, the work of health-building, and in nearly all cases carry it to a successful issue.

Exercise. The value of exercise as a health-building agent is coming to be generally recognized. That pronounced physiological effects may be produced and morbid conditions relieved by exercise is universally admitted. However, we must remember that exercise may be made harmful as well as beneficial. Sometimes the prescribing of exercise in proper kinds and amounts calls for the most exacting and mature judgment. It is not uncommon to hear people say that exercise does not agree with them. Doubtless the fault is not in the exercise itself, but in the way in which it is applied.

Authorities agree that an imposing muscular system is not a sure indication of health. Health depends on perfect functional activity, that is, harmonious action of the vital organs, such as the stomach, the heart, the kidneys, the liver and the lungs. These organs are all encased in the trunk of the body. It may be said that it is in the trunk that the individual lives. This is the human power house. The limbs may be amputated and yet the vital organs will go on doing their work as before, and the individual may enjoy good health. But once impair the efficiency of any of these vital organs, and you have a condition of ill health to a greater or a lesser degree.

The Aim of Modern Physical Culture. It is therefore to the trunk of the body with its vital contents that modern physical culture experts direct their attention. The more perfectly the vital organs coordinate, the higher the individual's vitality. It has been found that there is a close sympathy between the exterior muscles of the trunk and the internal organs, and that by strengthening these muscles it is possible to invigorate the underlying organs. It is therefore of the greatest importance that the abdominal muscles be developed and that the exterior muscles over the heart and lungs be strengthened through suitable exercise. This, in brief, is the aim of physical culture today, and the exercises shown on the following pages are planned systematically to build up and strengthen the muscles of the trunk.

The exercises prescribed can be taken in your own home, without any expenditure for special clothing or apparatus. It is important that the exercises be taken in a well-ventilated room, and that sufficient loose clothing be worn to protect the system from cold. To the beginner a caution is necessary: One unaccustomed to these exercises is very liable to indulge too freely at the start. When this happens, muscular soreness and lameness follow. It is far better to do too little than too much, and the exercise should be continued only long enough to produce mild fatigue, *never to the point of exhaustion*. The amount of exercise should be increased gradually as the strength improves. While the most desirable hours for these exercises are just before retiring at night, or when one rises in the morning, they may be taken at any time if other hours are more convenient.

It is not supposed that one will attempt all of the following exercises at the beginning. Only one or, at the outside, two should be practiced at first. After this, one exercise after another can be added as the strength increases and the system is invigorated. Doubtless but few will care to practice all of the exercises given. Neither is it necessary that they be taken in the order in which they are named; some may prefer to select certain numbers, others another series of numbers. The chief point is that a certain amount of exercise be taken with regularity and that the exercises adopted be such as to bring all the muscles of the trunk into activity.

Exercises for Practice

Exercise 1. Lie flat on the back. Raise first one leg and then the other to a perpendicular position. (See next page, Figs. 1 and 2.)

Exercise 2. Raise and lower both legs. Continue until mildly tired. This is an excellent exercise for the abdominal muscles.

Exercise 3. Same position as in Exercise 1. Hands clasped behind the head. Pull up to sitting position. (See Fig. 3.)

Exercise 4. Stand erect, arms outstretched to the side horizontally. Twist to left as far as possible, then twist to the right. (See Fig. 4.)

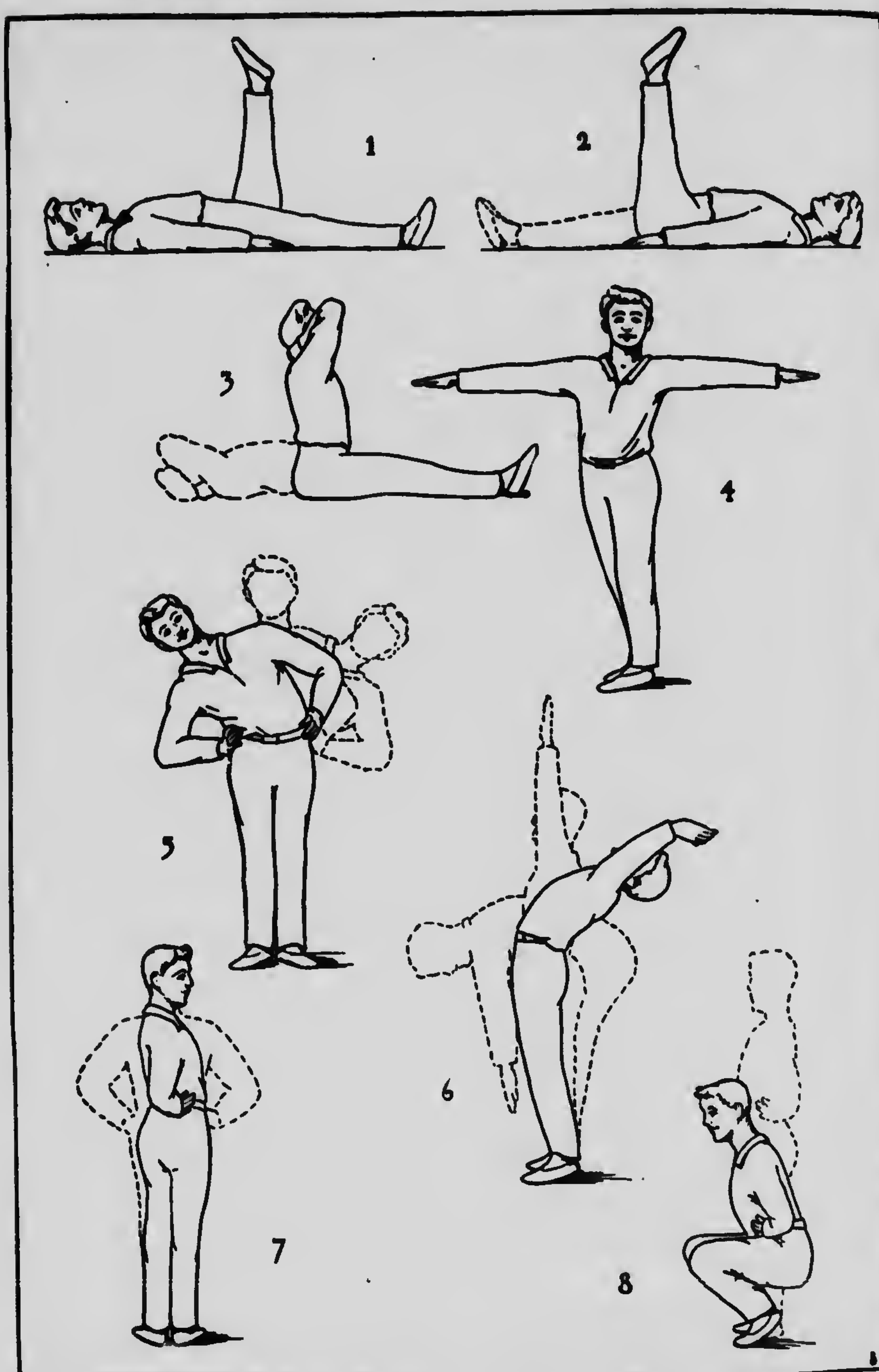
Exercise 5. Hands on hips. Bend first to right as far as possible. Then repeat to the left. (See Fig. 5.)

Exercise 6. Stretch hands overhead. Bend back as far as possible, repeating until tired. Alternate by bending forward and trying to touch toes. (See Fig. 6.)

Exercise 7. Hands on hips. Twist the trunk around in a circle, first one way, then the other. (See Fig. 7.)

Exercise 8. Hands on hips. Lower the trunk to a squatting position and raise to standing. (See Fig. 8.)

Exercise 9. Tense the muscles of the neck and turn head from side to side, making one set of muscles resist the other in the movement. In the same manner turn the head forward and back and around in a circle, first to the left, then to the right. This is to develop and strengthen the neck. A large neck indicates power. It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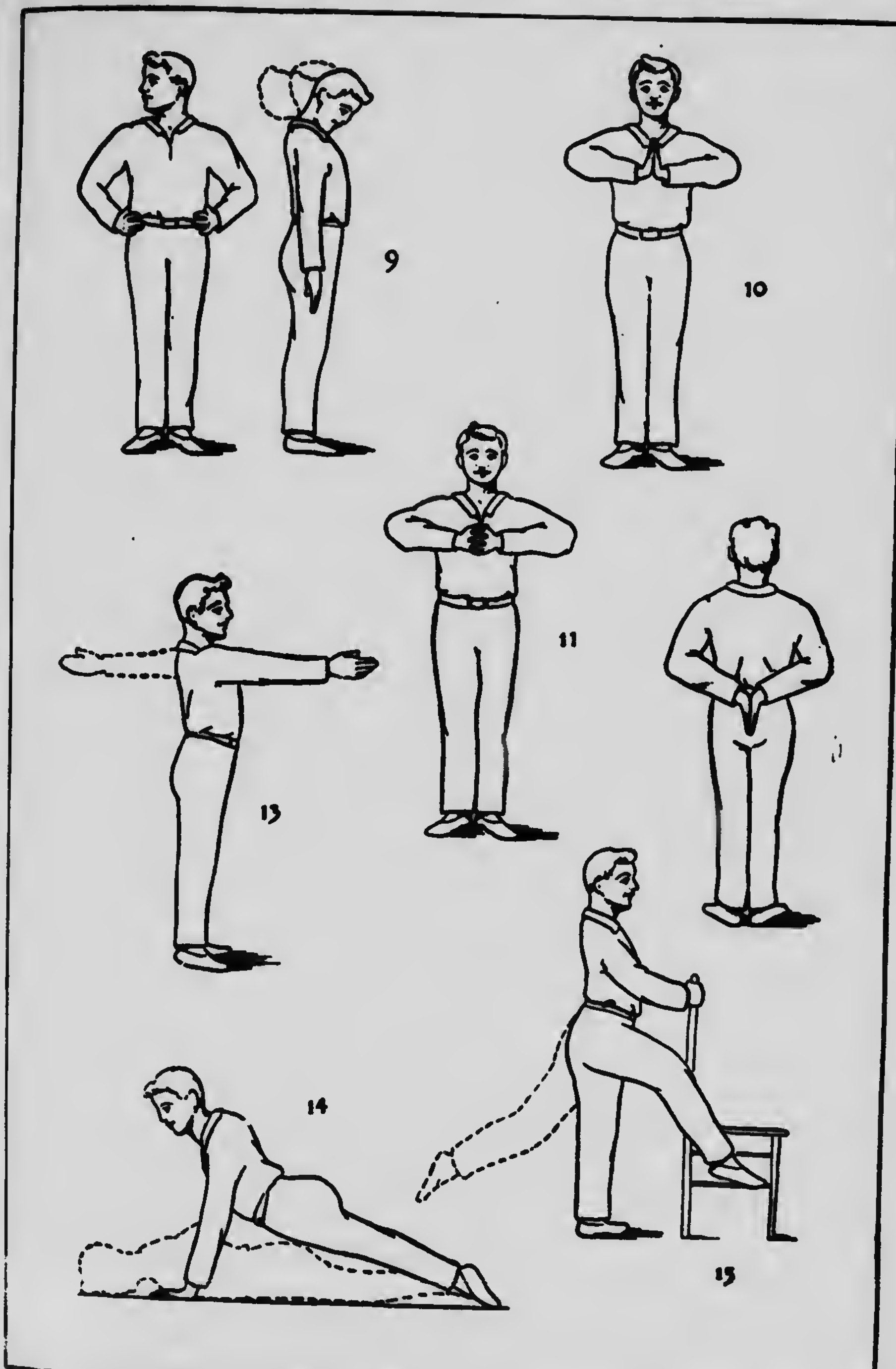
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insures a good blood supply to the brain. (See Fig 9.)

Exercise 10. Place the palms of the hands together in front of the breast and press hard. (See Fig. 10.)

Exercise 11. Lock the fingers together in front of the chest and pull one hand against the other. (See Fig. 11.)

Exercise 12. Lock the hands behind the back and alternately pull one against the other and push them together. (See Fig. 12.)

Exercise 13. Arms outstretched horizontally. Make the hands describe a full circle forward and back. (See Fig. 13.)

Exercise 14. Place the hands on the floor, the body outstretched, face downward. Raise and lower the body from the floor, dipping the body until the nose touches the floor. (See Fig. 14.)

Exercise 15. Hands on back of a chair or table. Raise and lower the knees rapidly, as in running. (See Fig. 15.)

Caution. It is not intended that all these exercises be taken at any one time. Selections may be made from them according to taste. If the doing of these exercises becomes drudgery to the child, stop a while, but resume them again as soon as possible. Let there be one day in the week of absolute rest.

Food, Air and Ventilation

Wise Selection of Food. Food is closely related to health. The quantity and quality of food should be suited to the needs of the individual. This means that it depends very largely upon age, climatic conditions and occupation. In general, one engaged in an occupation which calls for vigorous and prolonged muscular exercise in the open air requires a larger quantity of food and more stimulating food than one engaged in sedentary occupations. There are, however, exceptions to this general rule. These exceptions are very apparent among certain classes of people who take directly opposite views in regard to the value of meat as an article of food. Those known as vegetarians exclude meat from their diet entirely, while we find others who subsist almost wholly upon meats. However, the great majority make use of a mixed diet, in which vegetable foods and meats are mingled in varying proportions.

In the last analysis, the quantity and nature of food depend upon the individual. Neither medical science nor the systematic study of disease have yet been able to disprove the truth of the old adage, "What is one man's meat is another man's poison." In other words, those articles of food which seem to be perfectly adapted to one individual, and by that person easily digested, are to another almost entirely indigestible and cannot be eaten without injury.

Food should be nutritious, readily digestible and free from an excess of condiments or other substances which highly seasoned food contains. For all such substances as need cooking, thorough cooking should be done. In winter one needs more food than in summer, and usually one eats more meat and more fats in winter than in summer because of the heat-producing quality of these substances.

Few Know How to Eat Properly. More attention should be given to the manner of eating than is bestowed upon it by a large number of people. All vegetable substances contain more or less starch, and unless starch is digested, it furnishes no nutriment. One should remember that the digestive process of starches begins in the mouth by the mingling of saliva with the food. Therefore, food should be thoroughly masticated. One should eat slowly and chew the food until the saliva is thoroughly mingled with it. By doing this the food becomes more thoroughly digestible, furnishes a larger proportion of nutriment, and consequently a less quantity supplies the needs of the system. Those who eat rapidly invariably eat too much and overwork the digestive organs. This practice in the course of time cannot fail to lead to the weakening of these organs and consequent ill health.

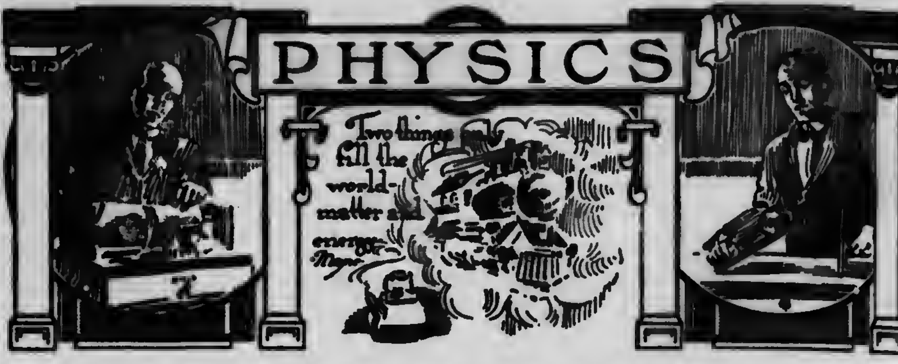
Food should be taken at regular intervals. The digestive organs are rhythmic in their action, and when they become accustomed to act at certain intervals, they perform their duties more satisfactorily if this custom is followed. The average adult eats three meals in twenty-four hours; some believe in eating but two. However, if other conditions are equal, the person eating two meals a day will take and assimilate as much food as the one eating three; the first simply eats more at a time. Young children need to eat more frequently than adults, and this need should always be met. However, it should not degenerate into a habit of constantly eating between meals, after the children have reached such an age that there is no necessity for their eating more frequently than adults. Another very injurious habit which children are sometimes allowed to form is that of constantly munching. This always keeps undigested food in the stomach, and tends to overwork that organ and consequently to irritate it.

Pure Air a Necessity. Pure air is as essential as pure food. One can live for hours and even days without food and drink, but one cannot live five minutes without breathing. We pay too little attention to proper ventilation. Defective ventilation is one of the most prolific sources of tuberculosis and other lung troubles. The home, and especially the sleeping rooms in the home, should be thoroughly ventilated. People are recognizing the importance of pure air, and in most modern dwellings good systems of ventilation are provided. However, in many of the older houses these are either defective or wholly wanting. In such cases, care should be taken to let in air from the outside at frequent intervals. One should remember that cold air is not necessarily pure air, and a room whose temperature is below freezing may, from this point of view, need ventilation as much as one which has a temperature of 70°, or even more. Schoolrooms and all other public buildings should be thoroughly ventilated every time they are vacated. At each recess the doors and windows of the schoolroom should be thrown open, even in cold weather, for a few minutes, to let the foul air escape and pure air enter. This should be done when the building is provided with a good system of ventilation, for no system provides a sufficient circulation to remove all the foul air and provide each occupant with all the fresh air necessary.

Breathing Exercises. Breathing exercises in the open air, except in cold weather, are very beneficial and strengthening. In taking these exercises one should stand erect with hands on hips and head thrown back a little. Air should be inhaled slowly until the lungs are filled to the utmost capacity, then the air should be expelled from the lungs as completely as possible. Exhalation may be slow or rapid, or the slow and rapid movements may alternate. The same effect is secured by practicing these exercises in a room with windows open so as to give as full a circulation of air as is obtained out of doors. In all cases the air should be inhaled through the nostrils.

Breathing exercises are beneficial to everyone, but they are necessary to the maintenance of health for those who are engaged in sedentary occupations. In such cases breathing exercises should be taken at least twice a day—morning and evening. These more formal exercises may be supplemented by an occasional full breath taken while at work. Let the worker pause for a moment, throw the head and shoulders back and inflate the lungs to their full capacity. This secures relaxation of nerves and muscles, and helps invigorate the blood.

In the beginning breathing exercises, like muscular exercises, should be taken lightly, for they can cause more or less of a strain upon the system. As one becomes accustomed to them, they can be increased in length and vigor. But if indulged in too freely at first, they are liable to result in injury.



Introduction. When we study the facts of nature we study what are called physical phenomena. This word phenomena (the plural of the noun phenomenon) may confuse us at first, but if we once have its meaning firmly in mind it will help us to understand our subject. In Greek this word meant any fact or event in the sense that it was changing and could be seen; the Greek distinguished between the "phenmenon," or the nature of a fact as it appeared at a particular moment, and the "essence," or real nature. Today when we speak of a phenomenon we study not only the action, but the law. We say that the fall of an apple from a tree is a phenomenon. Yes, but why? We are not content to accept the fact, and say, "Yes, the apple fell because it was over-ripe." Why didn't the apple fly away into space? Why did it fall to the ground? Did this particular apple do something that no other apple ever did or could have done? Of course not. But we refuse to accept each phenomenon merely as a fact; we want to understand as well as see. In a word, we must study the general principles. When we understand these we can see the connection between facts which formerly seemed unconnected. We can make our own experiments.

Properties of Matter. Physics is called the science of matter and energy. Just what matter is, nobody knows; we identify it by its characteristics or properties, that is, the facts that are peculiar to it. Thus all matter occupies space. But some matter, like window-glass, lets light pass through it and lets us see through it; it is *transparent*. Some things allow light to pass through but do not let us see through; these are translucent (from the two Latin words *trans*, which means *through* and *lux*, which means *light*). A piece of slate does not let light pass through it; it is *opaque*. A watch spring or a rubber band recovers its shape after we bend it; it is *elastic*. A strip of lead, on the other hand, will keep the shape into which it is bent; it is *inelastic*.

All matter occupies space: it has three dimensions, length, breadth, thickness. It has cubic contents, and it has mass or weight. One of the most important properties of matter is its tendency to continue in whatever state of rest or motion it happens to be. We all know that a stone lying in the road cannot run away. It is an object which cannot move unless somebody stumbles over it, or picks it up, or a horse kicks it aside, or something of that kind happens. The stone has nothing to do with the motion; if nothing interfered with it, it would remain in its place. This property is called *inertia*, or sometimes *inertia of rest*, when it refers to a body at rest. The word "inertia" means "without motion of its own." On the other hand, if a galloping horse suddenly stops or shies, the rider is likely to fall forward over the horse's head. The horse and rider have been moving forward rapidly; the horse stops; but the rider who has no control over his motion, tends to keep on. This is sometimes called *inertia of motion*, to distinguish it from "inertia of rest." We know now that if a moving body is stopped, the cause is always outside the object itself; and if a body at rest suddenly begins to move, we know the motion must come from some outside source. Anybody can try a simple experiment, without the danger of falling from a horse. Hang a heavy weight or ball by a string, and to the under side fasten a similar piece. If you pull steadily downward the string above the weight will break, because the weight and the steady pull produce greater strain than the pull alone; if, however, you pull downward suddenly, the string will break below the weight. On account of the *inertia* of the heavy weight, the lower string breaks before the sudden pull reaches the upper string. For the same reason, to drive a handle into a hammer head we strike the handle, not the head, against the floor or an anvil. The head, because of its inertia, tends to keep on moving after the handle has stopped. Inertia, then, is that property of matter by which a body at rest remains at rest, and a body in motion remains in motion in a uniformly straight line unless acted upon by some external force.

THE BALL AND STRING EXPERIMENT

Mechanics of Solids. As soon as we try to change the position or form of matter we must consider a new subject—energy, or force. It is a law of the universe that energy cannot be lost; it is only transferred. This transfer of energy from one object to another is called "doing work." When we have studied the different forms of energy and the change from one form to another, we shall understand why no energy is ever wasted. The division of physics which deals with forces is called *mechanics*, because it deals with the principles used in constructing machines.

The most obvious effects of force on matter are, first, to produce change of motion, and second, change of size or shape. To speak of the rate of speed with which a body moves we use "velocity." If a body moves for five seconds at a rate of ten feet a second it will move fifty feet; the space passed over by the body in motion is equal to velocity multiplied by the time during which the body moves. This is called *uniform*, or *constant*, motion, because the speed remains the same. The final velocity at any moment is the product of the number of seconds during which the body has fallen and the uniform rate of increase in velocity. This increase, or it may be a decrease, is called *acceleration*. If a body starts from rest, the average velocity for t seconds is $\frac{1}{2}(0+at)$, or $\frac{1}{2}\,at$. The distance passed over in t seconds is then $\frac{1}{2}at\times t$, or $\frac{at^2}{2}$. Remember that a stands for *acceleration*, and t the *time* expressed in seconds. If we let s equal distance or space passed over,

$$s=\frac{at^2}{2} \qquad (1)$$

Then $$a=\frac{2s}{t^2} \qquad (2)$$

and $$t=\sqrt{\frac{2s}{a}} \qquad (3)$$

Combining (2) and (3)

$$s=\frac{a^2t^2}{2a}=\frac{v^2}{2a} \qquad (4)$$

Or $$v=\sqrt{2as} \qquad (5)$$

With these formulas we can get the velocity of any body moving with a uniform acceleration, no matter what the force moving it. Suppose a body starts from rest with an acceleration per second of 20 feet per second. What space does it pass over in 6 seconds and what is its velocity at the end of that time? We substitute our values just as we do in any algebraic equation:

(1) $s=\frac{at^2}{2}$ $\qquad v=\sqrt{2as}$

(2) $s=\frac{20\times 36}{2}$ $\qquad v=\sqrt{2\times 20\times 360}=\sqrt{14400}$

(3) $s=360$ ft. $\qquad v=120$ ft.

Toward the end of the seventeenth century Isaac Newton discovered the law of universal gravitation: every particle of matter in the universe attracts every other particle with a force whose direction is that of a line joining the two particles, and whose strength varies directly as the product of the two weights, and inversely as the square of the distance between them. In our study we may neglect all forces of gravitation except that of the earth. The mass of the earth is so great that no other object near it is strong enough to act in an opposite direction. The bodies greater in size than the earth are too far away to influence its laws of gravitation.

If you were asked, "Which falls faster, a feather or a ten-pound weight?" you would probably laugh and say, "the weight, of course." And you would be right, because you are thinking of dropping the objects in air. If you could drop the feather and the weight in a perfect *vacuum*, that is, a place "empty of air," you would find that both fell at the same rate of speed. Galileo was the first to find out this truth by dropping various bodies from the top of the leaning tower of Pisa. In air the lighter bodies fall slightly slower than the heavier ones, but this is due to the resistance of the air. This uniform attraction is due to gravity. Just what this magnetic power is we do not know. We do know that it draws objects toward the earth with a velocity of 9.8 metres or 32.15 feet per second.

We have already found that $v=at$

$$\text{and} \quad s=\frac{at^2}{2}$$

Substituting g or gravity for a, we have $v=gt$

$$\text{and} \quad s=\frac{gt^2}{2}$$

If now we throw a body upward we shall find that our law still holds true. The acceleration is negative, and the initial velocity is diminished each second by g units. If, for example, the velocity is 1470 centimeters a second, the time of ascent would be $\frac{1470}{980}$ or 1.5 seconds. (We had $v=gt;\ \therefore\ t=\frac{v}{g}$). The time of ascent is the time of descent again to the starting-point; and the body will return to the starting point with a velocity equal to its initial velocity in the opposite direction.

Mechanics of Fluids. A solid has rigidity or elasticity of form; its form can be altered by applying pressure; but a fluid has no form unless it is supported by a containing vessel, or, to be more exact, it conforms to the shape of any vessel in which it is placed. Fluids are divided into liquids and gases by means of two distinguishing properties:

First, a liquid, such as water, is but slightly compressible, while a gas offers relatively small resistance to a pressure seeking to reduce its volume. Water is reduced only .00005 of its volume by a pressure which will reduce air one-half of its volume.

Second, gases are distinguished from liquids by the fact that any mass of a gas in a closed vessel always completely fills it, whatever its volume. A liquid has bulk of its own, but a gas has not. The particles of a gas will always expand to the boundaries of its containing vessel.

Probably you have never thought of fluids as exerting a pressure in all directions. Yet it is true. A board on top of water is evidence that there is pressure holding it up. We know water has weight and therefore exerts pressure downward. It is a fact, too, that there is pressure on the sides. The pressure of a fluid is always at right angles to any surface on which it acts. Furthermore, if we neglect the weight of the fluid, pressure is the same at all points in the mass of the fluid. If, therefore, we apply pressure to any area of an enclosed fluid, the pressure acts equally in every direction.

The pressure of a liquid on a body immersed in it is a vertical force upward; this upward pressure is called "buoyancy." For example, suspend a weight by a string from the hook of an ordinary spring balance and note the reading. Now submerge the weight in water. The weight will be less. The law of buoyancy is said to have been discovered by Archimedes about 240 B. C.: a body immersed in a liquid is buoyed up by a force equal to the weight of the liquid displaced by it. When a body is immersed in a fluid, it may displace a weight of fluid *less* than, *equal* to, or *greater* than its own weight. In the first case, the upward pressure will be less than the weight of the body and the body will sink. In the second case, the upward pressure will just equal the weight of the body, which will remain in the fluid wherever placed. In the third case, the upward pressure will exceed the weight of the body, which will then rise to the surface. For purposes of experiment we use the weight of one cubic centimeter of water at 4° Centigrade as unity. The *density* of a body is the number of units of mass of it contained in a unit of volume (e. g. grammes per cubic centimeter). The *specific gravity* of a body is the ratio of the mass of any volume of it to the mass of the same volume of pure water at 4° Centigrade—in other words, it is only *relative density* as compared with water. To find the density of a body it is necessary to know its mass and volume. Its mass is easily found by weighing it. The most accurate and convenient method of obtaining the volume, especially if the solid is irregular in shape, is as follows:

The buoyant effort of a liquid equals the difference between the weight of the body in air and its weight when immersed in the liquid. This difference is the weight of a volume of the liquid equal to that of the body. Hence, if this difference be divided by the density of the liquid, the quotient will be the volume of the liquid and also that of the body. The mass divided by this volume will be the density. For example, a body heavier than water,

Weight of body in air.............. 10.5 g
Weight of body in water............ 6.3 g

Weight of water displaced.......... 4.2 g

Since the density of water is 1 gramme per cubic centimeter, the volume of water displaced is 4.2

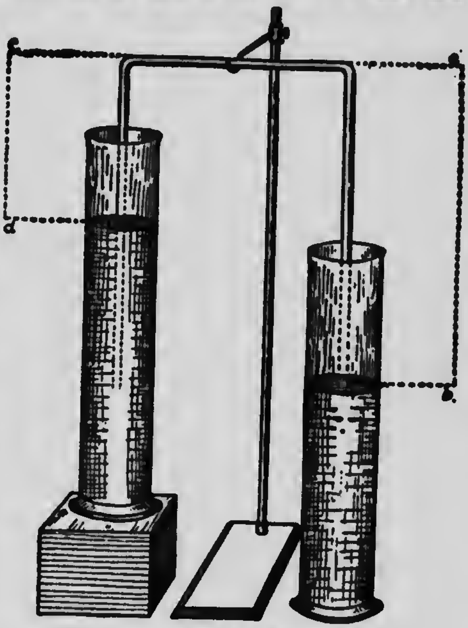
cubic centimeters. This is also the volume of the body. Therefore, 19.5÷4.2=2.5 grammes per cubic centimeter, the density.

To find the density of a liquid the simplest method is to weigh a glass sinker or stopper in air, then in the liquid. The difference will be the mass of the liquid displaced by the stopper. (Why?) Then weigh the sinker in water; the loss divided by the density of water will be the volume of water displaced by the sinker, and hence the volume of the liquid whose mass has been found. Divide the mass of the liquid displaced by the volume displaced and the quotient will be the density.

Few of us think of the air as having weight. When the wind blows we know there is force in it, but who of us has thought that the air at rest has pressure? Years of experiment have finally proved that the pressure of the air is 1033.3 grammes per square centimeter, or 14.7 pounds per square inch. One of the easiest methods of testing air pressure is by a barometer. The density of mercury at 0 Centigrade is 13.596. With the use of these facts we can make our own barometer (see *The Boy's Workshop* in this volume) and perform interesting experiments. A barometer reading of 76 centimeters is the normal reading at sea level. The diameter of the column of mercury does not influence the reading. Why?

Another interesting experiment is with a "siphon," in its simplest form a U-shaped tube of glass or rubber to carry liquids from one vessel to another at lower level by means of air pressure. First invert the tube and fill it with water. Then put the tube in position with the long arm at lower level. Water will flow from one vessel to the other as long as the liquids are at different levels. The longer the arm—in other words, the greater the difference between the levels—the more rapid the flow of water. Let us try to explain the action of the siphon:

Let p represent the upward atmospheric pressure at the end of the tube d. Then the pressure h of the liquid in that arm is downward, and the resultant pressure acting upward in the tube is $p-h$. In the same way, if h' is the pressure of the liquid in the long arm, then the upward pressure in that arm is $p-h'$. The difference between $p-h$ and $p-h'$, or $h'-h$, is a force acting toward b. In other words, the force which causes the liquid to flow is measured by the pressure of a column of the liquid whose height is the difference between the heights of the arms. This principle of the siphon explains many things we have never tried to explain. For instance, why does water flow from a tank on the top of a hill down through pipes and then up again to the second or third floor



THE SIPHON

of a house? Now that we know what a siphon is we see that our system of water pipes is merely a simple siphon.

We have already noticed that pressure on liquids has much less effect than on gases. After years of experiments Robert Boyle, an English physicist, found that the volume of a given mass of gas varies inversely as the pressure exerted on it. If the pressure is doubled the volume is diminished by one-half. If p and p' are original and final pressure, and v and v' are original and final volume, we have the proportion $p : p' :: v' : v$, or $v' = -\frac{pv}{v'}$. For any simple experiments this rule will do; but scientists have found that it is not exactly true, especially if the temperature changes.

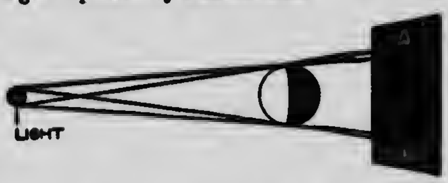
Sound. Sound is a disturbance of the atmosphere which affects the hearing. Yes, you will say, but that is not a definition. It is true of sound as well as of light, heat, electricity, etc., that the definition properly comes last, because it has taken years of experiment to come to a conclusion. Even today definitions vary:

probably every textbook has a new wording, though the fundamental idea is the same. The fundamental idea is this: sound is vibration through air, water, or any substance capable of transmitting vibrations; but until these vibrations strike the ear-drum there is no sound. When a body, such as a tuning-fork or violin string vibrates, the disturbances in the air around it are known as sound waves. These waves may be reflected just as light or water waves are; this reflection is the echo. Sound travels at a rate of 332.4 meters or 1090.5 feet per second through air at the freezing point. Heat increases the velocity; for each degree centigrade the rate is 0.6 meter, or nearly two feet more per second. Another point to be noticed is the quickness with which sound decreases as we get further away; it has been proved that if the distance between us and the source of the sound is doubled, the volume of sound will be only one-fourth as great.

One of the commonest methods of producing sound is by the vibration of a string. All string instruments such as the violin and 'cello are of this kind; also the piano. The pitch, that is, the number of vibrations, is determined by the length and thickness of the string. Take any two strings of different thickness and stretch them so that the vibrating sections will be of equal length. The musician will say that the thicker string gives off a lower *note*, but the physicist says it has a lower *pitch*. If we shorten the strings we shall find that the pitch is higher. The standard pitch for music is what we know as middle C of the piano, which vibrates 256 times a second.

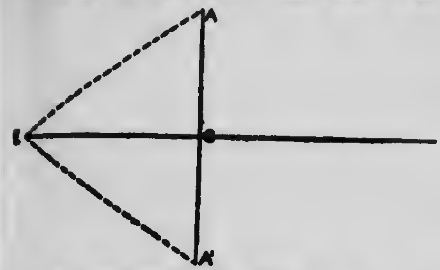
An *echo* is the repetition of a sound caused by the reflection of sound waves from some distant surface, like that of a building, or from cliffs, clouds and trees. The interval between the sound and the echo is the time that the sound takes to travel from the source to the reflecting body and back again. The sensation of sound lasts about one-tenth of a second, and during that time the sound wave travels one-tenth of 1090 feet, or 109 feet. If the reflecting surface is about 55 feet away, a short sound will be immediately followed by its echo, since the first sound wave will travel to the reflecting surface and back to the ear to renew the sensation just as the first one ceases. If the distance is much less than 55 feet, the reflected sound reënforces the original one. The poor acoustic properties of many large halls and churches are due to a confusion of echoes from many walls.

Light. Like sound, light is produced by vibrations or waves, but there are several important differences. In the first place, it is not a vibration of air, but of a finer medium, known as ether, which penetrates between the small particles of ordinary matter. Just what ether is, nobody knows; scientists assume that it exists. Another difference is that sound may travel around corners and curves—that sound waves need not flow in a straight line—but light waves flow only in straight lines. Light, moreover, travels at the tremendous speed of 186,000 miles a second, whereas sound travels only 1090 feet a second when temperature is at the freezing point. This fact explains why we usually see a lightning flash several seconds before we hear the thunder clap. For all distances on the earth light is practically instantaneous.



We can perform a few simple experiments to illustrate some of the principles for the study of light. Hold a ball or round bit of cardboard between a light and a white screen. The space behind the object from which the light is excluded is called the *shadow*. You will find that the center of the shadow is darker than the edges; the diagram shows why. The flame is so large that some light streams to A and B. The darker part of the shadow is called the umbra, the lighter part the penumbra. Now try experiments with a smaller flame, also vary the distances between the light and ball, and between the ball and screen. What general conclusions do you derive from these experiments?

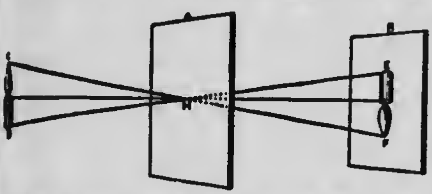
No doubt you have often wondered why some images are upside down. Why for instance is the image of a tree upside down in the water? It will help us to understand if we remember one fact, that the angle at which a ray of light strikes a reflector is the same angle at which the ray is reflected. Take a mirror and make the experiment. Now is it clear why the bottom of the tree is at the top of the image in the water? In the diagram, E is the eye, which acts as reflector; A is the top of the tree, and A′ the top of the reflected image; C is the base of the tree. The angle AEC must equal A′EC, the line EC being the surface of the water. So the image of point A, the top of the tree, is reflected by the eye to A′. And every point



ILLUSTRATING REFLECTED IMAGE
AC represents a tree; CA′ the reflection

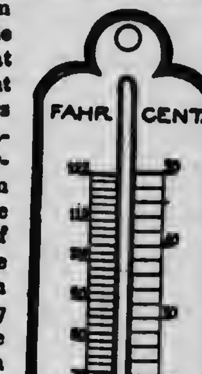
between A and C will be reflected so that every point on the image will form an angle with the surface equal to the corresponding angle from the tree.

Have you ever stopped to think why the image in a camera is upside down? The lens of the camera is much smaller than the object to be reflected. But rays of light travel in



straight lines. Therefore, a ray of light from C must travel through the lens or hole H in the direction CF; and a ray from D must pass through H in the direction DE. If we hold a screen at B the image is caught in the position EF, upside down. For the same reason you always put the slides in a magic lantern upside down. Can you explain that to your own satisfaction?

Heat. If you take hold of an iron rod that has just been removed from the fire, it feels *hot*; on the other hand, if you touch a piece of ice, it feels *cold*. The cause of these sensations is said to be *heat*. The warmer body always gives off heat to a colder. For many years it was believed that heat was a fluid, called "caloric;" about the middle of the nineteenth century the experiments of Joule proved that a definite amount of mechanical work is equivalent to a definite form of heat. In other words, *heat is a form of energy*. Heating or cooling is merely a transformation of *temperature* or "heat level," as before we might have spoken of a higher water level. To measure temperature the simplest instrument in use is the thermometer, a long glass tube on one end of which is a bulb partly filled with mercury. The tube is open at the upper end after the mercury is poured in. The bulb is then heated till the mercury rises to the top, when the tube is sealed by means of a blow-pipe. As the bulb cools the mercury recedes, leaving a vacuum at the upper end of the tube. It is clear that there must be some point at which all thermometers agree. Careful investigations have made it certain that under uniform conditions the temperature of *melting ice* and that of *steam* are invariable. These points are generally known as *freezing point* and *boiling point*. On the centigrade scales (centigrade from *centum*, meaning hundred, and *gradus*, meaning steps) the freezing point is marked 0° Centigrade and the boiling point 100°. On the Fahrenheit scale (named after the German scientist Fahrenheit) the freezing point is 32° and the boiling point 212°. Most household thermometers are marked in the Fahrenheit scale, but for scientific purposes the Centigrade scale is much better, because it is readily reduced to decimals.



THE THERMOMETER
Showing both Fahrenheit and Centigrade scales

It frequently happens that we are called on to change temperature readings from the Centigrade scale to the Fahrenheit, or from Fahrenheit to Centigrade. We know that 100° C. equal 212° − 32° or 180° F. (the abbreviations C. and F. are commonly used instead of writing out the words). We are asked to find the equivalent in Fahrenheit degrees of a reading of 60° C. We know that

	100° C. = 180° F.
Then	1° C. = 1°.8 F.
Therefore,	60° C. = 108° F.

In other words, 60° C. above zero will equal 108° F. above the freezing point, because that is the Centigrade zero. But the Centigrade zero is 32 on the Fahrenheit scale. So we must add 32 degrees to give the true reading above the Fahrenheit zero.

Therefore, 60° C.=108° F.+32° F.=140° F.

To change a reading from the Fahrenheit scale to the Centigrade scale is just as simple; we reverse the process. To change 40° F. to Centigrade degrees, we first subtract 32° F. in order to find how many Fahrenheit degrees above the freezing point remain to be changed to Centigrade units. In this case we find there are 8° F. above the freezing point. We already know that

180° F.=100° C.

Then 1° F.=$\frac{5}{9}$ or 0.555° C.

Therefore, 8° F.=4.44° C.

It is possible that a reading above zero on the Fahrenheit scale will be below zero on the Centigrade. In this case our answer would be in minus degrees Centigrade, in other words, below zero.

For the purpose of measuring the quantity of heat gained or lost by a body when its temperature changes, it was necessary to adopt a unit of heat. The one commonly used in connection with the metric system is the quantity of heat that will raise the temperature of one gramme of water one degree Centigrade. It is called a *calorie*. The number of degrees required to raise the temperature of a body through one degree Centigrade is the thermal capacity (from the Greek word *thermos*, which means heat) of the body. The thermal capacity of a unit mass of a substance is its *specific heat*. Specific heat bears the same relation to a calorie as specific gravity does to *g* or gravity, which we have already studied. For example, the specific heat of mercury is 0.033; this means that the heat which will raise 1 gramme of mercury through 1 Centigrade will raise 1 gramme of water through only 0.033 Centigrade.

When a body changes from the solid to the liquid state through the application of heat it is said to *melt* or *fuse*. *Freezing* or *solidification* occurs when the body changes from the liquid to the solid state. An interesting experiment may be performed with water; if undisturbed it may be cooled a number of degrees below 0 Centigrade, but if it is disturbed it usually freezes at once and its temperature rises to the freezing point. Some substances, like wax and glass, have no sharply defined melting point. They first soften and then pass more or less slowly into the condition of a thick sticky fluid. Most substances occupy a larger volume in the liquid state than in the solid. A few substances, including water, expand when they become solids. When water freezes its volume increases nine per cent—that is the reason water pipes often burst in winter. When a body passes slowly from one state to another, there is no rise or fall in temperature. When a solid fuses, a quantity of heat disappears; and, conversely, when the liquid solidifies, an equal amount of heat is generated as was before lost. The heat required to melt one gramme of a substance without a change of temperature is called the heat of fusion. Of course, we understand that when we speak of the heat of fusion of ice as 80 calories, that we are referring to an absolute unit, merely a convenient method of measuring.

No doubt you have often noticed the "sweating" of pitchers of ice water, or the dew on grass and flowers, but have you ever tried to explain these facts? You have probably said that it was cool last night and the "dew fell." The explanation is simple; the plants give up their heat very quickly after the sun sets and the moisture of the air then condenses on the cooler surfaces of the plants. Perhaps even more typical is the "sweating" on the water pitcher. This occurs in the same way. The cold pitcher gives the moisture in the warmer air a chance to condense.

The word "condense" is new to our study, but surely most of us know what it means. When steam changes to water we say it condenses. Condensation is the change from vapor or gas to liquid; evaporation is the change from liquid to vapor. Like the heat of fusion, or the amount of heat required to change a solid to a liquid, there is a *heat of vaporization*, or the amount required to change a liquid into a vapor. This heat of vaporization is 536 calories. In other words, this amount of heat is lost before boiling water evaporates.

But we have already said that no energy is ever lost, and is not heat a form of energy? So what becomes of this heat? It remains in the water as energy, which will later have the power to do work. One of the simplest illustrations of the use of steam to do work is the steam engine (see *Steam Engine* in Volume V and *The Boy's Workshop*, in this volume). Let us try to trace this energy. The great source of energy is the sun. The sun's rays give life to trees, which are cut into logs, which feed the fires, which heat the water into steam, which runs the steam engine, which operates a saw-mill, etc. We could go on indefinitely, only to find that the energy is merely transferred. For a time it may not be in use, but it still has the power when it is needed.

There are three ways of transmitting heat. Place one end of a metal rod in a gas flame and the other end in melting ice. It will be found that heat passes along the rod and melts the ice. Hold your hand above the flame; it will be warmed by a rising current of hot air. Hold the hand by the side of the flame; again there will be a sensation of heat. This simple experiment illustrates the three ways in which heat may be transmitted from one point to another. The first is *conduction*, in which the matter conducts the heat without any visible motion of the matter itself. It is passed on from the hotter to the colder particles. The second method is called *convection*, which means to carry. A current of hot air or a flow of hot water through pipes is a visible transfer of heat; this is convection. The third method is *radiation*, by which heat is transmitted like light, by a wave motion in the ether. "Radiation" means simply that the heat travels in rays from a center; it is in this way that heat and light reach us from the sun.

Magnetism and Electricity. Certain ores, consisting of iron and oxygen, sometimes have magnetic properties; they are called natural magnets. Bars of iron or steel that have been made magnetic by contact with a natural magnet or other force are called artificial magnets. Probably you have one of the common horse-shoe

1—BAR MAGNET 2—HORSESHOE MAGNET

magnets. There are many interesting yet simple experiments with magnets. Two that will help us to understand the subject are as follows:

Magnetize a piece of watch spring by contact with a magnet. Then heat it red hot and test it for magnetism. It will be found to have lost its power of attracting other metals.

Magnetize a knitting-needle and find by several trials how many tacks can be lifted by it. Now hold one end firmly against the edge of the table or in a vise, and pluck the free end so that the needle vibrates for several seconds. The power of the magnet to pick up tacks will be found to be considerably less.

What conclusion can we derive from these experiments? It is clear that in both of them we have reduced or removed the magnetic power. The fact is that heating the spring or causing the needle to vibrate rearranged the tiny particles of matter of which the spring and needle are formed. These particles are called molecules, a long word for a "small object," which is a literal translation of the Latin parts which make up the word. Magnetism is really a strained condition of these molecules, so that their power of attraction is greatly increased. We have noticed that a general "law of attraction" says that all matter possesses a degree of power to attract. The earth and a falling bar of iron attract each other, but the bar of iron being smaller, moves easily and yields to the attraction of the earth. Magnetism increases the force of this natural attraction.

Closely connected with magnetism, because many of its effects are similar, is electricity. Bodies which show the power of attracting light bodies after being rubbed are said to be electrified; there are other methods of electrification, but rubbing is the simplest. Rods of glass, very dry wood, sealing-wax, etc., if rubbed gently, will attract bits of paper and light objects of various kinds.

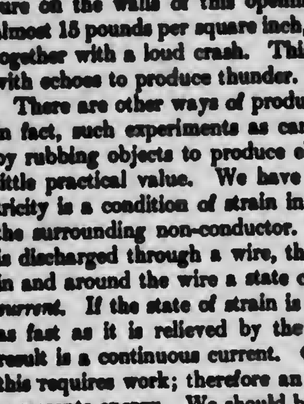
We all know that a hard rubber comb will sometimes be so full of electricity that it will make hair stand on end. How did this comb become charged with electricity? This is called electrification by induction. There is so much electricity in the air that the hard rubber of the comb becomes charged. Perhaps you have received a shock from touching a water pipe or some other metal about the house; probably you could not explain the accident. If you could investigate you would find that the metal was near some surface charged with electricity. The metal or hard rubber literally induces the electricity to jump through the ether.

One form of electricity with which everybody is familiar is lightning. In 1752 Benjamin Franklin proved that lightning is the same as an electric spark, by sending up a kite during a storm. He found as soon as the hemp string became wet, long sparks could be drawn from a metal key attached to it and various effects of electrification could be produced. That is a simple experiment any one could perform. Just how does lightning occur? If we hold the tip of a finger nail near a glass rod highly charged with electricity there will be a spark. The electricity jumps the air space between the two *conductors*.

(A conductor is a substance which will take or transmit electricity; a non-conductor is one which will not transmit electricity.) A lightning flash acts in the same way. The electricity jumps from one cloud to another or from a cloud to the earth just as soon as it becomes strong enough to jump or strain the air between. This flash of lightning ruptures the air along its path, and produces a partial vacuum. Since the pressure on the walls of this opening in the air is almost 15 pounds per square inch, the walls come together with a loud crash. This crash mingles with echoes to produce thunder.

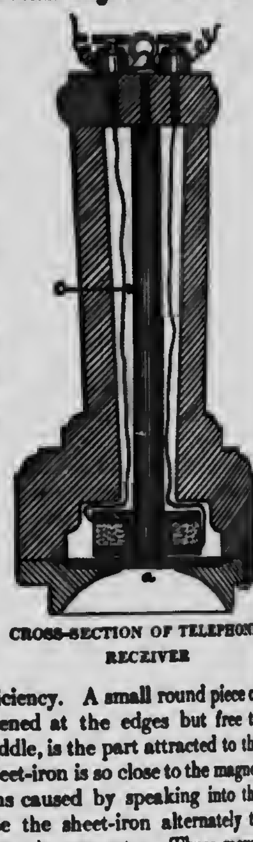
There are other ways of producing electricity; in fact, such experiments as can be performed by rubbing objects to produce electricity are of little practical value. We have seen that electricity is a condition of strain in the object and the surrounding non-conductor. If this charge is discharged through a wire, there is produced in and around the wire a state called an *electric current.* If the state of strain is again produced as fast as it is relieved by the conductor, the result is a continuous current. Obviously to do this requires work; therefore an electric current represents energy. We should bear in mind our general law of physics that no energy is lost; it is merely transferred or transformed.

One of the simplest means of producing an electric current is a cell or battery. The simple voltaic cell, named after its discoverer Volta, may be made of two strips, one of heavy sheet zinc and one of sheet copper, each about 10 centimeters long and 3 centimeters wide. The zinc must be polished with emery paper till it is bright. Support these strips side by side in a glass vessel nearly full of diluted sulphuric acid (one part acid poured into twenty of water). When the strips are connected by wires at the top, innumerable bubbles will rise from the copper strip and some also from the zinc. The copper plate is called the *positive element* or *cathode*, and zinc the *negative element* or *anode.* A current always leaves a cell by the cathode ("the way down or out"). There are many forms of batteries or cells which may be used to advantage in electrical experiments; details in regard to these will be found under the headings "Bunsen's Battery," "Daniell Battery," "Electric Battery," "Accumulator," in alphabetical order. A more elementary treatment may be found in *The Boy's Workshop* in this volume.



A SIMPLE BATTERY

We saw in our consideration of magnetism that we could make artificial magnets. This is one of the chief uses of electricity, as in the telegraph, wireless telegraph and telephone. In the telegraph the pressing of a key allows the current from the battery to flow through a magnet which then attracts a small bar of iron. When the key is released the iron bar flies back with a click. The arrangement of clicks into a code has been made possible by varying the time between them. The telephone also depends on a magnet for its efficiency. A small round piece of sheet-iron *a*, fastened at the edges but free to vibrate at the middle, is the part attracted to the magnet. This sheet-iron is so close to the magnet that the vibrations caused by speaking into the mouthpiece cause the sheet-iron alternately to vibrate to and from the magnet *o*. These movements of the disk alternately make and break the electric current, which in turn controls the vibrations at the other end of the line. Thus the disks at both ends vibrate in the same manner and the sounds are repeated. Perhaps the commonest use of an electric magnet is the ordinary door-bell. When the bell rings you will see that the magnet alternately attracts and releases the hammer. Examine any door bell; you will understand more about it than if you read several pages of technical description.



CROSS-SECTION OF TELEPHONE RECEIVER

A short time ago we noted that electricity is a form of energy. That this energy may be transformed into heat and then light is proved by the electric light. Electric lights are of two kinds, *arc* and *incandescent*. The arc light is composed of two carbon rods placed in connection with an electric current. When the current is turned on, the two carbon sticks should be touching. The carbon gradually disintegrates as the current continues. But the current meets resistance from the heated air which accumulates between the ends of the carbon sticks. The heat becomes so great that the carbon glows with a white heat. The modern arc lamp has an automatic device which keeps the ends of the carbons at the same distance from each other. The incandescent light (incandescent means to become warm or hot) is a fine wire or carbon fiber enclosed in a glass bulb from which the air has been exhausted to form a vacuum. The wires or fibers have a high resistance, so that the current heats them to a steady glow.

When you realize that the great physicists have spent years in studying phenomena and laws you must not be disappointed that you can study only a part of the subject. It is impossible to do more than summarize the natural laws which help us to understand the world in which we live. For the student who would like to make some of the instruments of which we have spoken there are directions in a special section of *The Boy's Workshop*. For the student who wants to advance in his knowledge of physics in general, reference should be to the Correlative Index at the end of this volume, which will show him where to find information on the many subjects that could not be adequately treated in this short sketch.

Outline

I. Introduction

II. Properties of Matter
- (1) Occupies space
- (2) Special properties

III. Mechanics of Solids
- (1) Energy
- (2) Motion and velocity
- (3) Gravity and laws of falling bodies
- (4) Curvilinear motion
- (5) Work
- (6) Machines

IV. Mechanics of Fluids
- (1) Characteristic phenomena
- (2) Laws of pressure in fluids
- (3) Density and specific gravity
- (4) Pressure of the atmosphere
- (5) Machines depending on air pressure

V. Sound
- (1) Wave motion
- (2) Transmission and velocity
- (3) Intensity and loudness
- (4) Beats
- (5) Pitch
  - (a) Of strings
  - (b) Of pipes
- (6) Quality
- (7) Harmony and discord

VI. Light
- (1) Nature
- (2) Reflection and refraction
- (3) Lenses
- (4) Color
- (5) Optical instruments

VII. Heat
- (1) Temperature
- (2) A cause of expansion
  - (a) Solids
  - (b) Fluids
- (3) Measurement of
- (4) Change of state
- (5) Transmission
- (6) Heat and work

VIII. Magnetism and Electricity
- (1) Magnetic action
  - (a) Nature
  - (b) Effect
- (2) Electricity
  - (a) Electrification
    - (1) By induction
    - (2) By conductors
  - (b) Current electricity
    - (1) Nature
    - (2) Effect
  - (c) Electrical qualities
  - (d) Machines

Questions

What do you understand by physics?

What is meant by properties of matter?

Explain transparent, opaque, elastic.

What is meant by inertia?

Define the two kinds of energy.

What are the two obvious effects of energy or force on matter?

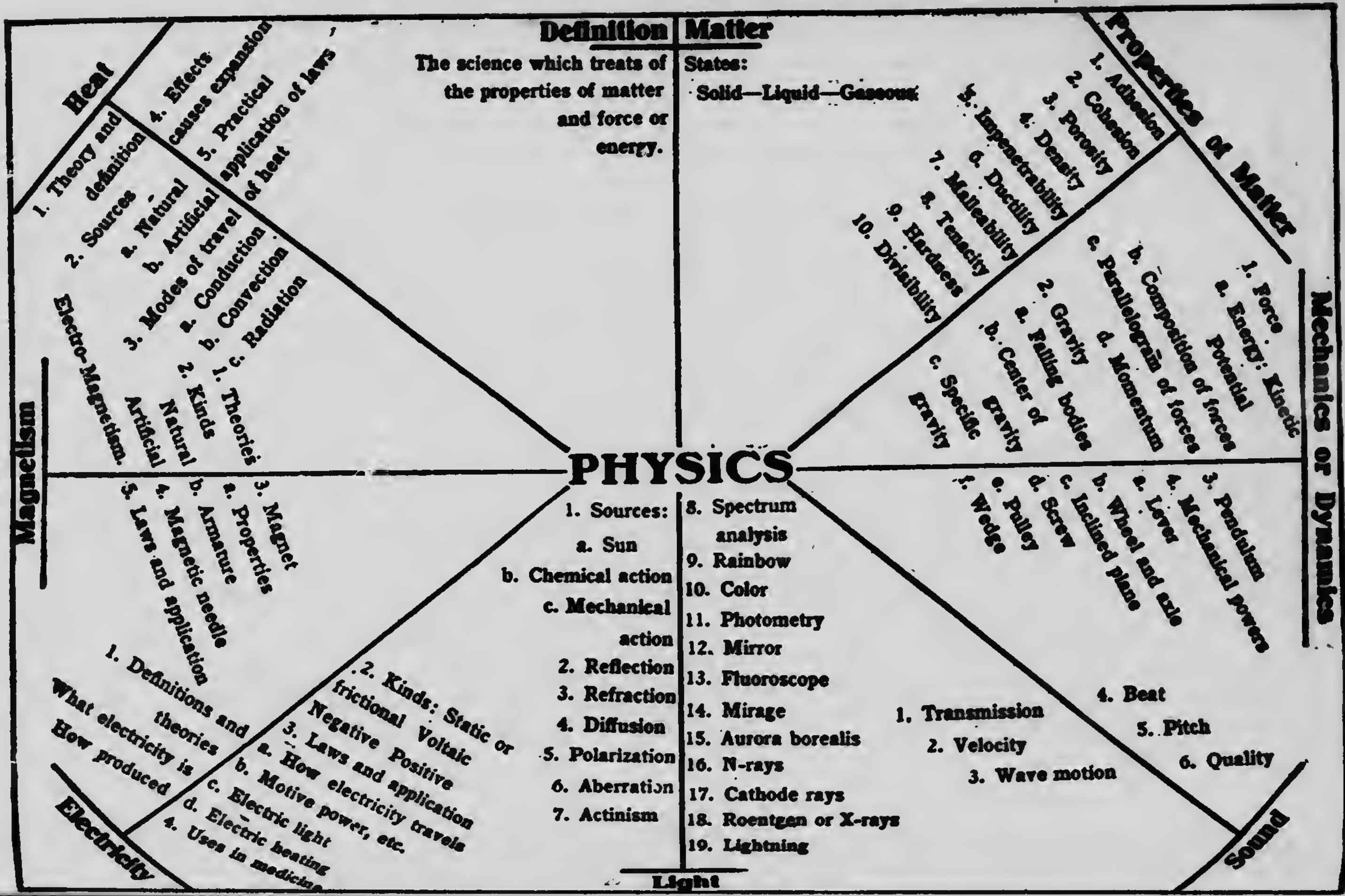
What is work?

What is velocity? Acceleration?

What is the simplest example of uniform acceleration?

What is gravity?

What is the law of universal gravitation?


PHYSICS
Definition
The science which treats of the properties of matter and force or energy.
Matter
States:
Solid—Liquid—Gaseous
Properties of Matter
1. Adhesion
2. Cohesion
3. Porosity
4. Density
5. Impenetrability
6. Ductility
7. Malleability
8. Tenacity
9. Hardness
10. Divisibility
Mechanics or Dynamics
1. Force
a. Energy: Kinetic
Potential
b. Composition of forces
c. Parallelogram of forces
d. Momentum
2. Gravity
a. Falling bodies
b. Center of gravity
c. Specific gravity
3. Pendulum
4. Mechanical powers
a. Lever
b. Wheel and axle
c. Inclined plane
d. Screw
e. Pulley
f. Wedge
Sound
1. Transmission
2. Velocity
3. Wave motion
4. Beat
5. Pitch
6. Quality
Light
1. Sources:
a. Sun
b. Chemical action
c. Mechanical action
2. Reflection
3. Refraction
4. Diffusion
5. Polarization
6. Aberration
7. Actinism
8. Spectrum analysis
9. Rainbow
10. Color
11. Photometry
12. Mirror
13. Fluoroscope
14. Mirage
15. Aurora borealis
16. N-rays
17. Cathode rays
18. Roentgen or X-rays
19. Lightning
Electricity
1. Definitions and theories
What electricity is
How produced
2. Kinds: Static or frictional Voltaic
Negative Positive
3. Laws and application
a. How electricity travels
b. Motive power, etc.
c. Electric light
d. Electric heating
4. Uses in medicine
Magnetism
1. Theories
2. Kinds
Natural
Artificial
Electro-Magnetism.
3. Magnet
a. Properties
b. Armature
4. Magnetic needle
5. Laws and application
Heat
1. Theory and definition
2. Sources
a. Natural
b. Artificial
3. Modes of travel
a. Conduction
b. Convection
c. Radiation
4. Effects causes expansion
5. Practical application of laws of heat

How far will an apple fall the first second? A ten-pound stone?

Will a feather fall the same distance?

Would it fall the same distance in a vacuum? Define vacuum.

What is center of gravity? Explain equilibrium.

Which learns to walk more easily, the biped or quadruped? Why?

What makes it so difficult to walk on ice?

What is friction? In what cases is it desirable to do away with it altogether? What means are used to accomplish this?

What would happen if friction did not exist?

Give practical examples of cohesion and adhesion.

What is the difference between a solid and a fluid?

Name the two divisions of fluids? How are they distinguished?

In what directions do fluids exert pressure?

Is the pressure the same in all directions?

Define buoyancy.

State the law of Archimedes.

Who was Archimedes?

When a body is immersed in a fluid, it may displace a weight of fluid *less* than, *equal* to, or *greater* than its own weight. Explain what happens in each case.

What do we mean by soft water?

Explain density and specific gravity.

What is the weight of air?

Explain the principle of the barometer and the siphon.

What effect has pressure on the volume of a gas?

What is sound?

How fast does it travel through air at the freezing point?

On what does the loudness of sound depend?

What is an echo?

What is pitch? What is an octave?

How is light produced?

What is the velocity of light?

What is the relation between the angle at which light strikes a reflector and the angle at which it is reflected?

Can you give any reasons why this law is important? Illustrate by examples, if possible.

Explain why the slides in a magic lantern must be put in upside down.

What is a mirage?

What is the cause of twilight?

What causes a rainbow?

What is heat?

When both are in the same temperature, which seems colder, marble or wood? Why?

What is meant by the term "cold"?

Why does fire produce heat?

What instrument is used to measure heat?

Define "caloric," "fusion," "heat of vaporization."

What is dew?

Why are clear nights usually cold?

What causes frost? Fog? What enables you to see your breath?

Explain three ways of transmitting heat.

How does the sun heat the earth?

What is magnetism?

What are the poles of a magnet?

What is the law of attraction and repulsion of the poles of the magnets?

What is the magnetic field?

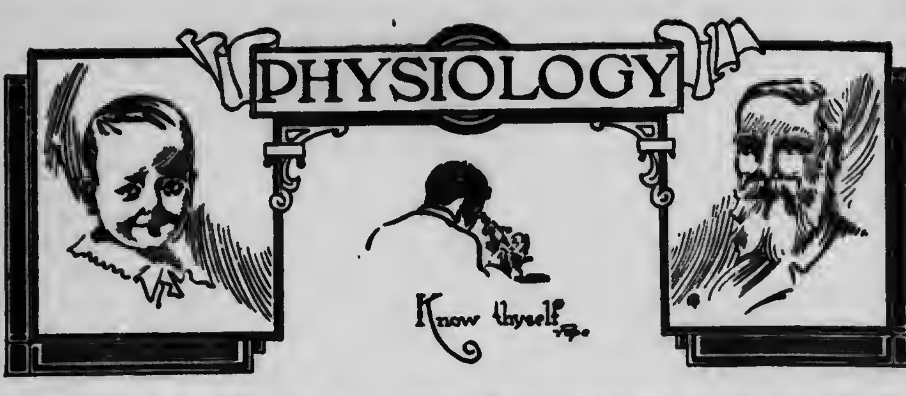
Explain lightning and thunder.

What is an electric current?

What is an electric cell?

Define anode and cathode.

Explain the operation of the telephone.



Importance of the Subject. It is doubtful if physiology ranks as high among the sciences studied in school as its importance merits. As prepared for work in school, physiology really embraces elementary instruction in three distinct sciences; these are *anatomy*, which treats of the structure of the human body; *physiology*, which describes how the various parts of the body work together to perform their functions; and *hygiene*, which instructs one in the ways by which the body may be kept in health.

The human body is at once a home and a machine. It is the home of the mind and the soul; what the latter is we doubtless will never know as long as we remain alive; we know little about the mind except that we have by observation and study worked out many of the laws by which it operates. The mind and the soul may be one and the same thing, for aught we know. With these physiology is not concerned, except as we view the mind and body as landlord and tenant.

A Machine Which Repairs Itself. Viewed as a machine, the human body is the most wonderful mechanism of which the mind can conceive. In a general way, each of us is acquainted with this matter-of-fact statement. So perfect is the body in the performance of its various functions that almost instinctively we become negligent in its care, assuming that so wonderful a machine has within itself such powers of recuperation that special care is not needed to keep it in perfect condition. If we indulge this view of the case we are in serious error, although it is true that the body will stand more abuse and show fewer signs of damage than any other machine or organism. These are only surface indications, however.

The use of physiology as a school subject should be largely to acquaint the child with a general idea of the structure or framework of the body, the names, locations and functions of the various parts, all to the end that there may be systematic care of health and conservation of strength and energy. The one who realizes in what state the body must be kept to be in health is most likely not to do those things which are injurious.

Some Effects of Wrong-Doing. The skin contains more than two million openings, and each opening is the outlet of a sweat gland. Each sweat gland is designed as a river to carry off waste matter of the body; each perspiratory duct is nearly one-quarter of an inch in length, and they have a total length in the body of nearly nine miles; yet by refusing to bathe regularly countless millions of people dam up these rivers of health.

The full capacity of the lungs is nearly 320 cubic inches. These lungs must be fed with pure air, the life-giving principle of which is oxygen; yet we will work and we will sleep in rooms in which there is practically no circulation of air, and we starve our lungs and poison ourselves by breathing over and over again the air which the lungs have already expelled as unfit for further service. Scientifically stated, the exhalation from the lungs is carbonic acid gas, a rank poison. Regular breathing is at the rate of eighteen times per minute, and each hour there is inhaled about 3000 cubic feet; in the course of one hour, therefore, the exhalations of impure air are about 375 hogsheads, for the quantity of air exhaled is equal to the amount inhaled. A simple problem in arithmetic will demonstrate how deadly the air in a closed room will soon become.

The stomach daily produces nearly ten pounds of gastric juice for the digestion of food. This is ample if we eat properly, masticate thoroughly, and do not overload the stomach. Surely that organ is made to suffer when loaded beyond proper capacity and unable to provide sufficient digestive fluids to care for what is consigned to it.

Three-fourths of the weight of the human body is water and one-fourth is animal matter. There is rapid absorption of liquids to all the parts of the body, resulting in the sensation we know as thirst, which is simply the call of the body for more liquid. The only drink a person needs is pure water, yet immense industries with fabulous sums of money in capital exist throughout the civilized world to provide harmful and even dangerous drinks and stimulants to take the place of pure, free water. One of the reasons for the study of physiology is that the laws of practically every state demand that the child be taught the evil effects of strong drink upon the tissues of the body. We really believe that too little practical teaching is done along this particular line. No other one thing contributes more to keep the body in health than to drink plentifully of good water; there is nothing so detrimental to the health of a man and so destructive of muscular, digestive and nervous tissue as strong drink.

How to Study Physiology. This subject should be studied from a most practical point of view if results are to repay the time spent. Our knowledge of physiology is gained by observation, experiment and the study of our own bodily conditions, and a portion of this information can be gained quite easily from text-books. What we learn is of value from an educational standpoint, and, as well, from the standpoint of health. We learn to care for the body, to prevent disease and to develop powers which will build up better physiques and contribute to greater length of life. Every home and every school should be the center of such investigation.

A few suggestions at this point may greatly aid the investigator. The Correlative Index at the end of this volume brings together thousands of related articles covering practically the entire range of knowledge required by the average reader or student; if we turn to the Index for a classification of topics treating on Anatomy and Physiology we shall find a list of more than 130 titles. Each topic is ably discussed in its alphabetical position in the volumes. If one's investigation into the subject of Physiology is to be extended, then he will not terminate his study until the entire list of topics has been covered. If his desire is to include in his effort only the most important titles, he will condense his list, leaving sub-topics for later consideration.

The outlines below are developed from descriptive material in THE NEW PRACTICAL REFERENCE LIBRARY; these are valuable because all important topics are presented in regular order and study is thus made less difficult.

Outline for Study of the Human Body

I. ORIGIN OF LIFE
- (1) Cell
  - (a) Protoplasm
  - (b) Nucleus

II. TISSUES
- (1) Osseous tissues or bones
  - (a) Function
  - (b) Number
  - (c) Structure
  - (d) Growth
  - (e) Divisions
  - (f) Joints
    - (1) Movable
    - (2) Immovable
  - (g) Hygiene
  - (h) Disease
- (2) Muscular tissues or flesh
  - (a) Structure
    - (1) Striated
    - (2) Unstriated
  - (b) Kinds
    - (1) Voluntary
    - (2) Involuntary
    - (3) Skeletal
  - (c) Functions
  - (d) Characteristics
    - (1) Contractility
    - (2) Elasticity
    - (3) Tonicity
  - (e) Hygiene
  - (f) Diseases
- (3) Other connective tissues
  - (a) Areolar
  - (b) Adipose or fat
  - (c) Cartilage or gristle
  - (d) Marrow
- (4) Nerves

III. CIRCULATION
- (See special outline below)

IV. RESPIRATION
- (1) Organs
  - (a) Nasal cavities
  - (b) Pharynx

(c) Larynx
(d) Trachea
(e) Bronchi
(f) Lungs
(2) Function
(3) Movements
(a) Normal respiration
(b) Frequency
(c) Depth
(d) Types
(1) Abdominal
(2) Chest
(e) Mechanics of respiration
(1) Inspiratory movements
(2) Expiratory movements
(f) Abnormalities
(1) Cough
(2) Clearing the throat
(3) Sneeze
(4) Snore
(5) Crying
(6) Sigh
(7) Laugh
(8) Yawn
(9) Hiccough
(4) Hygiene
(5) Diseases
(a) Bronchitis
(b) Tuberculosis
(c) Pneumonia

V. Digestion
(1) Organs
(a) Stomach
(b) Intestines
(c) Liver
(d) Other organs
(2) Processes
(a) Absorption
(b) Secretion
(c) Elimination of waste
(3) Hygiene
(4) Diseases

VI. Nervous System
(1) Definition
(a) Nerve centers
(b) Nerves
(1) Sensory, bringing impulses to the center
(2) Motor, impulses from the center
(2) Divisions
(a) Cerebro-spinal
(b) Sympathetic
(3) Organs
(4) Functions
(a) General
(b) Special
(1) Touch
(2) Taste
(3) Smell
(4) Sight (See outline on the eye)
(5) Hearing (See outline on the ear)
(5) Hygiene
(6) Diseases

Questions

What are the osseous tissues?

How many bones are there in the human body?

In what way is a combination of strength and elasticity secured for the spinal column?

Explain, in a general way, the functions of the spinal column.

How many bones are there in the head?

How are the bones of the head united?

When do the bones reach their perfection?

Why are the bones more likely to break in old age than in youth?

Are the teeth a part of the skeleton?

What is the difference between the joints at the upper end of the ulna and the humerus? Why should this difference exist?

Describe the bone formation of the wrist.

How many ribs has man?

How many bones are there in the spine?

What is the collar bone?

What is the function of the muscular system?

What are the two forms of muscular tissue?

Explain *unstriated* muscle.

Name the three classes of muscles.

Explain what is meant by "goose flesh."

What are the peculiar characteristics of muscles?

What is areolar tissue? Adipose?

What is the chief function of fat?

Explain cartilage.

What is marrow?

What is meant by a vital organ? Name and locate the vital organs.

What is respiration?

Name the organs of respiration.

Describe the lungs and bronchi.

What is the larynx? Why is it important as an organ of respiration?

What is the normal frequency of respiration? Of the pulse?

Of which sex is abdominal respiration typical?

Explain five abnormalities of respiration.

What is meant by the expression "out of breath"?

What is bronchitis? Tuberculosis?
What is the function of the salivary glands?
Explain the work of the stomach.
What part does the liver play in digestion?
What are some of the causes of indigestion?
What are the causes of appendicitis?
What do we mean by the nervous system?
What is a nerve?
Explain the difference between sensory and motor nerves.
What are the two divisions of the nervous system?
What organ is the center of the nervous system?
What is the average weight of the brain?
Explain cerebrum, cerebellum, medulla oblongata?
Is there any apparent relation between idiocy and the size of the brain?
How does the skull protect the brain?
Why is such great protection necessary?
Explain the nerve process that takes place when one lays his hand on the point of a tack.
What is meant by reflex action?
What is the first requisite of a healthy nervous system?
How can we secure this requisite?
What effect has the use of alcoholic liquors and tobacco on the nervous system?
What are the organs of special senses?
Explain the process of smelling. Of tasting.
Is it possible to hear after the external ear has been injured? Why?
What is the function of sleep?
What is a dream?
Explain insomnia and somnambulism.
What are the two great series of changes continually going on in the human body?
Explain the growth of the hair and nails.
Explain the "germ theory of disease."
Is there any difference between germs and bacteria?
Explain the difference between allopathy, osteopathy and homeopathy.
What is the stethoscope? Why is it used?
In what parts of the world does cholera occur?
What do we mean by chronic diseases?

Outline of the Circulation of the Blood

I. Organs
  (1) Heart
    (a) Shape
    (b) Size
    (c) Position
    (d) Weight
    (e) Structure
      (1) Parts
      (2) Valves
      (3) Action
    (f) Nerve supply
    (g) Function
  (2) Arteries
    (a) Distribution
    (b) Structure
      (1) Coats
      (2) Capillaries
        (a) Definition
        (b) Function
        (c) Size
        (d) Structure
    (c) Circulation in arteries
    (d) Anastomosing
    (e) Pulse
  (3) Veins
    (a) Definition
    (b) Purpose
    (c) Structure
      (1) Coats
      (2) Valves
    (d) Circulation in the veins
II. Systems
  (1) Pulmonary
    (a) From the right side of the heart
    (b) Through the lungs
    (c) To the left side of the heart
  (2) Systemic
    (a) From the left side of the heart
    (b) Through the body
    (c) To the right side of the heart
  (3) Portal
III. Blood
  (1) Definition
  (2) Amount
  (3) Temperature
  (4) Composition
    (a) Corpuscles
    (b) Serum
  (5) Coagulation
  (6) Functions
IV. Causes of Circulation
  (1) Force of heat
  (2) Elasticity of arterial walls
  (3) Contraction of the heart
  (4) Muscular action
  (5) Act of breathing
V. Functions
  (1) Nourishment
  (2) Purification
  (3) Elimination of waste
  (4) Warmth

VI. Hygiene
(1) Air and sunlight
(2) Exercise
(3) Heat and cold
(4) Pressure
(5) Accidents
VII. Diseases
(1) Congestions
(2) Inflammation
(3) Scrofula
(4) Colds
(5) Catarrh
VIII. Associated Processes
(1) Absorption
(2) Assimilation
(3) Secretion
(4) Excretion

Questions on Circulation

What is circulation? Name the organs of circulation.

Describe the heart. Define arteries; veins.

Explain auricle and ventricle.

Describe the circulation of the blood.

Of what is blood composed?

What are the uses of the blood? What is the normal temperature of the blood?

What is the color of the blood in the veins? In the arteries? What causes the change?

Describe coagulation. What are the parts coagulated?

What is the serum?

Give the functions of the red corpuscles.

Was the circulation of the blood known at the time of the discovery of America?

Who first examined the circulation of blood in the web of a frog's foot? When?

Distinguish between the pulmonary and systemic circulation.

What vein carries the blood to the liver? What is the function of the hepatic veins?

How long does it take the blood to make a complete circuit of the system?

How long does it take the whole amount of blood to pass through the heart?

What part of the weight of the body is the blood?

The skeleton of an adult is said to weigh 14 pounds. Does the blood weigh more or less?

A person of average weight (154 pounds) is said to have approximately 100 pounds water, 60 pounds muscle, 14 pounds bone, 12 pounds blood and 4 pounds brain. How do you reconcile these figures?

What forces propel the blood?

What is the arch of the aorta? Does the aorta pass through the diaphragm?

Name the divisions of the aorta which supply the pelvis and lower extremities.

What is the name of the minute endings of the arteries connecting them with the veins?

Why is the inner coat of the arteries smooth?

Which coat of the arteries assists in propelling the blood? How?

When does an artery become a capillary?

What do you understand by the term "anastomosis"? Explain its function.

How may one check the flow of an artery when severed?

Where are the capillaries the largest? Where are the smallest capillaries? How can you illustrate their size?

How is the heart suspended in the chest? With what is the heart surrounded?

What is the effect of iron on the blood?

Explain the action of blood in case of a wound.

Why has blood a salty taste?

Could a person bleed to death from a small wound?

In cases of general debility, in what condition would you find the blood?

What do you know of William Harvey?

Trace the flow of blood from the left ventricle through the body.

The Ear

An article on the structure and functions of the ear, together with an accurate illustration of its parts, is presented in Volume II. This should provide abundant material for the study of the ear, and the following outline and test questions will be of value in presenting the subject to pupils or in home study. In addition the outline may serve as a guide to those who desire to pursue further the study of this organ.

Outline of the Ear

I. Function
II. Position
III. Anatomy
(1) External ear or concha
(a) Shape
(b) Composition
(1) Cartilage
(2) Muscular coat

(3) Skin
(c) Parts
(1) Helix
(2) Tragus or protecting flap
(3) Lobule
(4) Auditory canal
(d) Functions
(1) Collect sound waves
(2) Concentrate them on eardrum
(2) Middle ear or tympanum
(a) Situation
(b) Size
(c) Parts
(1) Membrane or eardrum
(a) Position
(b) Composition
(c) Function
(2) Cavity
(a) Filled with air
(b) Ossicles
(1) Number
(2) Names
(3) Arrangement
(4) Action
(5) Function
(3) Eustachian tube
(a) Definition
(b) Function
(d) Function
(1) Transmission of vibration to internal ear
(3) Internal ear or labyrinth
(a) Bone
(1) Vestibule
(a) Opening into tympanum
(b) Opening for auditory nerves
(c) Opening for cochlea
(d) Five openings into semi-circular canal
(e) Otoliths
(f) Fluid
(2) Semi-circular canals
(a) Number
(b) Names
(c) Position
(d) Function
(1) Not connected with hearing
(2) To maintain equilibrium of the body
(3) Cochlea
(a) Divisions
(b) Organ of Corti
(b) Membranes
(1) Form
(2) Fluids
(c) Function

Questions on the Ear

What is the ear?

What is the external ear? What separates it from the middle ear?

What substances make up the outer ear?

What are its important parts? Describe each.

What are its functions?

Describe the eardrum and the manner in which sound is transmitted to the middle ear.

Name the three bones of the middle ear.

Describe their action.

Where is the middle ear?

What is the Eustachian tube?

What is the internal ear?

What is the cochlea?

What is the function of the semi-circular canals? How are they connected with the vestibule?

What is the organ of Corti?

Of what is it composed?

Trace the transmission of sound from the outer ear to the brain.

What kind of an act is the final act of hearing?

State three ways of influencing the propagation of sound to the tympanum.

What are the names of the nerves of hearing?

Of what use is the fluid in the internal ear?

What parts of the inner ear operate in the same way as the strings of a piano?

What regulates the tension of the eardrum?

How are we enabled to recognize such a variety of sounds?

What is the educational value of training the sense of hearing?

How does the study of instrumental music develop the sense of hearing?

Why should the teacher thoroughly understand the mechanism of the ear?

What can you say of the ear of lower animals and its capacity for receiving sound?

Give three proofs of the delicate sense of hearing in birds.

Do you know of any animals notably hard of hearing?

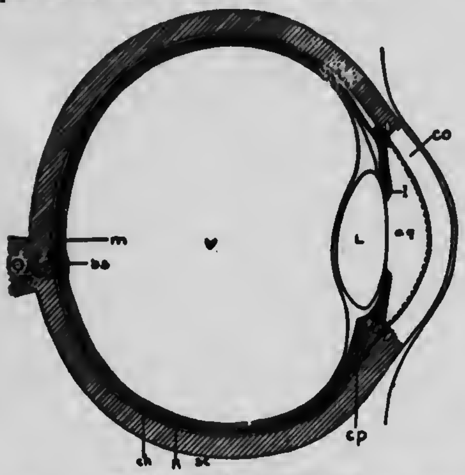
What other animals are noted for their keen sense of hearing?

Is it possible for animals to hear some sounds inaudible to the human ear? How can you explain your answer?

The Eye

One of the organs most necessary to happiness and comfort is the eye. To understand its operation and to take proper care of it should be a self-imposed duty. Not only this one part of the body but every part should be well cared for. A healthy body is essential to a healthy mind, and a healthy mind is essential to success and happiness.

The article on the eye in Volume II contains a complete description of the organ and an illustration showing the position of the eye in the head. The sketch below will make clear the position of the different parts of the eye.



CROSS-SECTION OF THE EYE

Parts: co, cornea; I, iris; aq, anterior chamber of aqueous humour; L, lens; cp, ciliary process; sc, sclerotic coat; R, retina; ch, choroid; v, vitreous body; m, yellow spot; bs, blind spot; o, optic nerve.

THE EYEBALL IN SECTION

Co, cornea	O, optic nerve
Sc, sclerotic	bs, blind spot
Ch, choroid	m, yellow spot
Cp, ciliary processes	L, crystalline lens
I, iris	aq, aqueous humor
R, retina	V, vitreous humor

Most diagrams of the eye omit the yellow spot. When the retina is looked at from in front two small marks may be seen on it. One of these is an oval depression about three millimeters across, of a yellow color, and is known as the yellow spot. It is situated directly in the horizontal axis from front to back and is the point of acutest vision. To one side and a little below is the blind spot (for explanation see *Eye*, Volume II).

Outline of the Eye

I. General Description
- (1) Position
- (2) Function
  - (a) Sight
  - (b) Principles of physics involved

II. Anatomy
- (1) Eyeball
  - (a) Coats
    - (1) Sclerotic and cornea
    - (2) Choroid
    - (3) Retina
  - (b) Iris
    - (1) Pupil
  - (c) Humors
    - (1) Aqueous
    - (2) Vitreous
    - (3) Crystalline lens
  - (d) Arteries and veins
  - (e) Muscles
- (2) Eyelids
  - (a) Skin
  - (b) Muscles
  - (c) Eyelashes
  - (d) Mucous membrane, or conjunctiva
- (3) Lachrymal glands and canals

III. Defects and Diseases
- (1) As a double organ
  - (a) Lack of association in movement
  - (b) Difference in focus
  - (c) Nearsightedness or myopia
  - (d) Farsightedness or hypermetropia
  - (e) Color blindness
- (2) Each as a single organ
  - (a) Conjunctivitis
  - (b) Tumors
  - (c) Inflammations of the cornea
  - (d) Scleritis or inflammation of the sclerotic coat
  - (e) Cataract
  - (f) Glaucoma
- (3) As a result of other diseases

Questions on the Eye

What is the shape of the eyeball?

How large is it?

What is the sclerotic? Cornea? Choroid? Iris?

What is the pupil?

A person going from a brilliantly lighted room into a dark one cannot see anything at first. Why?

How is the amount of light that enters the eye regulated?

PHYSIOLOGY

Digestion

1. Begins in the mouth by means of the saliva.
2. In the stomach the food is mixed with the gastric juices, the albumens changed into soluble peptones.
3. Average time occupied in digestion from three to four hours.
4. Intestinal juices complete the work, and chyle, the digested food, is ready for absorption.

Bones

1. Constitute the framework of the body.
2. Protect vital organs such as the heart and lungs.
3. Consist of 34 per cent animal matter, and 66 per cent mineral substances.
4. Reach their perfection in the temperate zones between the ages of 20 and 25. From that to 50 change slightly, and after that grow thinner and more brittle.
5. Covered by a firm membrane called the periosteum.

Muscles

1. Make up one-half the weight of the body. The organs of movement.
2. Involuntary muscles those not under the control of the will. Receive their nerves from the sympathetic system.
3. Voluntary muscles. In bundles of fibers, an inch in length. Penetrated by nerves from the cerebro-spinal system, under the control of the will.

Nervous System

1. Cerebro-spinal system.
   a. Includes brain, spinal cord and nerves branching out from them.
   a. The brain, the center of the nervous system and seat of consciousness. Weight of brain of the average male European about 50 ounces, that of the female, 45 ounces. The largest brain known, that of Cuvier, about 64 ounces. The substance of the brain, gray and white tissue.
   c. The spinal cord, a mass of nerve matter about 18 inches long.
2. The Sympathetic system.
   a. A series of ganglia, extending from the head, through the neck, thorax, abdomen, to the pelvis.
   b. The nerve centers of the head, by nerve fibers, control the pupil of the eye.
   c. The organs of special sense bring to their brain centers impulses, and the result is sight, hearing, touch, taste, smell, etc.

Respiration

1. The objects of respiration are to supply the necessary oxygen, and carry off the carbon dioxide.
2. The quantity of air in each act of respiration, from 20 to 30 cubic inches.
3. The quantity which cannot be expelled, but remains in the lungs, about 100 cubic inches.
4. About 686,000 cubic inches pass into and out of the lungs of an adult every 24 hours.

CIRCULATION

Heart

1. A hollow muscular organ which forces the blood through veins and arteries.
2. Has four chambers, two auricles and two ventricles.
3. Suspended in the chest by large blood vessels, is about five inches long, and its average weight in an adult from 9 to 10 ounces.
4. In 1628 Harvey pointed out the connection between the heart, arteries and veins, the several directions taken by the blood in the different vessels, the valves in the heart and veins.

Arteries

1. The system of tubes which carry the blood from the heart to all parts of the body.
2. The three coats: An outer elastic one; a middle muscular one which contracts and forces the blood along; an inner smooth one that the blood may move easily.
3. Arterial blood leaves the left ventricle of the heart, passes through the capillaries, giving up oxygen and taking carbonic acid, returning to the heart by the veins through the right auricle.

Capillaries

1. The fine blood vessels which connect the arteries with the veins.
2. Some so small that but one blood corpuscle at a time can pass through. They are smallest in the brain.
3. In certain organs they divide and subdivide, forming a network.
4. Capillary walls are thin, composed of but one layer of tissue.
5. Through them the blood receives waste products and gives up nutritious material.

Veins

1. A system of tubes for the purpose of returning the impure blood to the heart and lungs, after it has been carried to the various parts by the arteries.
2. They originate in the capillaries as tiny tubes, and as they unite they decrease in number and increase in size.
3. The two large veins empty into the right auricle of the heart.
4. Like the arteries they have three coats.
5. The valves are arranged in pairs, and prevent the blood from going backward.

Definitions. It is not difficult to understand the meaning of the word *psychology*, and from this rightly to judge the place of the science in education. Psychology is from two words, which mean to see the soul or mind. It is, then, a science which treats of the mind, the mental states and their processes, and of the principles and laws governing mental activity.

Pedagogy is simply the science of teaching, of imparting instruction. In the study of pedagogy we learn how to apply our knowledge of the mind to the teaching of any subject, so that this instruction may be in harmony with the principles of psychology. Pedagogy may then be called, in brief, psychology applied to the art of instruction.

The Development of Psychology. There are numerous methods in use for investigating facts relating to the science of the mind. One may set himself to study his own mind; he may keep close watch upon the origin of his own thoughts and their progress toward conclusions; he may analyze them as they come and go and note their connecting links. Such a method is called *introspection*, which means *looking within*.

There is another method called the *experimental* method. Many of our ideas come to us through the connection of mind and body in the form of sensations. Many of our desires find expression through the body. The reason that we call such a method the experimental method is that we may experiment with our organs of sense as a means of judging our ideas.

Another method is the *objective* method, or the method of learning through the observation of others. We may observe children with a view to ascertaining the gradual development of mind and thought, or we may study animals with a view to learning about their instincts, or we may investigate the minds of those who are defective in any way, like the blind, the deaf, or the insane and through them discover the effect of the absence of any physical or mental quality. In studying psychology, therefore, we study our own mental processes and growth, we experiment to see the effect of various mental processes combined with sensations, and we observe and compare the mental processes as exhibited in actions of others with our own mental processes under like circumstances and conditions. Thus it has been possible without difficulty to establish the general laws under which the mind of man operates. Psychology is an old science, dating back to the days of Pythagoras, in ancient Greece.

Place in Education. Psychology and pedagogy are two sciences regarding which the child has no knowledge and needs none, especially in its early years, but it is of first importance that fathers, mothers and all teachers should understand their principles and theory. No young man or woman should leave school without having studied psychology, at least a little; none other than those whose duty it is to instruct the young need add to psychology the principles of pedagogy. In this latter class we may include not only teachers, but parents, especially those who are not unmindful of the wonderful opportunity at their command to assist in the education of their children. To these a knowledge of the theory of pedagogy is a valuable help.

The laws of pedagogy, with their direct application to practical methods of teaching, must rest upon definite knowledge of the activities of the mind and of the laws governing those activities. Pedagogy is important, therefore, because it is the development of the natural processes of the mind. Methods of teaching are discredited only

EDUCATION

Education.

The art of developing and cultivating all the powers of man.

Physical Education.

The perfecting of the physical powers.

As specialized it is athletic training.

Intellectual Education.

The development of the intellectual powers.

Moral Education.

The training of the will and the conscience.

Four Steps in Education.

PROFESSIONAL AND TECHNICAL EDUCATION

The Normal School.
The School of Medicine.
The School of Pharmacy.
The School of Dentistry.
The School of Law.
The School of Theology.
The School of Commerce.
The School of Journalism.
The School of Technology.

HIGHER EDUCATION

Instruction in colleges and universities in the classics, sciences, art, literature, mathematics, economics, and philosophy.

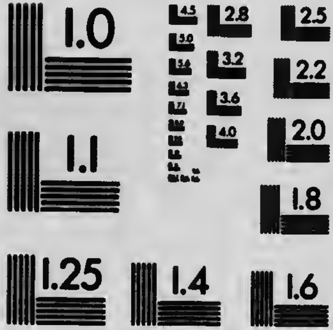
SECONDARY EDUCATION

Instruction in high schools preparing students for college; township high schools, academies, and other schools of similar grade.

PRIMARY EDUCATION

Instruction in common and graded schools below the high school.
The country school, and consolidated country school.

SUGGESTED FOR BLACKBOARD OUTLINE


1.0
4.5
2.8
2.5
5.0
3.2
2.2
3.6
2.0
4.0
1.1
1.8
1.25
1.4
1.6

when they develop into mere mechanical devices. One instructor may use a certain method with excellent discrimination and reach commendable results; another lacking the spirit and aim of the first may imitate the manner of use of the same method and miserably fail. It is the sane and reasonable adaptation of any method to known mental processes which distinguishes the teacher as an artist; lack of such ability marks the experimenter.

Limitations of Psychology. Psychology cannot be applied always to individual cases. It is a science, and, as such deals with classes. It develops the laws of the average mind, but takes no account of exceptional mental operations in particular cases. Psychology cannot lay down laws by which the mind of Willie Smith or Mary Brown will always respond to impressions; but it can tell what the average mental activities of all the Willie Smiths or all the Mary Browns will be. The subject, then, deals with averages of mental activity; it points out what is true in the aggregate.

What Is Included in Psychology. The following outline presents the essential elements of Psychology, arranged in suggested order for study:

Psychology: The Mental Powers

I. The Intellect
  (1) Perception
    (a) Sense perception
    (b) Self-perception
    (c) Its cultivation
  (2) Representation
    (a) Memory
      (1) Laws of memory
      (2) Cultivation of memory
    (b) Imagination
    (c) Phantasy
  (3) Thought
    (a) Concept
    (b) Judgment
    (c) Reason
II. Feeling
  (1) Sensuous
    (a) Special
    (b) Organic
  (2) Ideal
    (a) Altruistic
    (b) Egoistic
  (3) Intensity of feeling
    (a) Depends on—
      (1) Amount of stimulus
      (2) Prolongation of stimulus
III. The Will
  (1) Interest
  (2) Attention
    (a) Voluntary
    (b) Attracted
    (c) Development of
  (3) Choice
  (4) Action
    (a) Reflex
    (b) Instinctive
    (c) Impulsive
    (d) Result of purpose

Questions on Psychology and Pedagogy

Which phase of mental activity, knowing or feeling, is first in consciousness?

What is the most difficult stage of thinking? What can you say of its development? What are the two general methods of reasoning?

What is the first act of the imagination in constructing the image?

Distinguish between memory and imagination.

What power of the mind would be exercised in thinking of the human head joined to the body of a horse?

Fairy tales belong to what phase of imagination?

Why are they adapted to the child mind?

During what period in life are most of our habits formed? Why?

In what way does interest differ from desire?

What is the relation of psychology to physiology?

What are the processes of obtaining an idea?

Explain how an action becomes a habit both from the mental and from the bodily standpoint.

Why is it true that good habits are our best friends, and that bad habits are our worst enemies?

Compare the child's process of obtaining knowledge with that of mature minds.

What powers of mind are cultivated in the moral education? The mental? The physical?

What three steps are necessary in thought? Explain them.

What do we mean by the term logic? Logical mind?

What are some of the actions in life taken care of through habit?

Give processes of acquiring habit.

If it were not for habit how would the higher powers of the mind suffer? Would there be any development? Why not?

Why is it difficult for people to change their views or channels of work in middle life or old age? Of what great benefit is this to the progress of the world?

Through what channels is the mind aroused?

How is perception related to sensation?

Are ideas obtained through sight and touch to be depended upon?

Which of the senses are the most reliable and generally most accurately trained?

How can perception be trained?

What is the difference between conception and perception?

What is the chief thing accomplished by thought?

What stage of thought is judgment? What is its particular work?

Reason is what stage in thought? What is its work?

Why are subjects that appeal to observation and thought power valuable for memory training?

What depends in later life upon formation of correct concepts in early training?

Define interest; imagination; attention; apperception.

Where is the force of habit stronger, in the physical or the intellectual powers? At what times is habit a protection from a physical standpoint? The intellectual standpoint? The moral standpoint?

CHILD STUDY

What is included in child study? What is the aim? How can both teacher and parent assist in this?

By what is a child's ability limited?

Why should a teacher have knowledge of the physical condition of the child? Is this often ignored? With what results?

Why should a teacher be familiar with a child's environment at home? How does this affect her treatment of the individual child?

What effect does the mind have upon the body? The body upon the mind?

How has the subject of discipline changed? With what results?

What beneficial results have followed in the wake of kindergartens, normal schools, individual work by teacher, etc., in home, schools, community and to the child?

METHODS

What is meant by the term "method"? Upon what should it be based?

What is a "device"? Its general use? Is it harmful? When?

Why is application, or use, the true test of all knowledge?

What in general should be the aim of a teacher in her methods?

What is the great end and aim of education?

Which are the more important, principles or facts?

SENSES

In what order are the senses developed?

What sense gives us the widest range of knowledge? What is the next in importance?

At what period of growth are the senses very keen?

Should any of the senses be trained to the neglect of the others? Is this often done in the schoolroom and home? What are the results?

Upon what powers of mind is the acquiring of knowledge based in the primary grades?

ATTENTION

How does fatigue affect the mind?

Distinguish between voluntary and involuntary attention.

In presenting a subject what are the processes in securing the attention of the child?

Why should a lesson be conducted from the known to the unknown?

Upon what does attention depend?

Why is it easier to secure the child's attention in the early hours of the morning?

Why are recitations often dull? What is lacking?

Why is it that many people make a failure of life in a certain sense? Where and how could this have been remedied?

What are some of the methods of training the attention?

What is the importance of attention in the development of the mind?

What are some of the methods of awakening the interest of the pupil?

Distinguish between interest and desire.

Why is it easier to interest the child than the adult?

What should govern the length of a recitation?

What are some of the ways of stunting mental growth?

How does interest in the subject affect the memory?

How can a child be taught to observe carefully and correctly? What is the importance of this? What powers of mind depend upon correct observation? At what time in life is observation the most important source of information?

MEMORY

Upon what does memory depend? When is it especially active?

What are some of the devices a teacher may use to strengthen memory?

Is it possible to have knowledge without memory?

Is a child supposed to memorize what he does not understand? If so, how far is it practical to do this and with what end in view?

Why is memory of so much importance? Is it really a part of every other power of the mind?

What studies are especially valuable for training the memory?

How is memory affected by repetition?

How does interest in the subject affect the memory? What is the importance of interest in class recitals from this standpoint?

HABIT

To what does a repetition of an act finally lead?

In what ways does habit affect the physical, intellectual and moral nature?

What do we mean by a plastic condition of the mind or nervous system? Why are habits formed more easily in early youth? After what age are important habits seldom formed?

In what ways can a teacher assist in the formation of good habits?

How does habit determine character?

REASON

At what a[illegible] is a child supposed to begin to reason? What studies in the lower grades develop the reasoning powers?

What is the importance of judgment in reasoning and upon what does it primarily depend?

To what grade of school work is the inductive method of reasoning best adapted?

What is the deductive method of reasoning and to what department of school work is it best adapted?

WILL

What is instinct? What finally results from it?

What is the difference between an impulse and a desire? In which is the will brought into action?

What is meant by deliberation? To what action does it lead? What is the difference between a mature will and that of a child?

Why does choice involve so many difficulties?

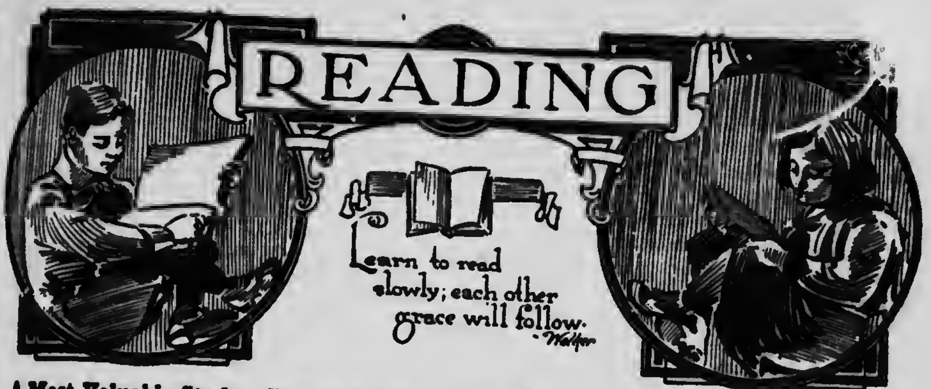
Is will the means of preventing action as well as performing it? Give examples of both states of mind.

How may the will be cultivated? What factor is it in the formation of habits?

Upon what is stubbornness based? Is it an action of the will?

Will exercises what control over the feelings? Does its control extend at last to all mental powers? With what effect?

Why is will the highest of the mental powers?



A Most Valuable Study. When a child has learned to read, he has come into possession of the key to all knowledge. The extent of his later reading and its quality determines to a considerable degree what manner of man he is to be.

The reading habit is instinctive; the minds of the boy and girl naturally reach out toward the unknown for facts which may be made their own and made to serve some purpose in their lives. Some like to read much better than do others; and this is due to more than one reason. The illiterate boy and the one with low ideals may have had no home encouragement in the direction of good literature and possibly even may have been discouraged in seeking it. His ideal is likely to be the town bully, and his literature the lurid pages of the nickel novel. Let no one believe that such a boy reads nothing; the instinct for something from the printed page which he can unite to his own experience is alive in him as in the boy of other caliber.

Choice Good Reading. Every boy and girl has a hero or a heroine—possibly many—and these are determined largely by their choice of reading. If one chooses the stories of King Arthur in early boyhood and reads them with pleasure, the lessons are going to be reflected in later years. It does no harm for the youthful mind to dwell upon the stirring plot of Jack the Giant Killer, for there is a high moral lesson which is sure to be learned and later remembered above the gory elements of the tale itself.

Every intelligent parent knows the importance and difficulty, in these days of rapidly multiplying books and sensational newspapers, of making a wise selection of reading for the child in the home. It can be set down as almost an axiom that the boy and the girl for whom good books are provided will not of their own volition seek the worse books for themselves. We refer now to the average boy and girl, the great majority of them; here and there we must note exceptions.

The teacher in the school has a duty in connection with formation of the life habits of reading by pupils almost as great as the parent in the home. A considerable portion of what follows is addressed directly to the teacher. Upon her shoulders is the responsibility of making good readers of her pupils. This is the first requisite, for unless one is fairly proficient in reading no amount of persuasion later can induce in the child a desire for the right kind of literature The teacher, therefore, should read with extreme care the suggestions on reading in the section which follows.

Need of Oral Reading. It is absolutely necessary that pupils should be required to do a great deal of reading aloud. It would be well if this could be done at home as well as in the school. Through oral reading teachers and parents learn whether boys and girls are pronouncing their words correctly and are thus laying good foundations for their silent reading. Almost all the reading one does is of the silent kind. A very little in later years is oral and is resorted to only for the pleasure or profit of others.

Suggestions on Reading

That the reading exercise may not conduce to bad habits it is essential that careful attention be given to the selection of the reading matter and that it be adapted to the student's needs. We believe the thoughtful teacher will give every attention to this important matter, and by spicing this exercise with the suggestive material here presented, every lesson will prove an inspiration and result in especially fitting the pupil for the understanding of other subjects, since reading must enter largely into this knowledge.

Be sure that pupils are thoroughly familiar with all the words in the lesson, their pronunciation and meaning, before expecting them to read a selection correctly.

The teacher should study the sense of the piece and see that the pupil understands it also.

Remember that reading, not elocution, is the subject to be taught.

Beginners should not have too many new words presented to them at once.

There is a possibility of laying too much stress upon exactness in some vowel sounds.

It is advisable that pupils should stand while reading, that the teacher may see the entire person and be able to criticize the position.

Monotony of expression can be remedied by having the pupil read with the teacher and by persistent drill.

Reading by the individual is always more important than reading by the whole class.

Cultivate a feeling of ease and freedom from embarrassment on the part of the pupil; it will help him greatly.

Care should be taken not to train the pupil merely to imitate the teacher in reading after her.

Pupils must be trained to take in the sense of a line at a glance. This is absolutely necessary to insure intelligent reading.

Allowance must be made for natural weakness or other defects in the voice.

Let the teacher give several sounds common to a number of words and then ask the pupils to give the words containing them.

Pay careful attention to the position of the pupil while reading; he should stand straight, well balanced on his feet, and should hold the book easily at a proper distance from his eyes.

Practice should be had in giving the elementary sounds when the word is spoken, and vice versa.

Let the pupil form words by combining vowels with consonants given him by the teacher, and vice versa.

Let the pupil reproduce in correct spelling words written phonetically on the board by the teacher; or let them spell the word phonetically from seeing it written in the ordinary way.

Have the class form other words from seeing the sounds of one word indicated phonetically on the board.

The pupils should be allowed, even encouraged, to criticize one another, but always in the right spirit.

Let the same paragraph be read in succession by different members of the class, and let corrections be suggested on the reading of each before the next reads.

The teacher's first duty is not to criticize nor to judge the pupil's work, but to teach him to appreciate the beauties of the selections being read, and to read them himself in such a way that others may appreciate them also.

Mistakes in pronunciation should be corrected wherever and whenever they occur.

Wherever possible the teacher should, by comment, explanation and illustration, connect the matter of the reading lesson with the every-day life of the pupil.

Exercises in spelling will often enliven the reading lesson.

Questions on the reading lesson should be adapted to make pupils observe and think for themselves.

Most interesting reading matter may be found in historical stories.

Train the pupils often and thoroughly in pronouncing elementary sounds, syllables and words chosen for the purpose.

Young children cannot be expected to profit much by rules; they can learn best by imitating the teacher. Her pronunciation, therefore, should be perfect.

Encourage the pupils at all times to seek help in pronouncing difficult words and be ever ready to assist them.

The vocal organs of the children will receive no training that the teacher does not give them.

Advantage may be derived from hearing children with similar voices or faults read in the same division.

Do not fail to illustrate the thought of each paragraph so plainly that every pupil will comprehend it.

Every helpful, ennobling thought occurring in the lesson or suggested by it should be strongly impressed upon the pupil.

Dialogues will be found well fitted for reading lessons. Assign a part to each pupil and make a special effort to secure the best expression possible.

At times, especially in reviews, allow one pupil to read several paragraphs without interruption. It will tend to give him ease and freedom in reading.

The pupils should be questioned on the points of the story, both at the opening of the recitation and during its progress.

It may be well to mark emphatic words on the page, or have them written on the board, and see that in the reading they get the emphasis due them.

Effort should always be made to secure the interest of parents in having the children take their books home and read there.

As the primary object of learning to read is to secure information, getting the thought of the paragraph should be considered as of even more importance than correct pronunciation.

A fault should never be corrected without showing the pupil the right way. The lesson should be carefully looked over by the teacher in advance and no lesson beyond the powers of the pupils assigned.

It may be well in particular cases to make use of exercises chosen especially for their difficulty and to drill the pupils systematically in pronouncing these difficult sounds.

Great benefit will be derived and a special effort will be secured by having certain pupils take a conspicuous place before the class and read a selection, being then criticized by all.

Careless enunciation should never be tolerated.

Have the teacher give the meaning of certain words occurring in the lesson, and with this information let the pupils locate the word.

Renewed interest can be secured by taking a good story from a magazine, cutting it up and passing the pieces around to be read by the pupils in class.

Have the pupils suggest synonyms for suitable words occurring in the lessons.

Patience must be exercised with the slow and dull.

It may be discouraging to a pupil to interrupt him while reading in order to correct him. Good judgment must be used in this.

Let each pupil present a list of words which he found difficult to pronounce; then have the brighter pupils try them, before the teacher.

Let the pupils give words of opposite meaning to difficult words occurring in the day's lesson.

The pupils may be asked to change statements to questions and affirmations to negations, etc. They may also be asked to change stanzas of poetry to prose.

Older pupils may be required to write a whole paragraph in other words than those used in the book, but giving the same sense.

Draw the pupils' attention to the different literary qualities by having them select paragraphs especially illustrative of those qualities.

Show the importance of punctuation by special sentences, such as the following: "What, do you think I can walk to school in the rain?" "What do you think? I can walk to school in the rain."

Constant drill should be given to remedy reading too fast or too slowly.

Do not neglect any opportunity of enlivening the lesson and broadening the pupils' information by having them look up all references to history, science, etc.

Where occasion offers, show how a different meaning may be given to the same words by altering the emphasis.

The pupil should not be expected to profit by the exercise of reading a whole paragraph aloud after the teacher; take a sentence only, or a clause.

Endeavor to have the pupil feel confidence in himself; it will make his reading easier for him.

Pupils can be taught to read more slowly by having them make a pause after each word, or by having each pupil read a word in turn.

Give your pupils occasional drill in such fundamental things as the sounds of the letters, pitch, stress, etc.

Require correct spelling of all or a part of the words in the lesson each day.

Plan your work carefully at least one day ahead.

Increased interest can always be secured by introducing some supplementary reading.

Make as much study as circumstances will permit of the lives of the authors read in the supplementary work.

Have one pupil read until a mistake is noticed by one of the others; then let the latter continue the reading.

At times have the older pupils in succession take charge of the class and conduct the recitation, the teacher always guiding the work.

Have a slow reader and a rapid one read together and insist on their keeping together.

Beware of drilling some one pupil too long on the same thing. He must not be tired out or discouraged.

Another useful exercise to remedy too rapid reading is to have the pupil read backward.

Endeavor to look at the difficult things from the pupil's standpoint as well as from your own.

Show the pupil just how the incorrect manner of reading impresses the hearer by reading incorrectly aloud yourself.

Allow the pupils occasionally, where it seems advisable, to suggest readings from papers or magazines, and vary the work by having these read in class.

Have some especially good pieces of literature, both prose and poetry, committed to memory by all.

Cons[illegible] that method best which brings into the class the most interest and effort, and to the pupils the greatest improvement in reading.

With very young children it will be well to read to them considerably, rather than to tire them by too much drill.

Select your supplementary reading matter with a view, at least partly, to the educational value of the information it contains.

With older pupils have supplementary selections read in class by certain ones, and lay stress on the importance of learning to read as a means of acquiring information.

You should have in your school library books especially chosen for their fitness for use in supplementary reading, on such subjects as science, manufactures, business, transportation, history, literature, biography, etc.

Do not work directly through your reader in the order there used with any one class, but alternate the selections of the reader with the supplementary work.

Strive in every way possible to develop the imagination of the children; teach them to picture in their minds what they read.

Have narrative selections in which conversation occurs put into dramatic form, and vice versa.

Vary the reading matter to meet the interest of the children; they cannot profit by reading a selection in which they are not interested.

Give the older pupils constant training in using the dictionary.

Much interest can be introduced into the reading lesson with older pupils by having occasional exercises in the derivation of words and their analysis.

If you can create an interest among your pupils to read the books in your school library you will secure greater interest in the class work also.

While reading the children's popular classics, put to the pupils questions on the text, having them answer in the words and expressions of the author, as describing characters, situations, etc.

In this work in the classics among the older pupils, freedom of discussion on characters and plot should be encouraged, and possibly debates should be arranged on similar subjects.

It may be that you can interest your pupils in drawing on the blackboard scenes illustrative of the text.

The acting out of some part of a classical play read with the advanced classes may sometimes be done to advantage; or of some poem or story that the class has dramatized.

The assigning of definite topics to be prepared by the pupils will be found to be helpful in studying the classics.

Ask questions on the text that will make the pupils think and see the important points, qualities or characteristics.

Outline on Reading

I. Purposes of Study of Reading
- (1) Thought getting and thought giving
- (2) Acquiring general knowledge
- (3) Development of taste for best literature
  - (a) Increasing general culture
  - (b) Promoting scholarly speech
- (4) Training the mental powers
  - (a) To strengthen memory
  - (b) To develop the will through increase of knowledge
  - (c) To render choice easier
  - (d) To strengthen imagination

II. Reading in Primary Grades
- (1) Purposes of primary reading
  - (a) Acquiring thought
  - (b) Adding to vocabulary
  - (c) Correct pronunciation
- (2) Material used
  - (a) Courses of study as provided
  - (b) Regularly adopted texts
  - (c) Supplementary readers and primers

III. Reading in Inter[illegible]ate Grades
- (1) Purposes of th[illegible]
  - (a) Mastery o[illegible]
  - (b) Adding t[illegible]
  - (c) Inducing [illegible] literature
  - (d) Correct int[illegible] expression
- (2) Material used (Same as II, (2) above)
- (3) Devices for increasing interest
  - (a) Discussions and explanations
  - (b) Geographical references studied
  - (c) Mythological references explained
  - (d) Historical setting made clear

Study of Authors

It has been a very special effort on the part of the editors of The New Practical Reference Library to give to literature and biography the space and importance it merits. There is also a carefully prepared treatment of the best methods of teaching reading, in Vol. IV.

We consider it not enough [illegible]scuss in an abstract way the value of literary productions and to place on record certain estimates of authors, but in addition believe it highly desirable and profitable alike to teachers, parents and pupils to give carefully arranged studies of authors and selections which may serve as types on which still other lessons may be planned. On page 126 of this volume there is a discussion of biography for children in the school, and a series of search questions on the general subject of biography. Below we go still further into detail, and by careful outlines show how to study an author and selections from his works.

HENRY WADSWORTH LONGFELLOW

The poems of Longfellow are possibly more generally studied than are those of any other writer. He addressed himself in many of his poems particularly to children and achieved the name of the "Children's Poet."

Biography. The following outline for the study of the life of Longfellow is offered as a model which can be used in studying the biography of any other writer. Its arrangement is such that it can be adapted to any changed conditions and can be studied by sections. Not all of the outlines below should be offered to younger pupils; the teacher or parent must exercise proper judgment in determining to what extent the smaller boys and girls should be introduced to biography.

I. Early Life
  1. Boyhood and youth
     (See "My Lost Youth," also "Prelude" to "Voices of the Night")
  2. Education
     Portland Academy
     Bowdoin College
     Classmates
     Poems

II. Professor in Bowdoin
  1. Attempt to study law
  2. Appointment at Bowdoin
  3. Residence in Europe
  4. College work
  5. Marriage
  6. Second trip to Europe
  7. Death of Mrs. Longfellow

III. Professor at Harvard
  1. Residence in the Craigie House
  2. Friendships
     Felton, Cleveland, Sumner and Hawthorne
  3. Work in the university
  4. "Hyperion"
  5. "Voices of the Night"
     "Prelude," "Hymn to the Night," "A Psalm of Life," "The Reaper and the Flowers," "The Light of Stars," "Footsteps of Angels," "Flowers," "The Beleaguered City," and "Midnight Mass for the Dying Year"
  6. Ballads
     "The Skeleton in Armor"
     "The Wreck of the Hesperus"
     "The Village Blacksmith"
     "Excelsior," and others
  7. Poems on slavery
  8. Third trip abroad
  9. Second marriage
  10. "The Spanish Student," and other poems
  11. "Kavanagh"
  12. "The Building of the Ship," and other poems

IV. Later Life
  1. Retirement from Harvard
  2. Important poems of this period
     "Evangeline," "The Courtship of Miles Standish," "Hiawatha," "Tales of a Wayside Inn," and "Birds of Passage"
  3. Celebration of Longfellow's seventy-second birthday
     The presentation of the chair
     Whittier's poem, "The Poet and the Children"
     "From my Armchair"
  4. Death, March 25, 1882

V. Estimates of Longfellow as a Poet

The Study of Selections

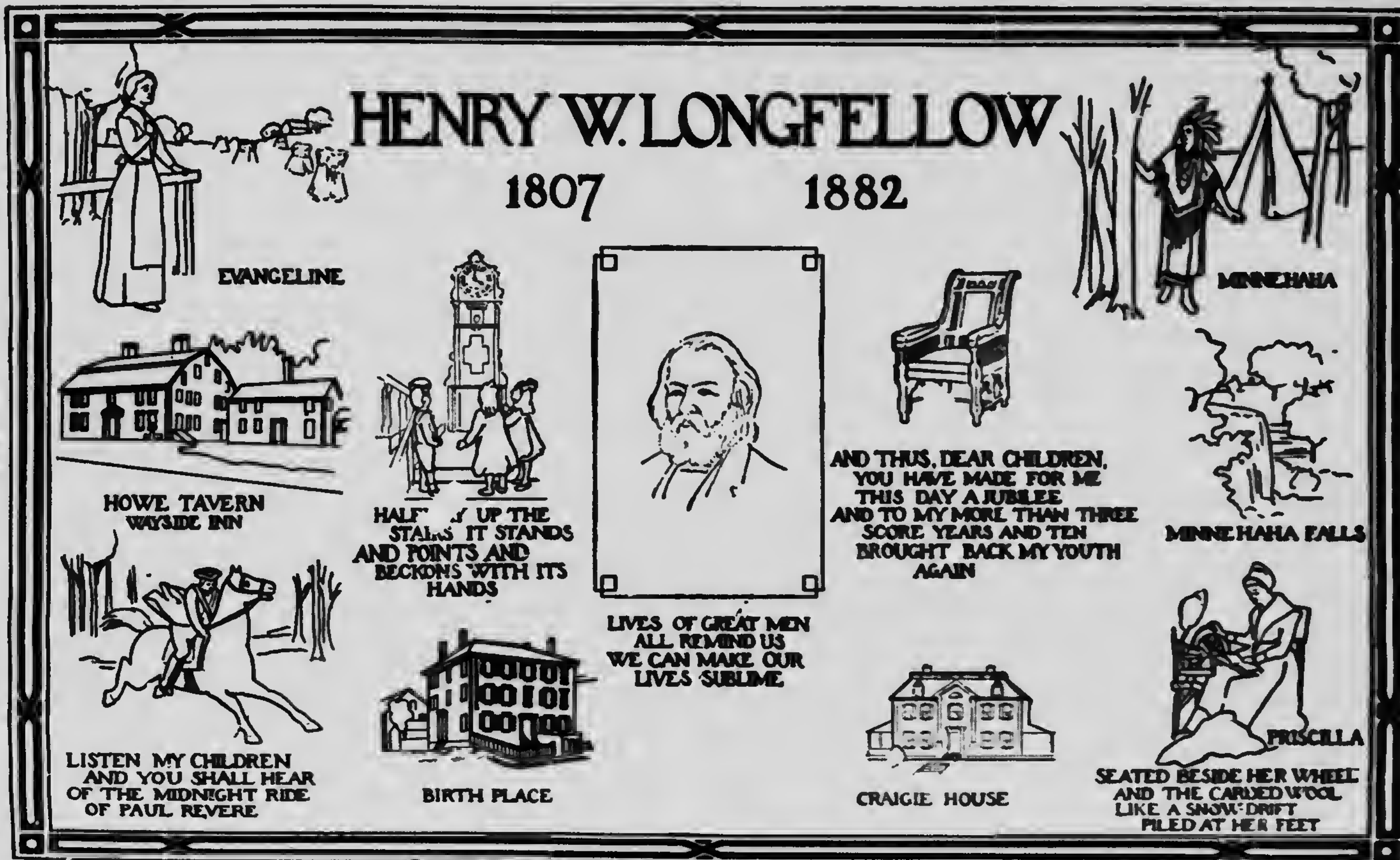
In the study of literature selections, whether of poetry or prose, the teacher should observe the following points:

1. Be sure that the selection is adapted in thought and sentiment to the age and capacity of the class. Inexperienced teachers often make the mistake of using selections too difficult for the pupils.

2. See that the subject is such as will enable the pupils to grasp and enter into the spirit of the selection. (Note directions for the study of "The Village Blacksmith," below.)

3. Be sure that the pupils know the meaning of all words in the selection, and that they understand all the obscure and difficult passages.

4. If necessary, assist the pupils in forming



SUGGESTED FOR BLACKBOARD OUTLINE

mental pictures of the scenes and objects described.

5. Add such interesting items and information as you can obtain. For instance, pupils are always interested in the history of the selection studied. They like to know how Longfellow came to write "Children," "The Children's Hour," "The Village Blacksmith," and all poems in which they are interested. The teacher who can give information of this sort is always sure to have an interested class.

6. For the purpose of making practical application of our suggestions, we here give plans for the study of the poem "The Village Blacksmith".

The Village Blacksmith

"The Village Blacksmith" first appeared in a volume of Longfellow's poems entitled "Ballads and Other Poems." The smithy alluded to was on Brattle Street, Cambridge, and was partially over-arched by a large chestnut tree. In his walks, Mr. Longfellow frequently saw the smith at work. Years afterward, the smithy was removed, a dwelling house was erected upon the site, and some of the branches of the tree were lopped off to make room for the house. This gave the tree such an unsightly appearance, that some months later it was ordered to be cut down by the village authorities. Most of the chips were carried away by the people of Cambridge as souvenirs. From the wood of this tree was made the chair which the children of Cambridge presented Mr. Longfellow on his seventy-second birthday.

THE VILLAGE BLACKSMITH

Under a spreading chestnut tree
The village smithy stands;
The smith, a mighty man is he,
With large and sinewy hands;
And the muscles of his brawny arms
Are strong as iron bands.

His hair is crisp, and black, and long,
His face is like the tan;
His brow is wet with honest sweat,
He earns what'er he can,
And looks the whole world in the face,
For he owes not any man.

Week in, week out, from morn till night,
You can hear his bellows blow;
You can hear him swing his heavy sledge,
With measured beat and slow,
Like a sexton ringing the village bell,
When the evening sun is low.

And children coming home from school
Look in at the open door;
They love to see the flaming forge,
And hear the bellows roar,
And catch the burning sparks that fly
Like chaff from a threshing-floor.

He goes on Sunday to the church,
And sits among his boys;
He hears the parson pray and preach,
He hears his daughter's voice,
Singing in the village choir,
And it makes his heart rejoice.

It sounds to him like her mother's voice,
Singing in Paradise!
He needs must think of her once more,
How in the grave she lies;
And with his hard, rough hand he wipes
A tear out of his eyes.

Toiling, rejoicing, sorrowing,
Onward through life he goes;
Each morning sees some task begun,
Each evening sees it close;
Something attempted, something done,
Has earned a night's repose.

Thanks, thanks to thee, my worthy friend,
For the lesson thou hast taught!
Thus at the flaming forge of life
Our fortunes must be wrought;
Thus on its sounding anvil shaped
Each burning deed and thought.

Teacher's Preparation. 1. Make a careful study of the poem before presenting it to the class.

(a) Be sure you can explain by concrete illustrations the meaning of all terms used in the poem.

(b) Separate the poem into parts, having each part contain a unit of thought or representation. There are four such divisions in "The Village Blacksmith."

(1) The smithy and the smith (Stanzas 1–3).

(2) The children at the smithy (Stanza 4).

(3) The smith at church (Stanzas 5–6).

(4) Lessons drawn from the life of the smith (Stanzas 7–8).

(c) Learn the history of the poem and be prepared to tell it to the pupils.

Presentation. 1. Tell the story of the poem—what led to writing it, and when it was written.

2. Study the poem by sections with the class. The first study will include the first three stanzas.

3. Select the words whose meaning the pupils may not understand.

4. Select the objects named in the picture which the pupils may not have seen. To some city pupils the smithy and the chestnut tree will be strange objects. The bellows and the sledge may also be unfamiliar. *Sexton* may also need attention.

5. Have the pupils describe the picture. The description must include a description of the chestnut tree, the smithy and the smith.

Recitation. 1. Have the class read the first stanza.

2. Watch for faulty expression. This indicates lack of comprehension.

3. Read the second and third stanzas in a similar manner.

4. Call upon the different members to read the three stanzas. This will reveal their degree of comprehension of the division studied.

Other Sections. The second and third divisions can probably be taken at one lesson. The scene in the smithy will need explanation to the children who have not seen a forge. The flame is small and the roar of the bellows is the sound made by the current of air forced through the fire. The pupils may not know what chaff is. Be sure that the children get a correct mental picture of the smithy.

The fourth and fifth stanzas need but little explanation. The chief thought to bring out is that beneath a rough exterior the smith carries a kind and loving heart.

The last division should be taken at one lesson. The first stanza teaches the lesson of industry and shows the satisfaction arising from completing one's task. The last stanza refers to the lesson which the smith's life teaches, and compares his work at the forge with the work of each individual in shaping his character. The poem is usually read before the pupils can fully grasp the thoughts in this stanza, yet they will get some comprehension of them. It is well to carry the study only so far as they can readily follow it.

Review. 1. After the entire poem has been studied according to this plan, have the members of the class read it. Each member should read the entire poem.

2. Have the class memorize the poem. The pupil's familiarity with it will make this easy. It will be wise, however, to defer this review until the pupils have studied one or more selections on other subjects.

Summary. We have herewith given complete plans for the study of this poem. These plans can readily be applied to the study of any literary selection suitable to the pupils of this grade. If the pupils are older, they should make a more detailed study of the selection, and the finer shades of meaning should be brought out. The main features of these plans are common to the study of all selections. The minor features must be determined by the teacher from the character of each selection. The underlying principle is, *Comprehension of thought must precede expression of thought.* Therefore, before oral reading is attempted, all obscure meaning must be made plain. Much of the faulty expression in oral reading is due to the fact that pupils are called upon to read selections which they do not understand.

ALFRED TENNYSON

The following poem, "The May Queen," is chosen for study because it is popular with all classes of pupils and will serve as a type for many other selections for later analysis.

The May Queen. "The May Queen," a poem in three parts, commemorates the annual celebration of May Day. This festival is supposed to have originated in the celebration which the ancient Romans held yearly in honor of the goddess Flora. It is still customary in the rural districts of England for the young people to go to the forests early in the morning and collect evergreens and flowers. At the exercises which follow, the young lady previously selected for the honor is crowned Queen of the May. In the incident described in the poem, a black-eyed beauty of the village is to be queen. Fearing that she will sleep and be late, she begs her mother to awake and call her early.

The first part of the poem expresses the girl's joy at the honor conferred upon her. The second part tells of her illness and approaching death, and the third of her resignation to God's will. The first and second parts were published in 1833, but the third part did not appear until 1842. Only the first part is here given. "The May Queen" is well suited to securing an interest in Tennyson.

THE MAY QUEEN

You must wake and call me early, call me early, mother dear;
To-morrow 'ill be the happiest time of all the glad New-year;
Of all the glad New-year, mother, the maddest, merriest day,
For I'm to be Queen of the May, mother, I'm to be Queen of the May.

There's many a black, black eye, they say, but none so bright as mine;
There's Margaret and Mary, there's Kate and Caroline;
But none so fair as little Alice in all the land they say,
So I'm to be Queen of the May, mother, I'm to be Queen of the May.

I sleep so sound all night, mother, that I shall never wake,
If you do not call me loud when the day begins to break;
But I must gather knots of flowers, and buds and garlands gay,
For I'm to be Queen of the May, mother, I'm to be Queen of the May.

As I came up the valley whom think ye should I see
But Robin leaning on the bridge beneath the hazel-tree?
He thought of that sharp look, mother, I gave him yesterday,
But I'm to be Queen of the May, mother, I'm to be Queen of the May.

He thought I was a ghost, mother, for I was all in white,
And I ran by him without speaking, like a flash of light.
They call me cruel-hearted, but I care not what they say,
For I'm to be Queen of the May, mother, I'm to be Queen of the May.

They say he's dying all for love, but that can never be;
They say his heart is breaking, mother—what is that to me?
There's many a bolder lad 'ill woo me any summer day,
And I'm to be Queen of the May, mother, I'm to be Queen of the May.

Little Effie shall go with me to-morrow to the green,
And you'll be there, too, mother, to see me made the Queen;
For the shepherd lads on every side 'ill come from far away,
And I'm to be Queen of the May, mother, I'm to be Queen of the May.

The honeysuckle round the porch has woven its wavy bowers,
And by the meadow-trenches blow the faint sweet cuckoo-flowers;
And the wild marsh-marigold shines like fire in swamps and hollows gray,
And I'm to be Queen of the May, mother, I'm to be Queen of the May.

The night-winds come and go, mother, upon the meadow-grass,
And the happy stars above them seem to brighten as they pass;
There will not be a drop of rain the whole of the livelong day,
And I'm to be Queen of the May, mother, I'm to be Queen of the May.

All the valley, mother, 'ill be fresh and green and still,
And the cowslip and the crowfoot are over all the hill,
And the rivulet in the flowery dale 'ill merrily glance and play,
For I'm to be Queen of the May, mother, I'm to be Queen of the May.

So you must wake and call me early, call me early, mother dear,
To-morrow 'ill be the happiest time of all the glad New-year;
To-morrow 'ill be of all the year the maddest, merriest day,
For I'm to be Queen of the May, mother, I'm to be Queen of the May.

Plan for Study. The pupils will need but little assistance in interpreting the poem. Their attention, however, should be called to the moods which follow each other in the mind of Alice, and to the emphasis and completeness of the thought brought out by the last stanza, which is a repetition of the first. The peculiar use of the apostrophe in this poem should also be noticed.

The first three stanzas show Alice as a joyful, envious girl, anxious for the morrow. The fourth, fifth and sixth stanzas tell of her feelings towards one who is in love with her, and show that she has little or no sympathy for him. In the seventh stanza her thought is brought back to her sister and mother, and she expresses a desire that they may share the pleasure with her. The eighth, ninth and tenth show the girl's love for Nature, and contain beautiful pictures which form a proper setting of the scene. As far as is necessary, the teacher should assist the pupils to see these pictures. The last stanza is, as said above, added for emphasis and completeness.

Other Poems. Other short poems suitable for school use are "Enoch Arden," "The Brook," "The Charge of the Light Brigade," "Break, Break, Break," "Columbus" and "Crossing the Bar," and from "The Princess," "The Bugle Song," "Sweet and Low" and "Home They Brought Her Warrior Dead."

Interesting Facts about Authors

I—Longfellow

William Longfellow, from whom the family in America descended, came to Massachusetts in 1651 and settled in Newbury.

The poet's paternal grandfather was prominent in law and politics. He represented his town in the General Court of Massachusetts for eight years was several years Senator from Cumberland County and for fourteen years was judge of the Court of Common Pleas.

Longfellow's father was a leading lawyer of Portland. He held many offices of trust in his city and county, and was a member of the Eighteenth Congress.

On his mother's side, the poet was a descendant of John Alden, who came over in the "Mayflower" and whose wife, Priscilla, Longfellow immortalized in his "Courtship of Miles Standish."

Longfellow's early education was obtained in a private school and at the Portland Academy, where he prepared for college. In the poem "My Lost Youth" he gives a description of Portland and the surrounding country as they were at that time.

Longfellow's first published poem, "Lovewell's Fight," appeared in the "Portland Gazette" when he was fourteen.

Longfellow entered Bowdoin College with his brother Stephen in 1821. Among his classmates were John S. C. Abbott, the historian, and Nathaniel Hawthorne, who became one of the most distinguished American men of letters.

Longfellow's college life was uneventful. His charming manner and studious habits made him a favorite alike with students and instructors. While in college he wrote a number of poems, which were first published in the "United States Literary Gazette." From this journal they were copied by other papers, and thus received a general circulation throughout the country. Only seven of these poems were included in later editions of the author's works.

Longfellow's father intended that he should be a lawyer, but a year's trial in his father's office convinced the young poet that he would never succeed in the legal profession. About this time he was chosen Professor of Modern Languages in Bowdoin College, and his life work began.

The origin of some of Longfellow's most popular poems is of special interest. "The Psalm of Life" was written on a bright summer morning, as the poet sat at a small table, it is said, looking out over the landscape. "The Wreck of the Hesperus" was written by chance, after a violent storm. The story came into his mind in the evening. He went to bed, but could not sleep, so he arose and wrote the poem. "Excelsior" was suggested by his seeing that word upon a scrap of paper which he picked up on the street. He took from his pocket a letter which he had just received from Charles Sumner, and sitting upon the curbstone, wrote the poem on the back of the letter. The story on which "Evangeline" is founded was given to him by Hawthorne, who had received the facts from a friend. This friend thought Hawthorne could write an excellent novel on the incident, but he did not see anything in it for a story, so he gave it to Longfellow.

II—Tennyson

Tennyson's first volume of poems was published by himself and his brother Charles. Both boys contributed to its contents, and it is difficult to tell which one wrote the various poems. The volume appeared when Tennyson was seventeen.

Tennyson was a general favorite in college and formed many friendships. His closest friend was Arthur Hallam, son of the historian. Hallam died soon after leaving college. "In Memoriam" is Tennyson's immortal monument to his friend.

The general recognition of Tennyson as the greatest poet of his time dates from the publication of his famous volume in 1842. Among the poems in this volume were "The Talking Oak," "Dora," "Locksley Hall" and "Sir Galahad."

In 1883 Tennyson was offered the peerage by Queen Victoria, and was designated Baron of Aldworth and Farringford, January 18, 1884. Thereafter he was known as Lord Tennyson.

"Locksley Hall" was published in 1842. In 1886 appeared "Locksley Hall Sixty Years After," written when the poet was in his seventy-eighth year; yet the latter poem shows no lack of mental vigor.

Tennyson died October 7, 1892, and was buried in the "Poet's Corner" of Westminster Abbey.

III—Whittier

Until he was a young man, Whittier lived and worked on a farm. This was before farm machinery had been invented, and all work was performed by hand labor with the simplest tools. To his early training is undoubtedly due Whittier's sympathy with all forms of common labor. His interest in the lives of the working people of his time is shown in the series of poems known as "Songs of Labor." "The Shoemakers" and "The Huskers" are two of the best-known poems of this series.

The old farmhouse near Haverhill, Massachusetts, in which Whittier was born, and which he described in "Snow-Bound," was built in 1688. It is still standing, and with its furniture is carefully preserved. Many of the rooms are open to visitors.

When Whittier was fourteen, the schoolmaster whom he describes in "Snow-Bound" brought to his home a volume of Burns' poems. In reading this, the boy obtained much inspiration. The book influenced all of his life and many of his poems. In his poem "Burns," he speaks of this influence.

"O'er rank and pomp, as he had seen,
 I saw the man uprising;
No longer common or unclean,
 The child of God's baptizing!

With clearer eyes I saw the worth
 Of life among the lowly;
The Bible at his Cotter's hearth
 Had made my own more holy."

Whittier's first slavery poem was published in the local paper when he was eighteen. The lines attracted the attention of William Lloyd Garrison, who was then but twenty. He went to the Whittier homestead and urged Whittier's father to give him an education. To his plea the father replied, "Sir, poetry will not give him bread." Whittier's schooling was limited, being confined to attendance at the common school in his district, and two terms at the Haverhill Academy.

He began his literary labors as the hired editor on the "American Manufacturer," though while attending the academy he wrote nearly one hundred poems, many of which appeared in in the "Haverhill Gazette."

Whittier early became interested in politics, and when a young man was favorably considered for a congressman. His love for liberty, however, caused him to join the Abolitionists, and this ended his career in every party which at that time was laboring to succeed at the polls.

He was one of the leaders in the movement to abolish slavery, and did much by his writings and influence to accomplish this result. Whittier was a friend and admirer of Charles Sumner, and was largely instrumental in securing his election to the United States Senate.

"Barbara Frietchie," considered to be one of the best ballads of the Civil War, was written in 1863. There has been a good deal of controversy as to whether or not the ballad was founded on fact. Whittier said that the poem conformed strictly to the incident as he learned it from trustworthy sources. Barbara Frietchie was a gentlewoman highly esteemed in the community in which she lived. She was a stanch Unionist, and it is said that when the Confederates entered her yard, she denounced them and shook her cane in their faces, and drove them out. It was also stated that May Quantrelle, a lady living in another part of the city, did wave the Union flag at the Confederate forces. In the narrative as it reached Whittier, the incidents were probably confused.

Notwithstanding his power as an anti-slavery advocate, Whittier lived a quiet, retired life.

When he left the farm, he removed to a smaller house near Amesbury, Massachusetts, where he lived during the most of his life. He died at Hampton Falls, New Hampshire, September 7, 1892.

IV—Holmes

Holmes was a cousin of Wendell Phillips, and a direct descendant of Anne Bradstreet, the first American poetess. The Dorothy Q described in his poem of that name was Dorothy Quincy, his great-grandmother.

The deacon who built the "one-hoss shay" was David Holmes, the poet's grandfather. He was a captain in the French and Indian War, and a surgeon in the Revolutionary War.

"Old Ironsides," one of the most famous of Holmes's poems, was written in 1830, and was inspired by the order of the Secretary of the Navy to destroy the frigate "Constitution." Holmes read the order in a newspaper, and on a scrap of paper with a lead pencil he wrote the stanzas at once, and sent them to the "Boston Daily Advertiser." The poem was copied by the press throughout the country, and was even printed on handbills and circulated about the streets of Washington. It created such widespread indignation that the Secretary countermanded this order, and the old ship still floats. This poem was written when Holmes was a law student and only twenty-one years of age. This is probably the only instance in history where the verses of a law student reversed the policy of the government. His "Plea for the Old South" performed a somewhat similar service.

Holmes graduated from Harvard College in 1829. Among his classmates were a number of men who gained a world-wide or national reputation in their respective callings. In his poem "The Boys," written for the class reunion of 1859, he refers in a pleasant way to some of these distinguished classmates. The "judge" of the poem was George T. Bigelow, Chief-Justice of Massachusetts. The "boy with the three-decker brain," was B. R. Curtis, a justice of the Supreme Court of the United States. The "boy with the grave mathematical look," was Professor Benjamin Peirce of Harvard, one of the most celebrated mathematicians of his time. James Freeman Clarke and Reverend Samuel Smith, the author of "America," were also members of this class.

We often hear Boston referred to as the "Hub of the Universe," but we seldom ascribe the origin of this expression to Holmes. In his "Autocrat of the Breakfast Table," he makes one of his characters say, "Boston State House is the hub of the solar system. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar."

Holmes also was the originator of the name of the "Atlantic Monthly." When it was decided to start this periodical the editorship was offered to James Russell Lowell, who consented to accept the position only on condition that Holmes should be secured as a regular contributor. To this Holmes replied, "You see, the doctor is like a bright mountain stream that has been dammed up among the hills, and is waiting for an outlet into the Atlantic." From this incident the periodical took its name.

Holmes' fame is not confined to the realms of literature. He was for thirty-five years Professor of Physiology and Anatomy in Harvard College, and was one of the leading medical authorities of his day. It was due to him that the microscope was introduced into medical practice in the United States.

V—Lowell

Lowell came of a family distinguished in many fields of activity. His father, grandfather and great-grandfather were graduates of Harvard College; his father was pastor of the First Church in Boston. His grandfather, John Lowell, as a member of the Constitutional Convention of Massachusetts, introduced into the Bill of Rights of the state a clause abolishing slavery.

An uncle of the poet, Francis Cabot Lowell, was a successful manufacturer, and the city of Lowell was named for him. Another uncle founded the Lowell Institute in Boston.

One of Lowell's ancestors on his mother's side was a signer of the Declaration of Independence.

During his college life, Lowell came in contact with many distinguished men of letters. Among his teachers were Benjamin Peirce, the mathematician of Holmes's "famous Class of '29," and Longfellow. Lowell himself tells us that he read, while in college, "almost everything except the text-books prescribed by the faculty." During his senior year he became so indifferent to college regulations that the faculty requested that he study for a time at Concord, under a tutor. It was here that he met Emerson, of whom he later became an ardent admirer. It was also at this time that he first felt the stirrings of his anti-slavery convictions.

Lowell was married in 1844 to a sister of one of his classmates, Maria White. She was a noble woman of lofty poetic genius, and by her inspiration she greatly influenced her gifted husband. Some of the most touchingly beautiful of Lowell's poems were written about his wife and children. "The Changeling" and "She Came and Went" were written in commemoration of his first child, Blanche, who died when two years of age. His poem which all children know and love is "The First Snowfall." In this he speaks of his second little daughter, Mabel, and of her sister "folded close under deepening snow." When he sent this poem to the periodical in which it was published, Lowell wrote, "Print that as if you loved it. Let not a comma be blundered. * * * May you never have the key which shall unlock the whole meaning of the poem to you."

"The Burial" in part was written after the death of Lowell's third daughter, Rose, who lived only a few months. Into it is interwoven the memory of his oldest child, especially in the last stanza, where he speaks of the little shoe in the corner. One of Lowell's biographers mentions that after Blanche was buried, her father took her tiny shoes, the only ones she had ever worn, and hung them in his chamber. There they stayed till his own death. Of his wife's death he says, "Something broke my life in two, and I cannot piece it together again."

Lowell was essentially a nature poet. In the famous "Prelude to Part Second" in his "Vision of Sir Launfal" he describes a scene which he himself enjoyed. In one of his letters he tells of a walk he took to Watertown over the snow in the moonlight. In his own words, "Orion was rising behind me, and as I stood on the hill just before you enter the village, the stillness of the fields around me was delicious, broken only by the tinkle of a little brook which runs too swiftly for frost to catch it. My picture of the brook in 'Sir Launfal' was drawn from it."

Lowell was our representative man of letters. He was a great critic, an essayist, poet, diplomat and scholar. As a poet he had a wider range than any other of our American poets. In his poetry he was an appreciative lover of Nature, a humorist, a patriot and a satirist, and he also wrote poems of sincere thought. His versatility is equaled by no other American man of letters.

VI—Scott

Sir Walter Scott came of a well-known Scottish family. Scott himself said that his birth was "neither distinguished nor sordid"; in the common language of the country the Scotts were "gentlefolk." Pride of family Scott considered "natural to a man of imagination." This pride sometimes led him into courses to his disadvantage, but at the same time it constantly spurred him on to exertion and to a high conception of duty. On the ceilings of Abbotsford are displayed the arms of about a dozen Border families with whom Scott's family claimed relationship.

In his autobiography Scott gives many interesting details of his boyhood. For example, he was sometimes called a dunce and an idler. Very carefully he explains why some people who did not like him might misrepresent the facts. As an infant of two years he had suffered severely from a fever which left its influence on him for life, his right leg being a trifle shorter than his left. His health as a boy was uncertain and his attendance at school was consequently irregular. Thus his studies suffered from forced inattention. Even as a child he seems to have been a favorite with his elders, and he spent many happy hours listening to the stories they gladly told him. As he grew older he steadily pursued his favorite studies of history and romance. He acquired a reputation among his schoolfellows for queer bits of knowledge and for story-telling—a reputation he worked hard to sustain as compensation for his indifferent standing in the regular school work. He studied French and Italian in order that he might read more romances in the original. This willingness to study hard in the pursuit of his pleasure was characteristic of Scott. He ransacked libraries for new material and by the time he was twenty-one was known for his ability in deciphering old manuscripts.

It was as a poet that Scott first established a literary reputation. In 1796 he published a number of translations from the German, and six years later issued the first part of his collection of *The Minstrelsy of the Scottish Border*; but it was not till 1805 that the *Lay of the Last Minstrel* placed him among the famous poets. This was followed by *Marmion* and the *Lady of the Lake*, both of which added greatly to Scott's popularity. Meanwhile he had been writing, though anonymously, the remarkable series of *Waverley Novels*. Not until five years before his death did he publicly acknowledge the authorship of these books, but the fact had been more or less of an open secret for a number of years.

The last years of his life were filled with trouble and sorrow. His business ventures turned out unfortunately and he was forced into bankruptcy. He labored in every way to pay off the enormous debt of his partners. In 1830 he suffered a stroke of paralysis from which he never fully recovered. The last months of his life were pathetic, as he died happy in the delusion that he had paid all his debts. No man ever showed a nobler sense of duty than Scott, when he literally wore himself out to pay obligations he could easily have avoided.

VII—Louisa M. Alcott

Louisa M. Alcott, the best American writer of children's stories, was of English ancestry. Her ancestors on her father's side were connected with the founders and governors of the chief New England colonies, and her mother was descended from a distinguished New England family. Miss Alcott's father, the famous Amos Bronson Alcott, was an unpractical idealist, though a very scholarly man. Her mother was a woman of fine mind, broad sympathies and unselfish generosity. Their gifted daughter seems to have inherited striking traits of both parents.

When Louisa was two years old the family removed to Boston, where Mr. Alcott opened a school. During this period, Louisa began a journal at the age of seven, which she kept for many years. Her personal experiences and those of her family, as there recorded, furnish very interesting reading.

In 1840, when Louisa was eight years of age, the Alcotts removed to Concord, Massachusetts, where some of her happiest days were spent. Among her neighbors were the little Emersons, Channings and Hawthornes, a noteworthy group of playmates. Some of their childish plays she afterwards reproduced in "Little Men."

Amos Alcott was a man of scholarly attainments and lofty ideals, but he lacked the ability to earn a comfortable living for his family. For many years his devoted wife and children suffered many privations, and the burden was not lifted until Louisa was old enough to shoulder some of the responsibility. The Alcott children were taught by their father, who had peculiar views on education and favored the Socratic method of questioning. Their minds were led to develop gradually and they were encouraged to express themselves freely and naturally.

In 1845 the family acquired a home in Concord, which is described in "Little Women," Miss Alcott's masterpiece. That story, best beloved of books by children of two generations, is based on the actual experiences of the Alcott family. The Meg of the book is the elder sister of Louisa. The wayward Jo is Louisa herself. Beth is a younger sister, Elizabeth, and Amy is the pretty and graceful May Alcott. Mrs. March is a reproduction of Mrs. Alcott, only, as Louisa says, "Not half good enough." The charming Laurie is a Polish lad whom the authoress met in Europe. The great charm of the book is its naturalness. It rings true. This can be easily understood when we consider that Miss Alcott was writing about her own life and that of her family. The book has been translated into French, German and Dutch.

Louisa wrote rhymes and plays when a girl, and had a story published which she wrote when she was but sixteen. Her real literary career began, however, when she was twenty-two, when she published a book of stories for which she received $32. For several years she devoted herself to making the family more comfortable, and she taught, sewed and wrote. After buying bonnets for the sisters with money received from writing, she said, "The inside of my head can cover the outside."

During the Civil War she became a nurse in a hospital, and has reproduced some of her experiences in "Hospital Sketches." This book has deservedly become very popular. The nursing resulted in a severe illness, and her health was never so robust again. "Old Fashioned Girl" is a bright and cheerful story, but it was written under very depressing circumstances. In her best books, Miss Alcott seems to be all humor and good cheer, but her life was a hard one, full of work and responsibility and saddened by the death of her mother and two younger sisters.

Her influence has been of the best. Her books for children, by which she is best known, are both wholesome and entertaining, and undoubtedly will be the delight of young readers for years to come.

VIII—Hawthorne

Hawthorne was a descendant of William Hawthorne, who came to Massachusetts from England in 1630. This ancestor was a stern Puritan and his son was one of the judges who condemned to death some of the victims of the Salem witchcraft. The Hawthornes became seamen; the grandfather of the novelist commanded a privateer in the Revolution and his father was a captain in the merchant marine.

Hawthorne's early days were spent in Salem, full of reminiscences of the stern old Puritan days. As a child, he read Shakespeare, Milton, Pope, Bunyan and Thompson, and with his own money bought a copy of Spenser's "Faery Queene." Among his teachers was Worcester, the famous dictionary-maker.

A part of his boyhood was spent in Maine on his uncle's estate. The wild scenery of the sparsely settled region and the primitive manners of the people greatly stimulated his imagination. He says of this period, "I lived like a bird of the air so perfect was the freedom I enjoyed." During the moonlight nights he would skate until midnight all alone upon Sebago Lake, "with the deep shadows of the icy hills on either side."

He entered Bowdoin College at the age of seventeen. Among his classmates were Longfellow and Franklin Pierce, the latter of whom became his lifelong and well-beloved friend. It is said that in college he ranked low in mathematics and metaphysics and that he found the required chapel declamations appalling. For twelve years after leaving college he lived in retirement in Salem, where, in an upper room of his mother's home, he wrote and dreamed. He speaks of this room as a place where he sat a long, long time, waiting for the world to know him The result of these long years of effort was "Twice-Told Tales," his first important work.

Hawthorne was thoughtful, reserved and quiet, but at times he enjoyed fun and jokes. His friend and biographer, James T. Fields, tells us that while they were in England together, they attended a reception given by an intelligent English lady, who asked Hawthorne to write in her autograph album. Hawthorne implored Fields to tell him what to say, and the latter, in a spirit of fun, suggested the old doggerel:

"When this you see
Remember me."

The famous romancer immediately wrote the couplet and signed his name to it.

On the way home from Europe, Mr. Fields found the Atlantic too much for him and suffered greatly from seasickness. Hawthorne was a splendid sailor and used to console his friend by suggesting all sorts of fanciful dishes. "He would lie by my side," says Mr. Fields, "and tell me to try a few roc's eggs beaten up by a mermaid on a dolphin's back, or gruel made from a sheaf of Robin Hood's arrows. He thought the proper clothing for a sea trip to be raven-down stockings, and sable clouds with a silver lining."

Hawthorne's last days were spent quietly in Concord. Emerson was one of his neighbors, and he speaks of his coming to call with a "sunbeam in his face." Just before he died he started a new romance, and the unfinished manuscript was laid upon his coffin. He was buried under a group of pines on a hillside overlooking the historic fields of Concord. Among the friends who saw him laid to rest were Emerson, Channing, Agassiz, Lowell, Alcott, Holmes and Franklin Pierce.

IX—Thackeray

Unlike Dickens, his great contemporary, Thackeray worked for many years before he was appreciated by the public. His personal character, moreover, was such as to make him avoid publicity. He was extremely shy, modest and nervous, and disliked continuous work. His school friends remembered him as a "pretty, gentle and rather timid boy," who was known for his skill in caricature drawing but not for diligence in study. His extreme sensitiveness is apparent in many of his books, especially when he writes of his school days.

The loss of his small fortune in ill-chosen ventures and the necessity of supporting his family forced Thackeray to hack work in 1837. He contributed humorous articles to *Punch* and other magazines and slowly won a reputation for this sort of work. His illustrations, though often poorly done from an artistic point of view, invariably caught the spirit of the article so that they greatly added to its effectiveness. Thackeray, in fact, spent a year in Paris in order to study drawing and painting, but he never succeeded in attaining correctness in design.

In his novels Thackeray displays his characteristics to best advantage. He uncovers the weaknesses of society in a gentle, yet firm manner. We realize that he is in deadly earnest in his satire, yet we are not offended, because his satire does not sting. *Vanity Fair* is generally considered his greatest novel. None of his characters are perfect, but the story is enlivened by an abundance of real human nature. Many readers consider *Henry Esmond* a greater and more enduring work. In it Thackeray gives a wonderful picture of social life in the eighteenth century; he even goes so far as to disguise his own natural style and to imitate eighteenth century prose.

How a Statue Is Made. Perhaps when some of us see in a museum a beautiful marble statue, we picture to ourselves the artist, a broad-browed man of genius, standing before the marble, chisel in hand, with the light of inspiration in his eye, hewing out the statue. And it may be something of a shock to us to realize that in almost all cases the artist does not touch the marble—that he merely makes a clay model, from which skilled workmen copy the statue. Yet this fact does not detract in the least from the genius of the artist or the worth of the artistic product. It is the idea, the inspiration that makes the statue great.

Treatment of Sculpture in These Volumes. A detailed account of the making of a statue, whether of marble or of metal, is given in The New Practical Reference Library in the article *Sculpture*, under the subhead Processes. The same article also contains a history of sculpture, from its earliest beginnings in Egypt to its latest development in the United States. This article is of necessity limited, and needs supplementing; and much of the necessary supplementary material may be found in the biographies of famous sculptors, of which there are fifty-five listed under *Biography*, subhead Sculptors, in the Classified Index. Other articles which will be of interest in connection with the general subject of sculpture are as follows:

Alto-Rilievo
Bas-relief
Byzantine Art
Carving
Cast
Colossus
Elgin Marbles
Mezzo-Rilievo
Wood Carving

Greatness of Ancient Sculpture. We have grown so accustomed to believing that increased knowledge and increased practice mean increased skill and ability that we are often in danger of thinking that things modern must in all ways surpass things ancient. We forget, sometimes, that the greatest epic was written literally thousands of years ago; that some of the most beautiful buildings in the world were created long before the beginning of the Christian Era; that perhaps the very highest mark in art was reached far back in the early days of Greece. It is this last statement which calls for emphasis here. Of course mere verbal defense of such a statement can do little; nothing but a study of the works of art themselves can convince one of the justice of the judgment of the critics when they say that Greek sculpture is probably the greatest manifestation of art which the world has ever seen. But since we cannot have the sculpture groups to look at, we may study about some of the most famous of them, that we may look at them with more appreciation when we do see them.

Myron. One of the first noteworthy Greek sculptors of whose work we possess any example was Myron, who lived about the middle of the fifth century B. C. All of his statues were in bronze, and the examples we have are but copies. Of these one, the "Discus Thrower," is one of the most famous of ancient statues. It shows the athlete, every muscle strained, with his arm stretched back and about to hurl the discus. While the body shows perfectly the effort that is being made, the face is calm and almost expressionless. And that is the chief criticism that is made on Myron; he can show motion, but not emotion.

Phidias. It seems strange that of the work of the greatest of all Greek sculptors we should have no example. But for our estimate of the work of Phidias we are dependent on the testimony of ancient writers, who rank his work, whether in marble, ivory or bronze, above that of anyone who preceded or followed him.

SCULPTURE

DEFINITION

The art of imitating living forms in solid substances.

PROCESSES

1. Modeling. The use of clay in the fashioning of the image.
2. Casting.
   - a. Plaster of Paris poured over the model.
   - b. The plaster of Paris removed, and plaster of Paris poured into the new model.
   - c. Reproduction of the plaster cast in marble or stone.

FORMS

1. When the object stands free it is said to be in the round.
2. Projecting slightly from a solid surface it is in relief.
3. When cut into or sunk down into the surface it is in intaglio.

HISTORY

Egypt

1. First signs of a developed form of sculpture.
2. Characteristics: Colossal size, stability, symmetry, calm repose, solemnity.
3. Best period from 1450-1000 B. C.

Assyria

1. Best period inferior to that of Egypt.
2. Characteristics: Intense a[illegible] spirit. No reference to any ideal beauty, over-laden with detail and ornamentation.
3. Persian sculpture (560-331 B. C.) usually included with Assyrian.

Greece

1. Development rapid and continuous from end of sixth century B. C.
2. Came to perfection in Phidias, in his Athene and Zeus.
3. Characteristics of the Periclean age: A perfect balance and combination of elements sublime and human. Sculptures of Parthenon; the Venus of Milo.
4. Period of Scopas, Praxiteles, Lysippus. Soft graceful forms: Venus, Bacchus, Amor.
5. From 323-146 B. C. Dying Gladiator, Apollo Belvedere.

Italy

1. A continuance of Grecian sculpture. Decline.
2. The revival came in twelfth century with Nicola Pisano, and came to its triumph in Donatello.
3. Reached its full expression in Michelangelo, who summed up and concluded previous efforts to interpret passion and feeling.
4. Modern sculpture tends to realism.

France

1. Early art expresses Byzantine, Romanesque and Gothic influences.
2. From fifteenth to eighteenth century: Bouteillier, Colombe, Goujon, Cousin, Pilon, Puget.
3. Eighteenth and nineteenth centuries produced Houdon, Bosio, Rude, Barye, Carpeaux.
4. Recent artists: Saint Marceaux, Frémiet, Dalou, Dubois, Bartholdi, Riviere.

Germany

1. The Renaissance produced Krafft, Vischer, Dürer.
2. Influence of Thorwaldsen originated the modern school, but the real founder was Rauch. From his school came Rietschel, Schwanthaler, Kiss, Bandel, Drake.
3. Of recent fame: Begas, Eberlein, Zumbusch, Hildebrand, Schilling.

England

1. Few examples before eighteenth century.
2. Gibbons, the first real artist of the English school.
3. Banks, the father of ideal English sculpture, but the school of the nineteenth century was founded by Flaxman.
4. Foley and Macdowall the last names of the classic school.
5. Present tendency toward originality and naturalism.

United States

1. First sculptors of importance: Greenough, Crawford, Palmer, Story, Rogers, Rinehart, Hosmer, Browne, Ward.
2. Since 1875 American sculpture influenced by the French. Howard Roberts, Levi Warner.
3. Of most recent fame: Augustus Saint Gaudens, Daniel C. French. Also, MacMonnies, Adams, Partridge, Bartlett, Bitter, Niehaus, Rhind, Proctor, Kemys, Barnard.

SUGGESTED FOR BLACKBOARD OUTLINE

Some few copies, probably of works of Phidias, remain, and modern critics differ in no way in their estimate of the sculptor from ancient critics.

Apollo Belvedere. Many of the most famous statues from antiquity can be assigned to no sculptor with any certainty. This is true of the celebrated statue of the "Apollo Belvedere," so called from the Belvedere court of the Vatican, in which it now stands. This figure of the youthful god shows him as marvelously beautiful, yet the face expresses a divine wrath, which makes us feel certain that, with his bow in his outstretched hand, he is about to right some wrong or punish some evildoer. The statue loses none of its beauty for us because we know that what was long thought to be a Greek original is only a skilful Roman copy, or because the left hand and right forearm, which had been broken off, were restored by a sculptor in the time of Michelangelo. Notice the wonderfully graceful yet strong pose of the figure, the beautiful fall of the drapery, and the motion expressed in the whole composition.

THE "DISCUS THROWER"

APOLLO BELVEDERE

Venus of Milo. When an ancient Greek sculptor really believed in his gods and in the beautiful myths told regarding them, there must have come to him when making statues of them an inspiration which could come from no other task. Such an inspiration must have come to the unknown sculptor who carved the statue found in 1820 on the island of Melos, in the Aegean Sea, and so called the Venus of Milo. We do not know even approximately the date when this work was produced, whether it was in the fourth or the first century B. C.; but we do know that in the opinion of the critics there is nothing else in art which can compare with this wonderful statue, and that almost anyone who will take the time to become well acquainted with it must be of the same opinion. The body and the draperies are battered, and both arms are gone, so that no one can be absolutely certain as to just what the position of the goddess was; but the nobleness of the ideal portrayed, the lines of the figure and the youthful beauty and majesty of the face make this Venus the chief glory of the Louvre, where so many priceless art treasures are gathered. The most plausible idea as to the position of the goddess is the one which suggests that her left foot rested on a helmet and that a shield was supported on her left thigh.

VENUS OF MILO

fiercest struggle, and thus there is something horrible about it. But the figures are so accurate anatomically, the passion and the pain shown on the faces and in the straining muscles are so real, that the group must rank with the great works of art of antiquity which have come down to us. No less a critic than Goethe held that the older son, the one to the left of the father, is not in pain, but is simply horrified at what

LAOCOON

It is possible to get, very inexpensively, copies in plaster of the Venus of Milo; and no one who makes such a purchase can ever regret it. It will be a possession of which one can never grow tired, and will show new beauties every time it is looked at thoughtfully.

Laocoon. A very well-known work of ancient sculpture is the "Laocoön," found at Rome and now in the Vatican. Although nothing definite can be determined as to the time of its production and the artist, it was probably produced in the second century B. C. Vergil tells the story which this group illustrates—how Laocoön, priest of Apollo in Troy, warned the Trojans against receiving into the city the wooden horse left by the Greeks, and how Apollo, to punish him, sent two huge serpents who attacked the priest and his two sons. The artist who made this statue has chosen to portray the moment of he sees his father and his brother suffering, and that he is about to push off the coils of the serpent and stand free.

The Victory of Samothrace. Between 1863 and 1867 French archaeologists were exploring the site of an ancient town on the island of Samothrace, in the Aegean. They found various objects of interest, but the greatest find of all was the statue which is called the Nike, or Winged Victory, of Samothrace, which is now in the Louvre. This statue is in a sadly mutilated condition; the head is gone, the arms are gone, the drapery is chipped. And yet it ranks with the Venus of Milo, and other of the most beautiful and famous works of art. Look at the sketch of the statue given here. Even in this form there is enough to make clear to us the reason for its ranking by the critics. Notice the wonderful poise; the lift of the wings, the sweep of the draperies. It gives one a feeling of lightness, almost of the ability to fly, just to look at it. Nike, or Victoria as the Romans called her, was the goddess of victory, and this statue was set up by the Greek ruler Demetrius in

WINGED VICTORY

306 B.C., after he had defeated the king of Egypt in battle.

Niobe. After the time of the great sculptor Praxiteles a group of sculptors grew up, who, from the type of subjects in which they delighted, were known as the Pathetic School. The Laocoön was a product of this school, as was also another famous statue which is preserved in Florence, and which is probably the work of a pupil of Praxiteles. This is the "Niobe and Her Children." Niobe was the wife of the king of Thebes and the mother of six beautiful daughters and six handsome sons, of whom she was very proud. In her pride she boasted that she was superior to Leto, the mother of Apollo and Diana, who had but the two children. Moved to wrath, Apollo and Diana let fly their arrows at the children of Niobe and killed them one after another. Finally only the youngest daughter remained. The statue shows Niobe in an agony of grief, trying to shield this last child from death. The story goes that she was unsuccessful, and that Jupiter, in pity for her grief, changed her into a stone which shed tears. A sketch of this statue is given with the article *Niobe* in Volume IV.

Later Works. These are the greatest statues of the greatest age of art—the most famous of the masterpieces to which modern sculptors look for inspiration. It would be impossible to describe even briefly the famous statues which have been produced since the days of Greece; but we may take time to look at a very few of them.

Some critics maintain that the "Moses" of Michelangelo is the greatest of human statuary, and certainly when the method of its production is considered, it appears most wonderful. It was hewn from the marble without a model, as by "a chisel of flame. A finer expression of the great legislator of the world, with the law in his hands, could not be conceived.

Another wonderful achievement of Michelangelo's was the "David." Forty years before, another sculptor had left as ruined a huge block of marble, on which he had begun to work. Michelangelo took close note of the dimensions of the block, and planned a colossal statue of David, of such proportions and in such a pose as exactly to utilize the discarded stone and yet not to hamper himself in his work. Sling in hand, the young Israelite stands, poised and waiting for Goliath, frowning, but beautiful, a triumph of the genius of the great artist who created him.

The Study of Statuary in School. It is much to the advantage of the school to have one or more groups of statuary so placed that they may be seen daily by all the pupils. Excellent casts of the best works of the great masters, both ancient and modern, can be procured at such small cost as to make it possible to procure these works of art wherever a desire for them is awakened.

In giving lessons on statuary the teacher will be aided by the following suggestions:

1. If possible, let the lessons be upon the statue instead of upon a photograph of it. However, it is better to give lessons upon the photographs than not to give them at all.

2. Select the subject with care. Some people object to the nude in art, and if the lessons are to be successful with all pupils these objections must be heeded. Remember that the actions of

THE SUN VOW

children appeal to the pupils, and so far as possible choose subjects containing children.

3. If photos must be used, try to have enough so that you can place a copy in the hands of each member of the class. It will be well to distribute these pictures a day or two before giving the first lesson.

4. A statue requires more study than a picture like that chosen for a picture study lesson. Therefore the statue needs more time upon it.

5. At first select only the most striking features. As the class shows the ability to grasp details they can be introduced.

6. Make the lesson short and usually let several days intervene between succeeding lessons. One or at the most two lessons a week are enough for subjects of this sort.

7. When the study is completed, require the pupils in the older classes to write a description of the statue. Pupils in the primary grades should be called upon to give oral descriptions.

The Sun Vow. The subject of our lesson, entitled "The Sun Vow," is the embodiment of a legend long standing among the American Indians. According to this legend, before a youth could be recognized as a man and be allowed to take his place among the warriors of his tribe, he must shoot an arrow at the sun as a test of his strength and skill. If truly aimed and vigorously sped, the arrow went far out of sight in the sun's rays and the youth was deemed worthy. Otherwise he remained longer with the squaws. The group further represents age about to pass from earth and youth about to enter upon the activities of life. This idea is vividly portrayed in the contrast of the figures of the old chief and the boy.

All children are hero worshipers, and boys especially like the heroic. Therefore the group selected for our study will be of special interest to them.

1. Make a careful study of the group and determine what you wish to bring out in the lesson before presenting the subject in class.

2. Introduce the lesson by telling the legend upon which the work is based. Ask the pupils about such customs of the Indians as are especially related to this legend, such as their weapons of warfare and manner of dress. Bring out the fact that in some tribes children and youths were often unclad.

3. Notice the perfect muscular development in the youth.

Call attention to the position of the arm and the bow. Are these natural?

4. It may lend interest to the study to have some boys make a bow and arrow and let members of the class take turns in shooting the arrow into the air. Have the other members of the class compare the position of the one shooting with that of the one in the statue.

5. Contrast the angular figure of the old chief with the beautiful muscular figure of the youth.

6. Again contrast the expression of calm resignation of the old man with that of eager expectancy on the countenance of the youth.

Does the old man want the boy to succeed?

What does failure mean to the boy?

Bringing out these contrasts will reveal the remarkable delicacy and skill of the sculptor as well as the thorough knowledge of his subject. It is given to but few to work clay, marble or bronze so delicately as to portray accurately the thoughts and feelings indicated by the countenances in this group.

Call the attention of the older members of the class to the composition. Notice how perfectly the group is balanced. Notice how natural is the position of each figure, and especially the lifelike appearance of the group as a whole. Lead the pupils to see that these characteristics, together with the contrasts to which attention is called above, make this group not only an object of beauty, but a work of the highest art as well.

Questions

Who created the "Discus Thrower"? The "Niobe"? The "Moses"? The "Sun Vow"?

Mention some great statues of which we do not know the creator.

Who is considered the greatest of all Greek sculptors?

On what do we base our estimate of his work?

Where is the Venus de Milo? The Laocoön? The Victory of Samothrace?

What is remarkable about the way in which Michelangelo's "Moses" was produced? His "David"?

Who is the greatest sculptor America has produced?

How are most marble statues produced? How are bronze statues produced?

What are the three forms of sculpture?

Where was sculpture first developed?

What are the chief characteristics of Egyptian sculpture?

What are the chief characteristics of Assyrian sculpture?

Mention a great French sculptor, a great German, a great English and a great Canadian.

The Desire for Stories. Perhaps there is no combination of words which the average child uses oftener or speaks more eagerly than "Tell me a story." From the time the child is able to talk until long after he is well able to read stories for himself, mother, father, big sister hear the words over and over—"Tell me a story." There is a popular fallacy that anybody can tell a story; almost anybody will attempt to. But the results are often so confused, tedious and pointless that we can imagine that only because the need for a story is to the child a very pressing one would he accept such results.

We sometimes hear the words "the art of story-telling," and the expression is none too strong. Story-telling is an art, but that need not frighten anyone, for it is an art which anyone may master sufficiently well to make the telling of a story a pleasure to the one who does it as well as to the children who listen. There are no absolute rules to follow, but certain points must be kept in mind if the results are to be as satisfying as possible.

The Main Purpose of Story-Telling. The first important point that needs consideration is the purpose of story-telling; for only as the purpose is understood and accomplished can the success or failure of story-telling be judged. If we ask a child why he demands stories so constantly, we shall without doubt receive some such reply as, "Because I like to hear them." And that is, after all, the real purpose—to give pleasure. If the story fails in this it fails in all. The art of story-telling is first, last and all the time an art of entertainment, and if it does not entertain it is no art.

Other Purposes. There are, to be sure, other values to story-telling; it accomplishes certain things which, with the child, can be brought about in no other way. But these are secondary results, and are by no means to be attained without the primary one—the giving of pleasure.

One of the very practical results of story-telling is that it encourages concentration. It will almost always be found that a child who is used to listening to poems or to stories hears better and more easily than a child who has not been so trained. Then too, a child who has heard all his life good stories well told uses without effort words which are entirely foreign to the vocabulary of another child.

Some people object to having fairy stories told to children because they fear that the imagination may be overdeveloped. There is, however, little fear of this. There is far more danger that the imagination will be underdeveloped, and it is just this danger which the telling of wholesome stories helps to guard against.

One of the most important of all the benefits which a child may derive from listening to good stories is the broadening of his sympathies and comprehension. Most of us live but one kind of a life, and have little opportunity to come in touch with lives spent in totally different surroundings and under totally different circumstances. This has an inevitable narrowing tendency, and there is nothing which can so effectually offset this tendency as good stories which arouse interest in other lives, other conditions, other creatures, other lands.

Telling Stories Better than Reading. A person who feels no ability to tell stories is likely to think that reading aloud can supply the need; but anyone who has tried both knows that there is a great difference. The personal element is almost entirely lacking in reading aloud. The eyes of the reader cannot meet and hold the listener's eyes, and the child is far more likely to become restless and lose interest.

The Essentials of a Good Story. Even the most skilful of story-tellers cannot make all stories interesting to children; widely as the different kinds of tales which are capable of interesting children differ, they all have something in common—there are certain qualities which a story must possess before it can ever be a favorite or even be tolerated.

First, it must have a definite beginning and a definite ending. No long introductory explanations are possible in a child's story; the action must begin at once. And the action must have worked itself out to its logical end before the story closes. The desire to make a story a "piece out of life" has led many writers of short stories for grown people to end their tales in the vaguest, most indefinite way; we do not know what really happened to the hero or heroine—we can only conjecture. But the child must know absolutely what happened, and if he can know that his story people were not only happy when the story closed but "lived happy ever after," so much the better.

Another requisite is that the story have action from first to last. Asides, moralizing, description, unless they are very brief, will not do. The characters must be moving, accomplishing something all the time.

The child's invariable desire for a happy ending to a story is simply an outgrowth of his feeling of justice. If the bad person is not punished and the good person rewarded, the child feels, the world is all wrong. As people grow older and see the many apparent failures of this principle of justice to work out, they accustom themselves to the same thing in literature; but the desire for a happy ending is innate in everyone, and it is seldom if ever that a child should be harrowed with a tale in which the hero or heroine comes to grief.

There is one point which everyone who has told stories to children must have noticed, and that is their fondness for certain little details which to an adult seem absolutely unessential. If there is a bit of color somewhere in a story, and it is left out in the fifth or the eighth or the tenth telling, the child misses it and feels disappointed. One woman declares that when she was a little girl the story of the Ugly Duckling never seemed quite the same to her if the old Spanish duck with the red rag around her leg was left out.

One device which is not really necessary in children's stories but which adds greatly to their attractiveness to the child mind is the repetition of certain words or phrases. This may take the form of a simple repetition of descriptive adjectives applied to a character, as the "little small wee bear" in the story of the *Three Bears*, or it may be more elaborate—the repeating of several lines of a speech. Just why this makes so strong an appeal to children is not quite plain, but it is certain that it does so. One worker, who had had much experience telling stories to children, made systematic inquiries as to what stories children really like best, and discovered that the prime favorites were *The Three Bears*, *The Three Little Pigs* and *The Little Pig That Wouldn't Go Over the Stile*. Each of these stories has much repetition, and doubtless this fact has something to do with their popularity, though the stories have all of the characteristics of good children's stories.

How to Tell a Story. Now a story consists of the gathering up of one set of emotional events from a possible million. What makes a tale tedious? Trying to mention as many of the million as possible, instead of keeping to the one set. What makes it confused? Trying to give the events without keeping in mind that they are in one set—that is, related definitely to each other. What makes a story pointless? Forgetting that, as the set of events is emotional, it must lead to some climax, some happening or point.

Once we get the idea of what a story really is, and hold to it, we are pretty likely to find that we, too, can tell a story well, after a little practice. Your "natural" story-teller—the one who seems to have a veritable "gift" for telling stories to children—is keenly alive and constantly awake to what a story is, and because she is so, follows some such rules as these:

Know Your Story. Know it so well that you feel free while you are telling it—certain just where each point is to come in, and sure of your climax. A few stories well learned is a better plan than many imperfectly known and thus poorly told. Do not feel that a story must always be told in the same words. Probably it will not be told twice alike, for the circumstances of its telling are never twice the same. If, however, there are conversations or familiar passages or some of the repetitions of which children are so fond, they should not be changed.

Be Happy In It. Your enjoyment and appreciation will convey themselves to the children. "Teacher makes us all laugh when she tells *The Hare and the Tortoise*. We wish she'd tell it every day." No one can tell really well a story which seems to him pointless or foolish or uninteresting.

See As You Tell. Live over again the events of the narrative as you talk. Try to see the things happen, rather than to think overmuch about your words, and the story will unconsciously become vivid, dramatic and interesting.

Keep the Point in Mind. Let the story shape itself gradually, always with this one group of emotional events in mind. Don't drag in anything, however interesting, that is not closely connected with the business of the story. Let all you say illuminate your text in some way.

Telling "The Three Goats." The following story was told just as it is given here, by a teacher familiar with the principles of good story-telling. Notice (1) her familiarity with it, (2) her own evident enjoyment of it, (3) its vividness and action, and (4) how all that is told helps on the movement of the tale. There is no attempt at moralizing, and yet how plainly the results of the various actions come out!

The Three Goats

Once upon a time there were three goats who were going to the green pasture across the river to eat, and eat, and eat, so that they would become very fat. They all three happened to be named "Gruff."

Now a great ugly troll lived under the bridge they had to cross to reach the green pasture. Ah, but he was a monster; his eyes were as big as plates and his wiggly nose as long as a hoe-handle!

The youngest goat Gruff stepped upon the bridge first.

"Trip trap! Trip trap!" whispered the bridge.

"Who is tripping over my bridge?" called the dreadful troll.

"Oh! it is only I, the very smallest of the goats Gruff."

"I'm coming to eat you up!" roared the troll.

"Please, please don't! I wouldn't make a mouthful for you. Wait till the second goat Gruff comes. He is much larger than I am."

"Trip on, then. I want a bigger mouthful," growled the troll.

Soon the second goat Gruff came along.

"Trip trap! Trip trap!" said the bridge.

"Who is tripping over my bridge?" called the dreadful troll.

"It is I, the second goat Gruff," said the goat in a voice like yours or mine.

"I'm coming to eat you up!" roared the troll.

"Please don't! I'm not very big. Wait till the third goat Gruff comes. He is much larger than I. He'd be well worth eating."

"Trip on, then. I want a very large meal," replied the ugly troll.

Very soon the big goat Gruff came.

"Trip trap!! Trip trap!!" called the bridge. It was ready to break with the weight.

"Who is stamping over my bridge?" called the dreadful troll.

"IT IS I, THE GREAT GOAT GRUFF!" called the largest goat in a voice as loud as the troll's.

"I'm coming to eat you up!" roared the troll.

"HO! COME ON, THEN, COME!" roared the great goat Gruff.

And the troll came. The great goat Gruff butted him with his great horns and threw him into the river in a hundred pieces. He never ate up anyone again who tried to cross the bridge.

Then the three goats Gruff ate, and ate, and ate, in the green pasture. Unless they have stopped, they are eating there still.

Kinds of Stories. Almost any kind of a story provided it has action and a definite beginning and climax may be told so as to interest children, but there are certain kinds which seem of right to belong to the child. First of these, perhaps, is the fable. Even very young children like and can appreciate fables, and the endowing of animals with human characteristics is no strain on their imagination. (This subject is treated under *Language and Grammar*, on page 498 of this volume, and a number of fables are there given.)

It is likely that if any group of children were asked what kind of stories they liked best the majority of them would say, without hesitation, "fairy stories." By this they mean not only stories in which real fairies take a part, but any stories in which supernatural events occur. The introduction of the supernatural troubles them not at all. It is to them the one great essential that virtue should be rewarded and wickedness punished, and if the reward and punishment are dealt out by fairy godmothers, enchanted princesses, kings' sons who are disguised as animals, so much the better. And the most of the old fairy tales present to the child moral truths and give him lessons in kindliness and industry which he could receive so acceptably in no other way.

The ancient myths, many of them, have that in them which appeals powerfully to children. These should, of course, to the young child be told simply as stories, with no intimation that he is being instructed in the religion and science of the world in its childhood days.

Humor is an element which is all too often absent from children's literature; and that children do enjoy it is shown by their appreciation of nonsense tales—tales which have in them little of story, but plenty of just that quality which appeals to children as "funny."

The nature story may be made very valuable, but the danger is always that it will be overdrawn; that the children will be given ideas of things in the world about them which are untrue. This does not mean that no tales should be told in which animals talk or show human characteristics; it does mean that care should be taken not to humanize too much the dog, the butterfly, the violet waking in the spring.

Historical tales and Bible tales, well told, never fail to interest children, and the lessons which they carry find their way into the minds of the little listeners without the necessity for emphasis on the moral.

A number of stories illustrating these different classes are given here, some of them, the real classics, being given just as they were written; others have been specially adapted for telling, for it is one of the essential points about story-telling that a story which is adapted for reading is very often not adapted for telling. Other stories are found in the *Kindergarten* department of this volume, while numerous fables and some story poems are included in the department of *Language and Grammar*. Under *Mythology*, also in this volume, is to be found a representative collection of myths.

The Frog and the Ox

A FABLE

As an ox was grazing in a marshy meadow, he happened to set his foot on a family of young frogs, and trod almost the whole of them to death. One, however, escaped, and, telling his mother of the sad fate of the rest of her family, he said, "And, mother, it was such a big beast! I never saw such a large one in my life."

"Was it as large as this?" said the old frog blowing herself as much a possible. "Oh!" said the little one, "a great deal bigger, mother." —"Well. was it as big as this?" and she puffed out her speckled skin still more. "O mother, it is no use your trying to make yourself as big as it, for were you even to burst yourself you would not be near its size." The mother frog was much annoyed at this remark: so she once more tried to increase her size, and she burst herself indeed.

MORAL—*Do not covet that which is beyond your reach.*

The Donkey in the Lion's Skin

A FABLE

A donkey, having found the skin of a lion, put it on, and, going into the fields, amused himself by frightening all the animals he met. Seeing a fox, he tried to alarm him also. But Reynard, perceiving his long ears sticking out, and hearing his voice, at once knew who it was. "Ah!" said he, "I should have been frightened too, if I had not heard you bray."

MORAL—*It is not wise to judge a man by the coat he wears.*

Frau Holle

A FAIRY TALE

There was once a widow who had two daughters; one was as pretty as could be, and worked hard for her living; the other was ugly and idle.

Now, it chanced that the widow loved the ugly daughter better than the pretty one, because she was her very own, whilst the pretty maiden was only her step-daughter. So, besides doing all the work of the house, the poor girl was sent every day to sit beside the village well and spin a bundle of flax into yarn. Sometimes she had to work so hard that her poor little fingers were covered with blood; and one day, when this happened, and a few drops of blood had fallen upon the spindle, she bent over the well to wash it clean again, and dropped it in.

She ran weeping to her step-mother, to tell her what had happened, and the angry woman scolded her without mercy. "As you have let the spindle fall in," said she, "you must just go and fetch it out again."

So the poor little maid went back to the well, and in her sorrow and despair, she jumped straight into it, to see if she could find her spindle. At once she lost all consciousness, and when she came to herself again she found that she had fallen into a beautiful meadow, decked with every sweet and lovely flower, where the sun was shining brightly.

As she strolled along the meadow path, she came to an oven full of bread. "Take us out! take us out! or we shall burn," cried the loaves; "we are just baked enough."

So the girl opened the oven door and took out the bread. and then went on her way again. Presently she came to an apple-tree weighed down with fruit, and it called to her as she passed: "Shake me! shake me! My apples are all ripe." So she shook the apple-tree till the apples fell like rain around her. When there were no more left upon the tree, she stacked them in heaps, and went her way.

At length she reached a little house, where an old woman was looking out of the window. The girl was afraid of her great big teeth, and would have run away, but she called to her: "Do not be afraid of me, dear child; I am Frau Holle. Stay with me, and help me with the housework. If you are a good girl, all shall go well with you. But you must take great pains to shake up my bed and make the feathers fly, or else there will be no snow to cover up the earth."

she was treated a thousand times better than ever she had been at home, she had a great longing to go back again. So she went to the old woman and told her how she felt.

"I have been very happy here," she said; "but I have such a longing to see my own people once again that I can stay here no longer."

"It is right you should wish to go home, my child," answered Frau Holle. "You have served me faithfully all this long time, so I will see that you have a safe journey back."

THE FEATHERS FLEW LIKE SNOWFLAKES

The old woman spoke so kindly that the girl took courage and agreed to stay with her.

She worked as hard as she was able, and pleased the old woman in everything she did. She shook the bed with such a will that the feathers flew like snow-flakes. So she led a happy life, with never an unkind word to grieve her, and had boiled and baked meats to eat every day. Time passed on, and the little maid grew pale and sad, though she herself could not tell at first what ailed her. At length she thought it must be homesickness, for, although

She took the girl by the hand and led her to a great gate, which stood wide open. As soon as she passed through, a shower of golden rain fell and covered her with glittering gold from head to foot, so that she looked as though she were clad in a golden mantle. "That is my gift to you, because you have been a good, hard-working girl," said Frau Holle, and then gave her, as well, the spindle which she had let fall into the well so long ago.

Immediately afterward the gate shut with a clang, and the girl found herself back in the world once more, and quite near to her mother's house. As she entered the courtyard, the cock began to crow:

"Cock-a-doodle-doo-doo-doo!
The golden girl's come back to you!"

Then the little maid went in to her mother and sister, who made a great fuss over her, now that she had come home covered with gold.

She told them all that had happened, and when the mother heard how her pretty daughter had come by her fortune, she was anxious that her ugly daughter should have the same good luck. So she sent her to sit by the side of the well, and put a spindle into her hand. The lazy girl had never pricked her fingers with spinning, but she thrust her hand into a thorn-bush, so that it might look as though she had.

Then she threw the spindle into the well, and jumped in after it.

She fell just as her sister had done, into a beautiful flowery meadow, and followed the same path.

When she came to the oven, the bread cried out as before: "Take us out, or we shall burn. We are just baked enough."

The lazy girl answered: "I am not going to soil my hands for you."

Soon she came to the apple-tree. "Shake me! shake me! my apples are all ripe," it cried.

But the girl tossed her head and went on her way. "If I were to shake you," she said scornfully, "I might get a bump on my head from one of you for my pains."

When she reached Frau Holle's house, she saw her looking out of the window, but was not in the least afraid of her, because she had heard beforehand of her large teeth. She engaged herself to the old woman, and at first things went very well. She remembered the gold she would receive at the end of her service, and did her work as well as she was able.

But very soon she grew lazy, and would not get up in the mornings. Then, too, she neglected Frau Holle's bed shamefully, and scarcely shook it at all, so that there was not a feather to be seen. So her mistress soon tired of her, and told her to go home.

Miss Lazybones was delighted, for she thought the time had now come for the shower of gold, but when Frau Holle led her beneath the great gateway, instead of gold there fell a shower of pitch. "This is the reward for your services," said the old woman, and banged the door behind the idle girl.

And so, when she reached home, covered with pitch, and as black as a sweep, the cock, perched on the wall beside the well, began to crow:

"Cock-a-doodle-doo-doo-doo!
Your dirty girl's come back to you."

And dirty the girl remained all the days of her life, for, try as much as she would, she could never wash the pitch off again.

This is one of the tales that has a very plain moral—so plain that it need not be pointed out to the youngest child. Even children sometimes object to the "goody-goody," "Sunday School" stories with their obvious lessons; but the wonder element in this story, the striking character of the reward and the punishment make the story very attractive to children.

The Little Pig That Wouldn't Go Over the Stile

A NONSENSE TALE

One day, as a little old woman was sweeping her little house, she found a crooked sixpence, and she said, "I will go to the market and buy a little pig with this crooked sixpence."

So she did, and as she was coming home she came to a stile.

"Little pig, little pig, go over the stile," said the little old woman; but the little pig would not.

She went a little farther and met a dog, and she said: "Dog, dog, bite pig; pig won't go over the stile, and I shall not get home tonight." But the dog would not.

She went a little farther and met a stick and she said: "Stick, stick, beat dog; dog won't bite pig; pig won't go over the stile, and I shall not get home tonight." But the stick would not.

She went a little farther, and she met a fire. So she said:

"Fire, fire, burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the fire would not.

She went a little farther, and she met some water. So she said: "Water, water, quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the water would not.

She went a little farther, and she met an ox. So she said: "Ox, ox, drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the ox would not.

She went a little farther, and she met a butcher. So she said: "Butcher, butcher, kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the butcher would not.

She went a little farther, and she met a rope. So she said: "Rope, rope, hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the rope would not.

hay, I'll give you the milk." So away went the old woman to the hay-stack; and she brought the hay to the cow.

As soon as the cow had eaten the hay, she gave the old woman the milk; and away she went with it in the saucer to the cat.

As soon as the cat had lapped up the milk, the cat began to kill the rat; the rat began to gnaw the rope; the rope began to hang the butcher; the butcher began to kill the ox; the ox began to drink the water; the water began to quench the fire; the fire began to burn the stick; the stick began to beat the dog; the dog

"LITTLE PIG, LITTLE PIG, GO OVER THE STILE"

She went a little farther. and she met a rat. So she said: "Rat, rat, gnaw rope; rope won't hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the rat would not.

She went a little farther, and she met a cat. So she said: "Cat, cat, kill rat; rat won't gnaw rope; rope won't hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the cat said to her, "If you will go to yonder cow, and fetch me a saucer of milk, I will kill the rat." So away went the old woman to the cow.

But the cow said to her, "If you will go to yonder hay-stack, and fetch me a handful of

began to bite the pig; the little pig jumped over the stile; and so the old woman got home that night.

The Ugly Duckling

A NATURE STORY

It was glorious in the country; it was summer; the cornfields were yellow, the oats were green, the hay had been put up in stacks in the green meadows; and the stork went about on his long red legs, and chattered Egyptian, for this was the language he had learned from his mother. All around the fields and meadows were great woods, and in the midst of these woods deep lakes. Yes, it was right glorious in the country.

In the midst of the sunshine there lay an old farm, with deep canals about it; and from the wall down to the water grew great burdocks, so high that little children could stand upright under the tallest of them. It was just as wild there as in the deepest wood, and here sat a Duck upon her nest; she had to hatch her ducklings; but she was almost tired out before the little ones came; and she seldom had visitors. The other ducks liked better to swim about in the canals than to run up to sit under a burdock, and gabble with her.

At last one egg-shell after another burst open. "Pip! pip!" each cried, and in all the eggs there were little things that stuck out their heads.

"Quack! quack!" said the Duck, and they all came quacking out as fast as they could, looking all around them under the green leaves; and the mother let them look as much as they liked, for green is good for the eye.

"How wide the world is!" said all the young ones; for they certainly had much more room now than when they were inside the eggs.

"D'ye think this is all the world?" said the mother. "That stretches far across the other side of the garden, quite into the parson's field; but I have never been there yet. I hope you are all together," and she stood up. "No, I have not all. The largest egg still lies there. How long is that to last? I am really tired of it." And so she sat down again.

"Well, how goes it?" asked an old Duck who had come to pay her a visit.

"It takes a long time for this one egg," said the Duck who sat there. "It will not open. Now, only look at the others! They are the prettiest little ducks I ever saw. They are all like their father: the rogue, he never comes to see me."

"Let me see the egg which will not burst," said the old Duck. "You may be sure it is a turkey's egg. I was once cheated in that way, and had much care and trouble with the young ones, for they are afraid of the water. Must I say it to you? I could not make them go in. I quacked, and I clacked, but it was no use. Let me see the egg. Yes, that's a turkey's egg. Let it lie there, and do you teach the other children to swim."

"I think I will sit on it a little longer," said the Duck. "I've sat so long now that I can sit a few days more."

"Just as you please," said the old Duck; and she went away.

At last the great egg burst. "Pip! pip!" said the little one, and crept forth. He was so big and ugly. The Duck looked at him.

"It's a very large Duckling," said she. "None of the others looks like that; it really must be a turkey chick! Well, we shall soon find out. Into the water shall he go, even if I have to push him in."

The next day it was bright, beautiful weather; the sun shone on all the green burdocks. The Mother-Duck with all her family went down to the canal. Splash! she jumped into the water. "Quack! quack!" she said, and one duckling after another plumped in. The water closed over their heads, but they came up in an instant, and swam off finely; their legs went of themselves, and they were all in the water; even the ugly gray Duckling swam with them.

"No, it's not a turkey," said she; "look how well he uses his legs, how straight he holds himself. It is my own child! On the whole he's quite pretty, when one looks at him rightly. Quack! quack! come now with me, and I'll lead you out into the world, and present you in the duck-yard; but keep close to me all the time, so that no one may tread on you, and look out for the cats."

And so they came into the duck-yard. There was a terrible row going on in there, for two families were fighting about an eel's head, and so the cat got it.

"See, that's the way it goes in the world!" said the Mother-Duck; and she whetted her beak, for she too wanted the eel's head. "Only use your legs," she said. "See that you can bustle about, and bend your necks before the old Duck yonder. She's the grandest of all here, she's of Spanish blood—that's why she's so fat; and do you see? she has a red rag around her leg; that's something very, very fine, and the greatest mark of honor a duck can have: it means that one does not want to lose her, and that she's known by the animals and by men too. Hurry! hurry!—don't turn in your toes; a well-brought-up duck turns its toes quite out, just like father and mother—so! Now bend your necks and say 'Quack!'"

And they did so: but the other ducks round about looked at them, and said quite boldly:

"Look there! now we're to have this crowd too! as if there were not enough of us already! And—fie!—how that Duckling yonder looks; we won't stand that!" And at once one duck flew at him, and bit him in the neck.

"Let him alone," said the mother; "he is not doing anything to anyone."

"Yes, but he's too large and odd," said the Duck who had bitten him, "and so he must be put down."

"Those are pretty children the mother has," said the old Duck with the rag round her leg.

"They're all pretty but that one; that is rather unlucky. I wish she could have that one over again."

"That cannot be done, my lady," said the Mother-Duck. "He is not pretty, but he has a really good temper, and swims as well as any of the others; yes, I may even say it, a little better. I think he will grow up pretty; perhaps in time he will grow a little smaller; he lay too long in the egg, and therefore he has not quite the right shape." And she pinched him in the neck, and smoothed his feathers. "Besides, he is a drake," she said, "and so it does not matter much. I think he will be very strong: he makes his way already."

"The other ducklings are graceful enough," said the old Duck. "Make yourself at home; and if you find an eel's head, you may bring it to me."

And now they were at home. But the poor Duckling who had crept last out of the egg, and looked so ugly, was bitten and pushed and made fun of, as much by the ducks as by the chickens.

"He is too big!" they all said. And the turkey-cock, who had been born with spurs, and so thought he was an emperor, blew himself up, like a ship in full sail, and bore straight down upon him; then he gobbled and grew quite red in the face. The poor Duckling did not know where he dared stand or walk; he was quite unhappy because he looked ugly, and was the sport of the whole duck-yard.

So it went on the first day; and then it grew worse and worse. The poor Duckling was hunted about by everyone; even his brothers and sisters were quite angry with him, and said, "If the cat would only catch you, you ugly creature!" And the ducks bit him, and the chickens beat him, and the girl who had to feed the poultry kicked at him with her foot.

Then he ran and flew over the fence, and the little birds in the bushes flew up in fear.

"That is because I am so ugly!" thought the Duckling; and he shut his eyes, but flew on farther; and so he came out into the great moor, where the wild ducks lived. Here he lay the whole night long, he was so tired and sad.

Toward morning the wild ducks flew up, and looked at their new mate.

"What sort of a one are you?" they asked; and the Duckling turned about to each, and bowed as well as he could. "You are really very ugly!" said the Wild Ducks. "But that is all the same to us, so long as you do not marry into our family."

Poor thing! he certainly did not think of marrying, and only dared ask leave to lie among the reeds and drink some of the swamp water.

There he lay two whole days; then came thither two wild geese, or more truly, two wild ganders. It was not long since each had crept out of an egg, and that's why they were so saucy.

"Listen, comrade," said one of them. "You're so ugly that I like you. Will you go with us, and become a bird of passage? Near here is another moor, where are a few sweet lovely wild geese, all unmarried, and all able to say 'Quack!' You've a chance of making your fortune, ugly as you are."

"Piff! paff!" sounded through the air; and both the ganders fell down dead in the reeds, and the water became blood red. "Piff! paff!" it sounded again, and the whole flock of wild geese flew up from the reeds. And then there was another report. A great hunt was going on. The gunners lay around in the moor, and some were even sitting up in the branches of the trees, which spread far over the r ls. The blue smoke rose like clouds in among the dark trees, and hung over the water; and the hunting dogs came—splash, splash!—into the mud, and the rushes and reeds bent down on every side. That was a fright for the poor Duckling! He turned his head to put it under his wing; and that at very moment a frightful great dog stood close by the Duckling. His tongue hung far out of his mouth, and his eyes glared horribly. He put his nose close to the Duckling, showed his sharp teeth, and—splash, splash!—on he went without seizing it.

"Oh, Heaven be thanked!" sighed the Duckling. "I am so ugly that even the dog does not like to bite me!"

And so he lay quite quiet, while the shots rattled through the reeds and gun after gun was fired. At last, late in the day, all was still; but the poor little thing did not dare to rise up; he waited several hours still before he looked around, and then hurried away out of the moor as fast as he could. He ran on over field and meadow; there was a storm, so that he had hard work to get away.

Towards evening the Duckling came to a peasant's poor little hut; it was so tumbled down that it did not itself know on which side it should fall; and that's why it stood up. The storm whistled around the Duckling in such a way that he had to sit down to keep from blowing away; and the wind blew worse and worse. Then he noticed that one of the hinges of the door had given way, and the door hung so slanting that he could slip through the crack into the room; and that is what he did.

Here lived an old woman, with her Cat and her Hen. And the Cat, whom she called Sonnie, could arch his back and purr; he could even give out sparks: but for that, one had to stroke his fur the wrong way. The Hen had quite small, short legs, and therefore she was called Chickabiddy Shortshanks; she laid good eggs, and the woman loved her as her own child.

In the morning they noticed at once the strange Duckling, and the Cat began to purr and the Hen to cluck.

"What's this?" said the woman, and looked all around; but she could not see well, therefore she thought the Duckling was a fat duck that had strayed. "This is a rare prize!" she said. "Now I shall have duck's eggs. I hope it is not a drake. We must try that."

And so the Duckling was taken on trial for three weeks, but no eggs came. And the Cat was master of the house, and the Hen was the lady, and always said "We and the world!" for they thought they were half the world, and by far the better half. It seemed to the Duckling that one might have another mind, but the Hen would not allow it.

"Can you lay eggs?"

"No."

"Then will you hold your tongue!"

And the Cat said, "Can you curve your back, and purr, and give out sparks?"

"No."

"Then you will please have no opinion of your own when sensible folks are speaking!"

And the Duckling sat in a corner and was in low spirits; then he began to think of the fresh air and the sunshine; and he was seized with such a strange longing to swim on the water, that he could not help telling the Hen of it.

"What are you thinking of?" cried the Hen. "You have nothing to do, that's why you have these fancies. Lay eggs, or purr, and they will pass over."

"But it is so charming to swim in the water," said the Duckling, "so nice to feel it go over one's head, and to dive down to the bottom!"

"Yes, that's a fine thing, truly," said the Hen. "You are clean gone crazy. Ask the Cat about it—he's the cleverest thing I know—ask him if he likes to swim in the water, or to dive down: I won't speak about myself. Ask our mistress herself, the old woman; no one in the world knows more than she. Do you think she wants to swim, and to let the water close above her head?"

"You don't understand me," said the Duckling.

"We don't understand you! Then pray who is to understand you? You surely don't pertend to be cleverer than the Cat and the woman —I won't say anything of myself. Don't make a fool of yourself, child, and thank your Maker for all the good you have. Are you not come into a warm room, and have you not folks about you from whom you can learn something? But you are a goose, and it is not pleasant to have you about. You may believe me, I speak for your good. I tell you things you won't like, and by that one may always know one's true friends! Only take care that you learn to lay eggs, or to purr, and to give out sparks!"

"I think I will go out into the wide world," said the Duckling.

"Yes, do go," replied the Hen.

And so the Duckling went away. He swam on the water, and dived, but he was shunned by every creature because he was so ugly.

Now came the fall of the year. The leaves in the wood turned yellow and brown; the wind caught them so that they danced about, and up in the air it was very cold. The clouds hung low, heavy with hail and snow-flakes, and on the fence stood the raven, crying, "Croak! croak!" for mere cold; yes, one could freeze fast if one thought about it. The poor little Duckling certainly had not a good time. One evening—the sun was just going down in fine style—there came a whole flock of great handsome birds out of the bushes; they were shining white, with long, supple necks; they were swans. They uttered a very strange cry, spread forth their glorious great wings, and flew away from that cold region to warmer lands, to fair open lakes. They mounted so high, so high! and the ugly Duckling had such a strange feeling as he saw them! He turned round and round in the water like a wheel, stretched out his neck towards them, and uttered a cry, so high, so strange, that he feared as he heard it. Oh! he could not forget those beautiful, happy birds; and as soon as he could see them no longer, he dived down to the very bottom, and when he came up again, he was quite beside himself. He did not know what the birds were, nor where they were flying to; but he loved them more than he had ever loved anyone. He did not envy them at all. How could he think of wishing to have such loveliness as they had? He would have been glad if only the ducks would have let him be among them—the poor, ugly creature!

And the winter grew so cold, so cold! The Duckling had to swim about in the water, to keep it from freezing over; but every night the hole in which he swam about became smaller and smaller. It froze so hard that the icy cover sounded; and the Duckling had to use his legs all the time to keep the hole from freezing tight. At last he became worn out, and lay quite still, and thus froze fast in the ice.

Early in the morning a peasant came by, and found him there; he took his wooden shoe, broke the ice to pieces, and carried the Duckling home to his wife. Then the Duckling came to himself again. The children wanted to play with him; but he thought they wanted to hurt him, and in his terror he flew up into the milk-pan, so that the milk spilled over into the room. The woman screamed and shook her hand in the air, at which the Duckling flew down into the tub where they kept the butter, and then into the meal-barrel and out again. How he looked then! The woman screamed, and struck at him with the fire tongs; the children tumbled over one another as they tried to catch the Duckling; and they laughed and they screamed!—well was it that the door stood open, and the poor creature was able to slip out between the bushes into the newly-fallen snow. There he lay quite worn out.

But it would be too sad if I were to tell all the misery and care which the Duckling had to bear in the hard winter. He lay out on the moor among the reeds, when the sun began to shine again and the larks to sing; it was a beautiful spring.

Then all at once the Duckling could flap his wings: they beat the air more strongly than before, and bore him stoutly away; and before he well knew it, he found himself in a great garden, where the elder-trees stood in flower, and bent their long green branches down to the winding canal, and the lilacs smelt sweet. Oh, here it was beautiful, fresh, and springlike! and from the thicket came three glorious white swans; they rustled their wings, and sat lightly on the water. The Duckling knew the splendid creatures, and felt a strange sadness.

"I will fly away to them, to the royal birds! and they will beat me, because I, that am so ugly, dare to come near them. But it is all the same. Better to be killed by them than to be chased by ducks, and beaten by fowls, and pushed about by the girl who takes care of the poultry-yard, and to suffer hunger in winter!" And he flew out into the water, and swam toward the beautiful swans: these looked at him, and came sailing down upon him with outspread wings. "Kill me!" said the poor creature, and bent his head down upon the water, and waited for death. But what saw he in the clear water? He saw below him his own image; and, lo! it was no longer a clumsy dark-gray bird, ugly and hateful to look at, but—a swan!

It matters nothing if one is born in a duck-yard, if one has only lain in a swan's egg.

He felt quite glad at all the need and hard times he had borne; now he could joy in his good luck in all the brightness that was round him. And the great swans swam round him and stroked him with their beaks.

Into the garden came little children, who threw bread and corn into the water; and the youngest cried "There is a new one!" and the other children shouted, "Yes, a new one has come!" And they clapped their hands and danced about, and ran to their father and mother; and bread and cake were thrown into the water; and they all said, "The new one is the most beautiful of all! so young and so handsome!" and the old swans bowed their heads before him.

Then he felt quite ashamed, and hid his head under his wings, for he did not know what to do; he was so happy, and yet not at all proud, for a good heart is never proud. He thought how he had been driven about and mocked and despised; and now he heard them all saying that he was the most beautiful of all beautiful birds. And the lilacs bent their branches straight down into the water before him, and the sun shone warm and mild. Then his wings rustled, he lifted his slender neck, and cried from the depths of his heart:

"I never dreamed of so much happiness when I was the Ugly Duckling."

We are not accustomed to thinking of this as a nature study, but it has all the elements of the nature tales which modern writers of stories for children produce in such abundance. The emphasis, to be sure, is on the *human* side of the animal characters; but the other side is not neglected. As we read, the ugly duckling seems to us like

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HE WAS NO LONGER A CLUMSY, DARK-GRAY BIRD, BUT—A SWAN!

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Then he felt quite ashamed [illegible] under his wings, for he [illegible] do; he was so happy, and [illegible] for a good heart is never [illegible] how he had been driven about [illegible] despised; and now he heard them [illegible] he was the most beautiful of all [illegible] And the lilacs bent their [illegible] into the water before him, and the [illegible] warm and mild. Then the [illegible] lifted his slender neck, and cried [illegible] of his heart:

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a person, but he also seems like a duckling. The attitude of the other ducks toward the ugly duckling, who is near enough like them not to seem a stranger, and yet not exactly one of themselves; the instinct which makes the duckling, all unconscious that he is himself a swan, cry out when he sees the other swans; the instinct which keeps the hunter's dog, trained to pick up dead geese, from touching the live swan—all these are true to nature.

The lesson of the story, which is very plain, is a most beautiful one, and one which parents and teachers cannot afford to miss. There is many a child, awkward, conscious, large for his age, who is mistreated, laughed at, sometimes even abused, just because he is not like other children. And then, perhaps, later it is found to be just a repetition of the story of the ugly duckling; the child did not seem like other children because he was not like other children. He was something bigger, stronger, more beautiful than they, and for that very reason it took him longer to develop.

We might read over and over some such statement as this: "Just because a child is different from others, just because he is not attractive as a child, we cannot judge what he will be as a man. Perhaps he will amount to more in the end than all of his normal associates." But would such a statement make much impression on us? When we read *The Ugly Duckling*, however, we find it impossible to forget the lesson it teaches, and we find ourselves more ready to say, when we see a misjudged child, "Look out. He *may* turn out to be a real ugly duckling."

The Gifts the Dwarfs Made

A NORSE MYTH RETOLD FOR CHILDREN

This is a story about dwarfs, little dark men who lived far down under ground and made wonderful things.

Sif, Thor's wife, was most beautiful, with her blue eyes, fair skin, and golden hair. Her hair! It was the most glorious hair that had ever grown on anyone's head—bright and soft and fine, and so long and heavy that when she let it down it covered her from head to foot like a golden veil. Of course she was very proud of it, and of course Thor was proud of it too and loved to watch her shake it out so that it shone and rippled like a golden waterfall in the sun.

One morning when she woke, Sif found that her hair had been cut off close to her head. A look into her polished silver mirror showed her that the most of her beauty had gone with her hair, and she scarcely dared face her husband; but when she told Thor his anger was terrible to behold.

"It is Loki, the wicked Loki, who has done this," he cried, "and he shall suffer for it."

For Loki was a crafty schemer, always trying to annoy someone, and particularly fond of troubling Thor.

It was no easy task for Thor to catch the thief, for Loki had the power of changing his shape to that of anything he chose, and he made good use of this power now. Finally, however, Thor found him and grabbed him by the throat.

"Confess," he cried, "that you stole Sif's hair."

But his grip was so strong that Loki could only gasp and wriggle.

"Unless you give it back," Thor continued, "I shall kill you here and now," and he loosened his grasp that Loki might answer.

"I did it," confessed Loki sullenly, "but I cannot give it back, for I opened my hands and scattered it all over the earth."

"Then you shall die!" thundered Thor, and would have kept his word had not Loki promised to get for Sif a new head of hair as beautiful as the first.

"Go then," commanded Thor, "and make haste."

Loki slunk away and crept into the earth where lived his friends the dwarfs. They were ugly and not always very pleasant, but Loki knew their skill and knew that they were proud to be called on to show it. So he implored them to make for him not only the golden hair, but gifts for Odin and Frey, Thor's powerful friends, of whose anger Loki was afraid.

To anyone else it might have seemed like a very difficult matter to have to make a head of golden hair, but the dwarfs thought nothing of it. They brought their gold, and when they had softened it they spun it out into countless fine hairs. These they braided into a huge coil and gave to Loki.

"It may seem dead now," said the mastersmith, "but when it touches Sif's head it will at once become alive and begin to grow, yet it will always be real gold."

Wonderful as this was it was not the most wonderful of the dwarfs' gifts. For how could anything be as wonderful as the spear which they made for Odin, the spear which however it was thrown never missed its aim; or as the ship which they made for Frey? For this ship, while it could be folded up and thrust into the pocket, could be made so large that hundreds of people might ride in it in comfort, and it sailed as well in the air as on the water and always in just the right direction, no matter which way the wind blew.

No wonder Loki was pleased, and no wonder he cried aloud to the master-smith:

"You are surely the most clever smith in all the world. No one else, I am sure, could make such things."

IN THE DWARFS' SMITHY

But someone was passing and heard these words and was not pleased to hear them; this was the dwarf Brock, who belonged to a different family of dwarfs. When he heard the flattering words of Loki, whom he hated, he stopped and said:

"I do not know what your gifts are, but I know that whatever they are my brother Sindri can make something more wonderful."

"Let us make it a wager," cried Loki. "I will meet you tomorrow in Odin's great hall, and you may bring with you there three things made by your brother to present to Thor and Odin and Frey, and then we shall see what we shall see. And whichever one of us brings the most wonderful gifts shall have the other's head."

Without a word Brock turned and hurried to his brother's smithy, where he told his story; and Sindri, proud of his brother's faith in him, at once set to work. But first he said to Brock:

"You must blow the bellows while the gifts are being made, for I must go outside and work my magic spells or I shall not be able to accomplish anything wonderful; and whatever happens, never leave off blowing the bellows." And with these words he tossed into the fire a pig's skin, and thrusting the bellows into Brock's hands left the smithy.

Now Loki, for all his boastful words, was a little bit worried, and to be on the safe side he came to Sindri's smithy to see what was going on there. But Brock did not see him—Loki was not so foolish as to let himself be seen. He turned himself into a gadfly, and settling on Brock's hand, stung him until the pain was almost unendurable. But Brock blew the bellows and blew the bellows and never left off for a minute. When Sindri came back he said: "Good brother"; and he drew out of the fire a boar with shining bristles of gold.

Next he threw into the fire some gold, and warning Brock once more to be careful never to cease blowing the bellows, he again left the smithy. This time Loki settled on Brock's cheek and stung even more sharply than before, so that the poor little dwarf had to set his teeth hard to endure the pain. But still he never left off blowing the bellows, and when Sindri came back, there was found in the fire, instead of the lump of gold that had gone in, a heavy ring of gold, carved most beautifully.

"Once more," said Sindri, as he threw a lump of iron into the fire; "and this time be *extra* careful about the bellows." Brock turned to work bravely, but the gadfly Loki settled just over his eye, and stung him so fiercely that the blood ran down into his eye so that he could not see what he was doing. The pain would never have made him stop, but he just had to put up his hand and wipe the blood from his eye, and at that moment Sindri entered the room.

"You have spoiled it!" he cried, as he sprang toward the fire; but when he drew out the heavy hammer to which the lump of iron had been changed, he comforted Brock by telling him that it was not entirely spoiled—"only the handle is too short," he added.

"Loki declared," said Brock, "that his gifts were not only beautiful and useful, but that they were magic gifts and could do wonderful things."

Sindri smiled, then whispered something in Brock's ear which made the little dwarf's eyes shine.

The next day he was at Odin's hall promptly at the appointed time, and he stood patiently by while Loki gave his gifts.

"It is even more beautiful than the old hair," declared Thor, as Sif shook out about herself the new golden threads.

"And such a spear!" cried Odin. "No enemy will ever be able to stand against me now."

"But mine is best," said Frey, "for we can all use it. Come," he went on, turning to the crowd which had assembled, "let's go for a ride in this wonderful new ship."

"Wait," cried Brock, "I have something, too, to offer."

"What, more gifts?" exclaimed Odin. "Of course we will wait."

But he looked a little disappointed when Brock put into his hand the heavy gold ring, for he had rings a-plenty, some of them as beautiful as this one.

"It is a magic ring," said Brock; "every ninth night, eight rings as large and heavy as this one will drop from it. That one ring alone would make a person rich."

Then he pulled from his huge sack the golden boar, glittering in the sunlight.

"It is named Gullinbursti," said Brock to Frey, "and it is a magic boar. On his back you can ride through the air as fast as a thought can fly, and even in the darkest night it need never be dark to you, for the bristles of Gullinbursti will give out light as he flits across the sky."

"I like him even better than the ship," said Frey; and Odin, who had been looking at his two gifts in silence, now said:

"And I like the ring better than the magic spear."

Brock grew more and more cheerful, and Loki's frown grew blacker and blacker, but he smiled again when Brock drew out and handed to Thor, the ugly, short-handled hammer. Thor himself looked none too well pleased. Was the dwarf making fun of him? Hammers of this sort were to be had any day for the asking.

"But it is a magic hammer," exclaimed Brock. "It hits anything at which it is thrown and it never hits in vain. The strongest mountain will split, the strongest giant will die at a stroke of this hammer, and no matter how far it is thrown it will always fly back to your hand."

At the word "giant," Thor's look of displeasure changed. For were not the giants, the huge, ugly frost-giants, his worst enemies? And had he not always, up to this time, tried in vain to overcome them?

"Sif's hair is beautiful," he said, looking at his wife with pride in his eyes, "and the hammer is not beautiful, but I like the hammer better."

"Brock has won! Brock has won!" cried the crowd, who had heard of the wager and were none too fond of Loki, "and he may have Loki's head."

Brock turned for vengeance on Loki, but Loki had disappeared.

"I gave you the hammer; you will help me to find him," said the dwarf to Thor, and because he hated Loki and was grateful to Brock, Thor soon brought Loki back.

"You may take my head," said Loki; "it is yours by the terms of our wager. But if you touch my neck, or spill one drop of my blood, you will be taking more than belongs to you, and you must die."

"I am afraid that is right," said Thor, and Brock was in despair.

But at last he decided that if he could not have Loki's head he would at least sew up his lying, boastful mouth; so he borrowed an awl from his brother Sindri, made holes through Loki's lips, and fastened them together with a leather thong.

And so for a while there was peace, because Loki could not make trouble with his tongue. But it was not for long. Loki managed to cut the cord and was soon going about making trouble just as he had always done.

The Story of Arnold Winkelried

There have been brave men in every age and in every country, but there have been few braver than Arnold Winkelried, who was not a king, not a general at the head of his troops, but just a poor Swiss peasant.

Over five hundred years ago, the little cantons of Switzerland had banded together and were making a desperate struggle for liberty; for the rulers of Austria, who ruled Switzerland too, oppressed the Swiss people terribly and gave them no rights of any sort.

At last, in the summer of 1386, a great battle took place. The Austrian army, led by Duke Leopold, had four thousand horsemen and fourteen hundred foot soldiers, while the Swiss army had only thirteen hundred men altogether.

The Swiss are a brave people and the difference in the strength of the forces did not daunt them; but when they came to the actual conflict it seemed as if there were no way to begin the attack. The Austrian army looked like a wall, but a wall which bristled with spearpoints. Nowhere could the Swiss find or make an opening, and until they could, they knew that they should hurl themselves in vain on their enemies.

In the front rank of the Swiss there was one man, Arnold Winkelried, who was even braver than his comrades. His quick eye saw the difficulty, his brain told him the one way that it might be overcome, and he was brave enough to take that way; but the thought of his family held him for a time. Could he sacrifice them?

Still the two armies stood facing each other; still the Austrians in their pride looked scornfully at the little Swiss company. There should be a break in that solid phalanx! With a cry of "Make way for liberty!" Winkelried sprang forward, spread his arms, and gathering several of the enemies' spears, pressed them into his breast.

His deed was an inspiration to the Swiss, and they pressed forward into the little gap which he had made, and before the close of the day, the Austrian army had fled from the field, leaving fourteen hundred dead, and the Swiss had won a complete victory. Five hundred years later, in 1886, a monument was erected on this battlefield in honor of the heroic self-sacrifice of a common Swiss soldier.

It is not to be understood that all historical stories told to children are to be stories of bravery on the battlefield. It is, in fact, true that while such tales stir the blood of young people, they cannot have the same effect that stories of the heroes of peace may have, for very few will ever be called upon to show bravery on a battlefield. However, young children are much more interested in stories which have vigorous action, and it is only as they grow older that they are really interested in the struggle and accomplishments of even the greatest statesmen.

Joseph and His Brothers

Jacob, the patriarch, had many sons; but of them all, Joseph, the youngest, was his favorite. Nor did he attempt to conceal this from the other ten sons. Naturally they were jealous of Joseph, and this jealousy was increased when their father gave to the boy a most wonderful coat—a coat of many colors.

Joseph, though a good boy, was somewhat spoiled by his father and was not always wise in the way he talked to his older brothers. For instance one day he went to them in great glee and said:

"Hear this dream which I have dreamed; Behold, we were binding sheaves in the field, and my sheaf arose and stood upright, and your sheaves bowed down and worshipped it."

This made the brothers very angry, and they cried:

"And do you really believe that you shall reign over us?"

But their anger was no warning to Joseph, and a few days later when he dreamed that the sun and moon and eleven stars bowed down before him, he foolishly told this dream to his father and to his brothers. And his father, seeing the effect it had on his older sons, rebuked Joseph.

"Shall I and thy mother," he said, "and thy brothers indeed come to bow down ourselves to thee to the earth?"

Now Jacob had many sheep, and the ten older sons had gone with them to a fine feeding-ground in Shechem. One day Jacob called Joseph to him and said:

"Go and see whether it is well with your brothers and with the flocks and bring me word."

But when Joseph reached Shechem he found no trace of his brothers. At last, after wandering about, he met a man who told him that the brothers with all of their flocks had gone to Dothan, and there Joseph found them.

As the boy advanced toward them across the field, one of them said scornfully to the others, "Behold the dreamer cometh," and they began to plot in their envy and their hatred how they might put the boy out of the way.

One brother suggested that they kill him and drop his body into a pit and then return to their father, declaring that some wild beast had eaten him. "Then we shall see," he said, "what shall become of some of his dreams." But Reuben, the oldest son, had pity on the boy and advised them not to kill him but to put him into a deep pit which was near at hand; for Reuben meant when the other brothers were out of the way to save Joseph and send him back to his father.

After they had put the poor boy into the pit, they sat at their meal discussing what they might do with him; and as they talked they saw coming toward them a company of merchants with camels, who were going down into Egypt. One brother, perhaps because he was avaricious, perhaps because he did not want Joseph killed, suggested that they sell the boy to the merchants to be sold again as a slave in Egypt.

This they did, and then, because they feared to tell their father of what they had done, they took Joseph's coat of many colors and dipped it in the blood of a kid and took it to their father. Even now they did not lie to him outright and say, "Your son has been killed"; they showed him the coat stained with blood and said, "Can you tell whether this is our brother Joseph's coat?"

And Jacob knew it instantly and said, "It is my son's coat. An evil beast has devoured him."

Meanwhile, Joseph had been carried by the merchants to Egypt and there sold to Potiphar, an officer of Pharaoh the king. And from the very first the young man prospered; for Potiphar found that he could be trusted. His master's wife, however, became angry with him most unjustly and told false tales of him to Potiphar, who in his wrath had him put into prison. But even here Joseph was fortunate, for the keeper of the prison soon discovered that he was wise and trustworthy, and gave him control over all the other prisoners.

Now, in the prison at this time there were two servants of Pharaoh the king of Egypt—his chief butler and his chief baker.

JOSEPH CARRIED INTO EGYPT

One night each of these men dreamed a dream, and when Joseph visited them in the morning he said, "You look sad. Has anything troubled you?"

And in reply they told him of their dreams and begged him to interpret them for them; for in those days people believed that things which were to happen in the future were foretold by dreams. First the butler told his dream:

"In my dream, behold, a vine was before me; and in the vine were three branches, and it was as though it budded and her blossoms shot forth; and the clusters thereof brought forth ripe grapes. And Pharaoh's cup was in my hand; and I took the grapes and pressed them into Pharaoh's cup, and I gave the cup into Pharaoh's hand."

And Joseph interpreted thus:

"The three branches are three days. Yet within three days shall Pharaoh lift up thine head, and restore thee unto thy place; and thou shalt deliver Pharaoh's cup into his hand, after the former manner when thou wast his butler. But think on me when it shall be well with thee, and shew kindness, I pray thee, unto me and make mention of me unto Pharaoh, and bring me out of this house. For indeed I was stolen away out of the land of the Hebrews, and here also have I done nothing that they should put me into the dungeon."

The baker, pleased that the butler's dream had been so happily interpreted, then told his:

"I also was in my dream, and, behold, I had three white baskets on my head; and in the uppermost basket there was of all manner of bakemeats for Pharaoh, and the birds did eat them out of the basket upon my head."

But Joseph's interpretation of this was by no means so happy. He said:

"The three baskets are three days. Yet within three days shall Pharaoh lift up thy head from off thee, and shall hang thee on a tree, and the birds shall eat thy flesh from off thee."

And it all happened as Joseph had predicted, for in three days the chief butler was restored to his place, while the chief baker was hanged. But the butler promptly forgot the promise he had made to Joseph to remember him when he was restored to his place, nor did his promise occur to him for two full years. Perhaps he would not have thought of it even then, had not circumstances called it to his mind.

One night Pharaoh the king dreamed two dreams which troubled him strangely. All the magicians of his kingdom were sent for and questioned, but not one of them could give him an explanation of the strange dreams. Now it was that the butler remembered the young man who had so wonderfully interpreted his dream in the prison, and he told Pharaoh of Joseph. Joseph was summoned to appear before the king, and when he stood in the royal presence Pharaoh said:

"In my dream I stood upon the bank of a river, and there came up out of the river seven kine, fat and well-favored, and they fed in a meadow. And soon there came up out of the river seven other kine, lean and ill-favored, worse than any I have ever seen in the land of Egypt; and the lean kine ate up the fat kine, nor were they, after they had eaten, any less poor and ill-favored. The second dream was very like the first. Seven good, full ears of corn came up on one stalk, and seven withered, thin ears, blasted with the east wind, sprung up after them and devoured them. Both of these dreams I have told to my magicians, but they were unable to interpret them.

Without hesitation Joseph replied:

"The seven good kine and the seven good ears are seven years; the seven thin kine and the seven blasted ears are another seven years. This means that there shall be seven years of great plenty throughout all the land of Egypt, and then seven years of famine so severe that all the plenty shall be forgotten in the land of Egypt.

"Now the wise thing for the king to do is to choose a discreet man and put him in power over all the land, and let this man see that during the seven good years much food is stored up against the seven years of famine."

Pharaoh was much impressed by the advice of Joseph, and when he came to choose such a man to set over all his kingdom, he decided that there was no one among his own people whom he could trust as he could this young man. Thus, at the age of thirty, Joseph became practically ruler over Egypt, second in rank only to the king.

Everything happened as the dreams had foretold, and during the seven years of plenty Joseph and his officers were very busy getting food into the storehouses. Thus when the years of famine did come there was food for all who came to Joseph to buy.

Now it was not only in Egypt that the famine was severe; all the neighboring countries were suffering, and men from all countries came into Egypt to Joseph to buy corn. And among those who came were the ten brothers of Joseph. The youngest brother, the child Benjamin, they left with their father in Canaan, because the old man was so devoted to the child that he could scarce live away from him.

When the ten brothers of Joseph appeared before him, he knew them instantly in spite of the years that had passed. But they did not recognize, in the splendidly garbed favorite of the king, the brother whom they had sold, and who they imagined had died long since. To test them Joseph spoke to them roughly and even accused them of being spies; but they told him the truth about themselves—that they were all sons of one father and that they had one young brother at home in Canaan, and had had another. We can imagine Joseph's feelings when they said, "One brother is not."

Finally Joseph declared that he would sell them corn and allow them to go back to their own country only if one of them remained as a pledge that the other nine would return and bring with them their brother Benjamin. Simeon was the one chosen to remain, and the others departed without him, with their beasts of burden carrying sacks full of grain.

Now Joseph had commanded his servants to place in the sacks of grain the money which the brothers had brought with them to pay for the grain. Thus when they reached home they found that they had not only food, but all of their money.

Jacob, their father, was much distressed when he heard that they had promised to take Benjamin down to Egypt with them, and cried out to them:

"You have bereaved me of my children. Joseph is not and Simeon is not and you will take Benjamin away." And for a long time he refused to let them return to Egypt.

At length, however, the famine became so severe that it was absolutely necessary that they should in some way obtain more grain, and finally Jacob consented to allow Benjamin to go with them, Judah, one of the older brothers, pledging his own life that the boy should return unharmed.

When the brothers with the young Benjamin appeared before Joseph he was strangely moved, and he commanded that a feast be prepared for them in his own house. Joseph ate by himself, the Egyptians by themselves and the brothers by themselves, as the law of the Egyptians forbade them to eat with the Hebrews.

JOSEPH MEETS HIS FATHER

When the meal was over, Joseph commanded his servants to fill the brothers' sacks with grain and again to place each one's money in the mouth of his sack. In addition to this he ordered that his own silver cup be placed in Benjamin's sack.

The next morning when the Hebrews had gone but a little distance from the city Joseph's steward ran after them and overtook them and cried:

"Why have you repaid my master with evil when he did you nothing but good? One of you has stolen his silver cup."

The brothers protested that they knew nothing of the cup and declared that if it should be found upon any one of them, that one should die and the rest should return as servants to Joseph. But when the search was made, the cup was found in Benjamin's sack.

Sadly the little procession which had started out so joyously turned and went back to the palace of Joseph. They could not understand what had happened; they felt certain that Benjamin had not taken the cup, but how could they prove this? And they were responsible to the boy's father for his safety.

Joseph, when he met them, pretended to be very severe, but when Judah declared that they were all ready to be servants of Joseph, Joseph refused, saying:

"You may all go in peace, except the one in whose sack the cup was found. He shall be my servant." Then Judah stepped out before the rest of the brothers and told Joseph how he had become surety to his father for the boy, and begged Joseph to allow him to remain as bondman but to let the boy go back to his father.

"For how," he concluded, "shall I go up to my father and the lad be not with me?"

At this Joseph could restrain himself no longer. Sending all his servants and officers from the room, he cried:

"I am Joseph. Does my father yet live?"

Of course the brothers were afraid of his vengeance, but he comforted them and forgave them, assuring them that they had done him no harm, but only good, by selling him into Egypt.

"For God," he declared, "did send me before you to preserve life."

The joy and relief of the brothers of Joseph was beyond bounds, and Joseph himself was no less happy. Even Pharaoh, the king, when he heard that Joseph's brothers had come, was pleased, and sent word that they were to return to Canaan for their father and their households, and that they were then all to come down into Egypt, where he would allot to them for their homes the best land in the kingdom.

Joyfully the brothers returned home and told their father the wonderful story, which the old man could not at first believe. When he was at last convinced, he exclaimed:

"It is enough! Joseph my son is yet alive. I will go and see him before I die."

With their families and their servants, their flocks and their herds and their beasts of burden, the father and brothers of Joseph journeyed down into Egypt. They found that Pharaoh was as good as his word. He gave them land in plenty and they settled down in the strange land which yet did not seem strange to them because Joseph was ruler over all of it.

Games and Plays

Value in Play. The educational world is beginning to recognize the importance of play in the development of a child's character, and many public school systems make provision for games and plays in their course of study. Large cities are not only establishing playgrounds at public expense, but are also providing attendants who can teach the children interesting and healthful games. The suggestions here given are for the purpose of assisting teachers and parents who wish to teach the children under their charge to play in the right way.

"Play is not trivial; it is highly serious and with deep meaning," says Froebel. Play is one of the ways in which the child expresses himself. Games furnish one of the means of securing at least part of the development stated in the duecational ideal—"a healthy mind in a healthy body." Games aid in the cultivation of social and of competitive activity; they afford an opportunity for ethical training.

The play time furnishes an opportunity of so refreshing the body and mind, stiffened or fatigued from close application to work, that the work itself will be more advantageously pursued, and the time used in exercise more than made up because of renewed interest and attention. Because little children become easily fatigued, frequent brief play periods should be provided for, rather than one long one.

Aims. This work in physical training must be:

(1) Hygienic, adding to the health of the child through its good effects on circulation, respiration, etc.

(2) Corrective, tending to correct the defects in posture and movement caused by stooping over desks, etc.

(3) Educative, training the brain, nerves, and

muscles to alert, controlled action: the harmonious working of body and mind.

(4) Recreative, furnishing relaxation, fun, joy, all of which increase the value of the work for the pupil.

Now every game cannot have all these four values. The game, the aim of which is educative, as ring toss, which requires precision of movement and quick response of the body to the mind, should be played often, but not to the exclusion of others whose main aim is, let us say, hygienic, as racing, which gives a healthy stimulus to the circulation and respiration. Vary your games.

Some Simple, Practical Suggestions. Do not waste the short play time in making elaborate plans about what is to be played; get right to business and keep things moving.

During the game period, throw open the windows so that the air may be completely changed.

Let the teacher enter into the spirit of the play, making it a period, to an extent, of recreation to herself. She needs it.

Encourage the children to get into the habit of taking deep, full breaths to "wash out" the lungs. Tell them to take three such breaths every time they step out of a door into the air.

The best method of teaching a game is to make a full explanation of it before the pupils take their places to play. Never try to teach and play a game at the same time.

As a rule let the children choose the games. Encourage "team" work, trying with all their might to win for their side.

Insist on holding to the simple rules of the game—to the honest winning or losing of a game.

Games for Young Children

In the Schoolroom or the Home

I Saw. A child in each row tells of some action he has seen, as a duck flying, a soldier marching, or a train speeding, at the same time illustrating it. Each row in turn follows its leader around the room, imitating the action shown.

Express Train. Children are chosen for engine, headlight, bell, wheels, conductor, passengers, etc., and run in a row up and down the aisles, executing the action appropriate to each part. "Train is stopping!" calls the teacher. It comes to a standstill, children take their seats, and another train is "made up."

Squirrel Game. The children blind their eyes with heads upon their desks, and one hand open, in the hope of getting a nut which one child, the "squirrel," may drop into it. The child who receives the nut runs on tip-toe after the squirrel and tries to catch him before he reaches his seat. If he does not, then he is "squirrel."

Hole in the Ice. The "hole" or "crack" in the ice is represented by two chalk lines on the floor. One row of children at a time runs or jumps, in turn, trying to jump over the "hole." If any one touches the floor between the lines, instead of going home to his seat he must first come to the front of the room, while the other rows are jumping, and dry his feet by running on tip-toe "on place." The width of the "crack" may be gradually increased. This game is good for circulation and respiration.

Follow the Leader. A competent child leads the class around the room, up and down the aisles, skipping, then waving, stepping high like a horse, clapping, etc., changing quickly from one to another. The other children imitate. This and the following are excellent for brief recreative exercise.

Review Roundel. (This may be sung to the tune *Yankee Doodle.*)

"There you stand before us all
To teach us what to do, sir!
Now show a motion you recall
And we will follow you, sir!"

The pupils should stand at their desks or in a circle. The pupil chosen for "teacher" stands in front. The pupils march forward on lines 1 and 3, and backward to place on lines 2 and 4, singing as they step. At the close of the song, the "teacher" shows a favorite exercise, as sawing wood, touching the floor with the finger tips with knees sprung back, etc. The rest of the class imitate it. "Teacher" may mark the rhythm by singing *la* to *Yankee Doodle* tune, as the pupils take the exercise. This game gives all a little exercise at once.

Bean Bag Games. The following games can be played with bean bags about 5 inches by 5 inches made by the children (a set of these should be in every schoolroom for games), or with a large, light rubber ball. Some games can be played out of doors.

The teacher may open the game as follows: As many pupils as possible may take places on a chalk circle drawn on the floor in the front of the room, or where there is a vacant space.

The pupil who is "it" or "teacher" tosses the bag to any pupil in the circle, who becomes "teacher" if he catches the bag, or must take his seat if he does not. The pupils for whom there was not room at first, may fill vacant spaces.

The game may be varied by the "teacher" tossing the bag in the air and calling the name of a child, who becomes teacher if he jumps forward and catches it, or takes his seat if he does not. This latter variation of the game should be played very quickly.

Cat-Stitch. Number the rows or aisles of children, 1, 2, 3, 4, etc. The pupils should stand, each even row facing the nearest odd row. The first pupil in the even row tosses the bag to the second pupil in the odd file, the bag continuing in a zigzag course to the last pupil, who tosses it directly across, so that after returning in a zigzag course, the first pupil in the odd row will have the bag. Count may be kept to see which double row finishes, without dropping the bag, first. Allow laughter, but insist on attention.

Touch Ball. The ball or bag is passed rapidly from one to another of those forming the circle high or low, across the circle, or in any direction, stated by the teacher. A player, or "it," in the center, tries to touch the ball or bag, and changes places, when successful, with the one who had it when it was touched.

Out of Doors

Play out of doors when possible. Some of the following games may be played indoors, if space permits, in stormy weather:

Cat and Mouse. The players form a circle, grasping each other's hands and standing about an arm's length apart. The cat stands outside the circle; the mouse to be caught stands inside. The pupils forming the circle may favor one or the other by raising arms to allow passing in and out of the circle, or may lower arms to prevent it. As soon as the mouse is caught, other players are chosen.

Hawk and Hen. About ten or twelve children stand, one behind another, with their hands on the shoulders of the player in front, and represent hens. Another player, the hawk, tries to catch the last hen in the line, and the first hen tries to prevent this by getting in front of him, and by raising arms, etc., while the rest try to keep out of the way of the hawk. As soon as a hen is caught, she is out of the game. Choose an alert mother hen to head the line.

Moon and Morning Stars. This game is played when the sun is shining. One of the players is the moon and takes her place in the shadow of the schoolhouse, a tree, etc. She must not go into the sunshine. The other players, the morning stars, dance from the sunshine into the shadow near the moon, calling:

"O the Moon and the Morning Stars!
O the Moon and the Morning Stars!
Who will step—Oh,
Within the shadow?"

The moon tries to tag the stars, and they may either be kept with her or change places with her, as the players decide.

Dare Base. A line is drawn midway between the goals. A catcher stands at each end of this line. The other players run back and forth between the goals; they may not be tagged when in the goals or on the base line, but they may not pass back to the goal from which they started until they have gained the opposite goal. Those who are caught are put out of the game, or they may be made catchers.

Black Man. One is counted out as Black Man. The rest come round, crying, "Who is afraid of the Black Man?" Suddenly the Black Man begins to chase. When one is caught, he is Black Man, or else he may be the Black Man's Helper. The game closes when all are caught. Bounds must be set beyond which no one may run.

Frog in the Middle. Any number may play this. One player is chosen for "frog" and sits in the center with his feet crossed. The other players stand in a circle around the frog, repeating, "Frog in the middle can't catch me!" They dance forward toward the frog and back, taking risks in going close. He must keep his position while trying to tag his tantalizers. The one tagged is frog.

Other Games. Among other games suggested for young children are the following: Mulberry Bush, Farmer in the Dell, Jacob and Rachel, Oats, Peas, Beans, Drop the Handkerchief, London Bridge, Hopping, Three-Legged and Backward Races, Stoop Tag, Wood Tag, Pussy Wants a Corner, Bean Bag Throw, Itisket-Itasket, Shadow Tag, Follow Chase. Most of these one child or another will recognize by name and will gladly lead.

Games for Older Children

In the Schoolroom or the Home

Many of the games suggested for young children remain favorites and may be continued as the children grow older. As children grow older they enjoy the "team" element in games and are more anxious for their side to win than are the young children, who love more the mere activity of the game. Races, especially relay races of all sorts, appeal, therefore, to older children.

Bean Bag Race. Bean bags, books, erasers, or wands are held above the heads by pupils seated in the front seats. All the children sit erect with arms raised overhead. At command the bags are passed backwards above heads by pupils until the last pupils are reached. These pass them forward in the same manner. The pupil in front first receiving the bag rises to show which row has won. Allow the enthusiasm free expression in this most valuable game.

First In, First Out. A group of three erasers, or bean bags, etc., is placed in a chalk-marked square on the floor in front of alternate rows. The players, beginning with the pupils in the front seats of these alternate rows, take the objects one at a time from the square and place them in a similar square at the back, running down one aisle and returning by the other. When all are gathered, they are returned in the same manner, and the pupils in the second seats, without pause, continue the game. The row whose pupils finish first indicate it by clapping. This game is full of fun and excitement and a great outlet for the repressed energy of the child from ten to fourteen.

The same rules apply to the game of running to touch front and back wall in succession, and then taking the seat, which can be played when time is very limited and relaxation for all is desired.

Running Relay. The room may choose sides to last for a week. These sides may stand in close rows in the two center aisles, leaving aisles for runners at each side. Each leader has one bean bag. At the teacher's word "Go," the bag is passed rapidly down the line. The last pupil runs to the head of the aisle with it and the passing continues, the line gradually moving down as the children come to the head. This lasts until the first player is in his position again as leader. The side whose leader is first in place indicates winning by clapping.

Tossing Tally. Let pupils, one from each row in turn, stand at a given distance from a slanted board, two by three feet, with an opening eight inches square in the center, and throw bean bags. Bags passing through the center score ten points; those landing on the top of the board score five points, and those landing on the floor diminish the score by five points. Bags displaced count for the rows by which they are displaced. The score should be 100.

Out of Doors

Three Deep. The players form a double circle, one within the other. The distance between the players must be two steps. One player stands directly behind another. There are two "its," one trying to tag the other as he runs around the outer circle. Just as he is about to be tagged, the runner quickly moves to the inside in front of a pair of players (making "three deep"), and then the last, or outside player, must run. If the tagger succeeds in touching the runner before he jumps inside, they reverse the running, the one who has tagged trying to get in front of a pair at once. The children should never run across the circle or between circles to reach inside. This game is a particular favorite with older children, and makes for alertness as well as for general physical development.

Fire on the Mountains. Places are marked in a circle by sticks or stones, with considerable space between, providing for two less spaces than there are players. One of the odd players is a leader, and sits or stands in the center; the remainder, or "circle men," take the places marked. The other odd man stands anywhere between the bases or marked places. The object of the game is for the "circle men" to change places on a signal from the leader, each player trying to avoid being the odd man by losing a place. The longer the distance between the bases, the better the sport. The running must be done in a circle outside of the bases and no cross cuts through the circle are allowed. The player in the center calls:

"Fire on the mountain, run, boys, run!
You with the red coat, you with the gun;
Fire on the mountain, run, boys, run!
Base!"

Then the changes must be made, the center man and the other odd man trying to get a base. Those left out are the "its" as the game continues. Forfeits may be used in this game.

Last Couple Out. This game requires an odd number of players. One is chosen for catcher, who stands with his back to the rest, not less than ten feet in front of the rest of the players. The rest of the players stand in couples in a long line behind him, facing in the same direction that he does. The catcher calls, "Last couple out!" Then the last couple in the line runs toward the front, the right-hand one on the right side of the double line, and the left-hand one on the left side, and try to join hands in front of the catcher. The catcher must not chase them before they are in line with him, and must not turn his head to see them as they come. They should try to confuse him by circling far out beyond him on either side, or by one keeping close and the other circling out, etc. If the catcher succeeds in catching one of the players before that player can clasp hands with his partner, these two, catcher and caught, form a couple at the head of the line, which moves back a step. If neither is caught they are free, or out of the game.

Trade Game. A few players step aside and decide on some trade to represent. They advance to the others, saying: "Here we come!" The others respond, "Where from?" "New York," they reply. "What's your trade?" The few then show in pantomime some trade, either all taking the same action. or various actions used in the occupation chosen. The first one to guess the trade chases the players, trying to tag those desired for the next trade game, which the guesser promptly gathers a few players to decide upon. This is one of the most valuable of the "guess-action" games, which the teacher can vary to suit the needs of the school.

Other Games. Among other games suggested for older children are the following: Potato Relay Race, Black Tom, Hound and Rabbit, Prisoner's Base, Indian Club Race, Vaulting Relay, Fox and Geese, Tug of War, Poison Snake, and Medicine Ball. Most of these the children will recognize by name. Discussion of the rules in school helps greatly when the games are played.

Quiet Games

The following quiet games, with fewer physical values, are yet of great value for recreation and for mental training:

Magic Music. An object is hidden after one child has been sent from the room. Upon his return, those in the room help him to find it by humming a familiar tune or by clapping, softly at first, but loudly as he nears the hidden object. This is good for ear training and motor control.

Beast, Bird or Fish. One child comes to the front of the class and says: "Beast, bird or fish!—Bird! Martha!" Before the child in front counts to ten, Martha, or whoever is chosen, must call out the name of a bird or else come to the front. Beast and fish are called in the same way.

Horns Up. Hands should be placed with thumbs up, as in "Simon Says Thumbs Up." The leader calls: "All horns up!" "Dog's horn up!" or "Cow's horn up!" As he speaks, he lifts his own thumb up. When he names an animal that really has horns, all players lift their thumbs; when he names one that has no horns, any player that points his thumb up is out of the game.

My Thought. *Teacher:* I'm thinking of a word that rhymes with "pat."

Pupil: Is it what you wipe your feet on?

Teacher: No, it isn't "mat."

Pupil: Is it an animal that catches mice?

Teacher: No, it isn't "cat."

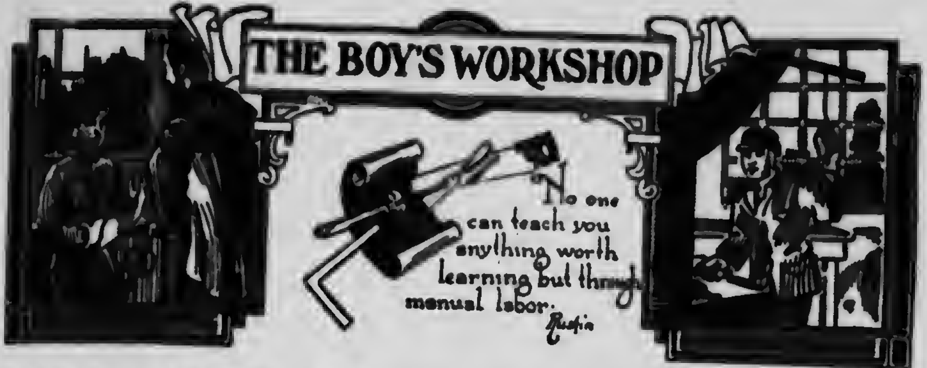
Pupil: Do you play ball with it?

Teacher: Yes, it is a "bat."

The same guessing idea may be carried out by sending out one child while the rest choose an object in the room, and then giving the child the right to ask ten questions of the pupils, in his attempt to guess the object. His first questions should determine whether it is animal, vegetable or mineral.

Guess Again. The teacher has sets of cards in Geography, History, etc., on which she has written the principal seas, cities, productions or the like, already learned by the children. She picks up one card at random on which may be written *Pacific Ocean*, and calls, "An ocean! P." Before the teacher can count ten the child she calls upon must name an ocean beginning with the letter P. There are many variations of this review game which will suggest themselves to the teacher.

Acting Charades. Children heartily enjoy "making up" plays, as in acting charades. Sides are chosen and each side in turn selects some word to be guessed by the other side. For instance, if *Washington* is chosen, it may be divided into "washing" and "ton." The act of washing may be represented, and then the act of weighing, after the explanation has been made that it is a proper noun of three syllables to be played in two acts. This game, too, is capable of great range, and cultivates great ingenuity on the part of the children.



Introductory. Every normal boy wants to know from earliest age how things are made; he asks questions innumerable of his elders, and we are sorry that sometimes in his proper quest for information he is frequently discouraged. Parents and friends become tired of ceaseless questions; this often may be pardoned in the latter, but it is the duty of parents to gratify this commendable curiosity of the child just as far as they are able to do so. As the boy grows older, he takes it upon himself to do things. He pulls apart his toys to see how they are made and then with infinite patience again attempts to construct the original.

The average boy is inventive. He sees a simple piece of machinery and attempts to duplicate it; he even enters the realm of difficult constructive work, as witness literally thousands of amateur wireless telegraph stations all over the world made by boys—and a few girls—and in successful operation by them. Our young people should be encouraged in these mechanical efforts, for though the inventive faculty may at times lead to the construction of things of no value, yet there is going on all the time education of mind and hand, which will later be utilized in the construction of things of greater moment.

In this division of the present volume we have aimed to direct the boy's attention to the construction of various devices along the lines of the average boy's thought.

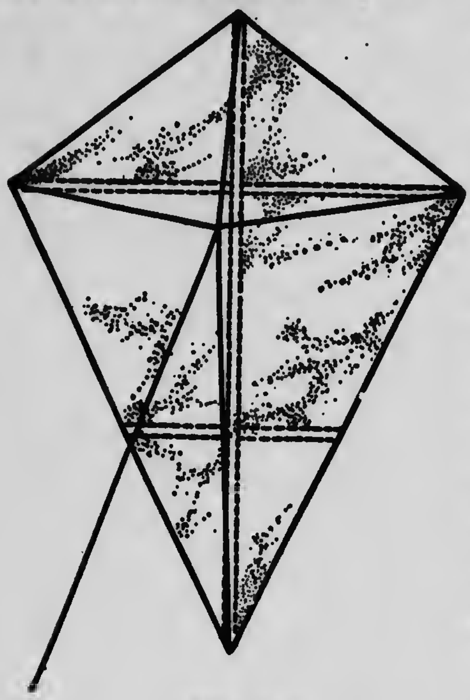
How to Make a Kite

Probably every boy has made the common kite, of two crossed sticks, a bit of string, paper, and old rags. If this shape of kite is made with three sticks as shown in the illustration on the next page, the kite will fly better and last longer.

Most boys do not remain satisfied with this common kite; they want something different. One of the easiest to make is a box kite. The sticks should be made of straight-grained wood, either spruce, basswood, or white pine. Box kites may be different sizes; the dimensions given below will be found useful for a kite of good size. The kite when finished should be 42 in. long by 18½ in. wide. In cutting the cloth and sticks it may be well to allow for errors. The long sticks should be ⅜ in. square by 42 in. long, and the four diagonal braces should be ¼ in. by ½ in. by 26 in. Two cloth bands should be made 12 in. wide and 74 in. long. These bands should be fastened to the four long sticks with 1 ounce tacks. Care should be taken to see that the sticks are equally distant, for the sides of the kite must be of the same size. It will strengthen the bands if the edges are hemmed and the ends turned over for half an inch. Nainsook or cambric make the best cloths, but any light weight stuff will do.

The diagonal braces should be cut a little too long, so that they will be slightly bent when put in position, thus holding the cloth out taut. The ends should be notched to fit the long sticks and then wound with coarse thread or fine wire to prevent the braces from slipping. If made as described the kite may be taken apart and rolled up.

The bridle or guiding ropes should be fastened as illustrated. H is a square knot which may be easily loosened and shifted to a different position on the bridle. A bow-line knot may be tied at J to prevent slipping. For flying in a light wind loosen the square knot and shift nearer to G, thus shortening G and lengthening F; in a strong wind lengthen G and shorten F. If the wind is exceptionally strong it is better not to use the bridle but to fasten the string at K.

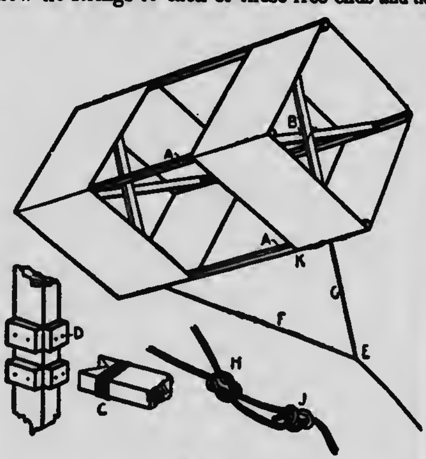


COMMON KITE

Another kite interesting to make is not as common as the box kite; this is the Chinese kite. From a sheet of thin tough tissue paper about 20 in. square the Chinese boy gets a perfectly square kite that is light and strong. First he shapes two pieces of bamboo, one for the backbone and one for the bow. The backbone is flat, ½ in. by 3/32 in. and 18 in. long; this is pasted diagonally to the paper. Over the ends of the stick should be pasted triangular bits of paper to prevent tearing. The Chinese generally use boiled rice, but any quick-drying paste will do. The bow should now be bent and its ends fastened to the other corners of the paper. In cutting the paper it is best to leave little projections at the corner to fold over for this purpose, but separate strips may be used. The difficult task of fastening the band or bridle comes next. This must be done by experimenting, till the kite balances perfectly. The string is fastened by a slip-knot to the band and moved back and forth until the kite flies properly; then the knot must be tightened.

With a little practice boys will have no trouble in flying these kites. Chinese boys often have battles with them. One of them will be flying a pretty kite, perhaps from a low flat-topped roof in some big city. Several hundred feet away on another roof appears another boy, who begins maneuvering to drive his kite across the wind over to the first kite. First he pays out a large amount of string till his kite wabbles to one side, with its nose pointing toward the first kite; then he tightens his line and commences a quick steady pull. If properly done his kite will cross over and above the other. The string is now played out until the second kite is hanging over the first one's line. It will take some skilful work now before the first boy's kite can spear the other one or perhaps cut the kite string. As it is not considered fair to haul down the other boy's kite the battle may be long and exciting.

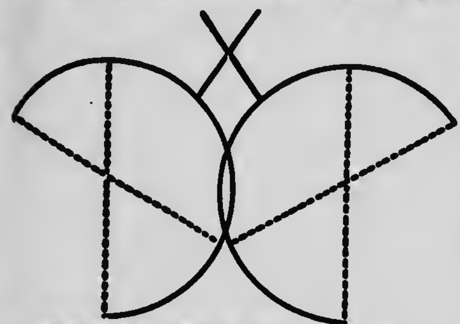
There is almost no end to the variety of sizes and shapes of kites. An easy one to make is called the butterfly kite. To make this get two thin kite sticks of equal length. Bend each into an arc and tie one end of a strong string to one end of each stick and the other end of the string to a point about 3 in. from the other end of the stick. This leaves one end of each stick free; now tie strings to each of these free ends and tie



BOX KITE

A, frame, with B, crosspiece; C D, details of joints; F G, bridle; E, string joined to bridle; H J, knots.

the other end to a point 3 in. from the opposite arc. Be careful that the two sticks are now in exactly the same shape. Then use thread to fasten the two frames together so that they overlap as shown in the sketch. To make the butterfly's head secure two heavy broom straws or stout wires and attach them to the top part

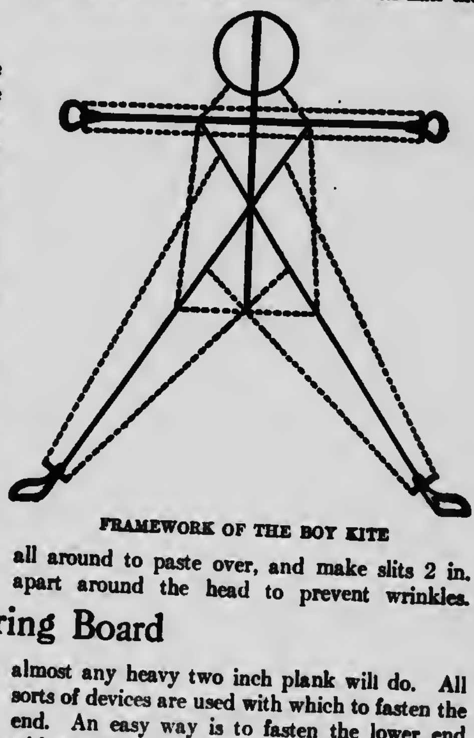


FRAMEWORK OF THE BUTTERFLY KITE

of the wing frames near the intersection of the sticks, so that the wires will cross. These are the "antennae" or "feelers." Over this frame paste any colored paper you choose. First lay the paper on the frame, then cut out the paper to the right shape, but leave about one-half inch margin for pasting. Cut slits about 2 in. apart around the curves and at all angles to keep the paper from wrinkling when it is pasted. When the kite is dry decorate it with paint or strips of colored paper. Add the usual tail.

Another interesting kite is the boy kite. To construct the kite use two straight sticks, say 3½ ft. long, to serve as legs and body; another straight stick about 2 ft. 4 in. long forms the spine; a stick about 3 ft. 3 in. for the arms. If a light tough stick is at hand this can be bent in a circle about 7 in. in diameter for the head; bind the ends firmly with twine. Fasten it to the spine, then tack on the arm stick three inches below the circle so that the arm stick is divided in the middle. The leg sticks should be fastened to the arm stick about 6 in. on either side of the spinal column and crossed so that the other ends are 3 ft. apart. Small hoops and cross stick of the same material as the head frame should be fastened to both ends of the arm stick and the lower ends of the leg sticks for hands and feet. See that both hands are of equal size; likewise the feet. No boy will want his kite to be a cripple any more than he would want one leg or one arm shorter than the other. The dotted lines in the diagram show how the strings should now be fastened.

To cover the kite select your paper, cut it to the shape of the frame, but allow one-half inch all around to paste over, and make slits 2 in. apart around the head to prevent wrinkles.



FRAMEWORK OF THE BOY KITE

Simple Spring Board

Most spring boards depend on the bending of the wood for its spring. Here is one for which almost any heavy two inch plank will do. All sorts of devices are used with which to fasten the end. An easy way is to fasten the lower end with a rod bent at the ends so that they may be run through holes in the planking and bolted on the under side. On each corner of the lower ends of the board fasten a piece of strap iron about 1 ft. long with the lower end projecting so that the rod may be passed through holes drilled in the strips. Then bolt a pair of light buggy springs to a square bar of iron at least as long as the width of the plank. Fasten this bar to the plank with several bolts. If the springs are too high they can be moved forward.

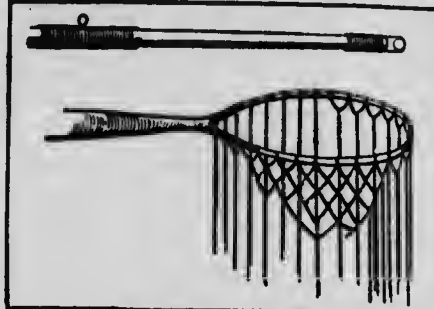
SIMPLE SPRINGBOARD

Fishing Tackle

Every fisherman must have a fishing-rod. To make one is an easy matter. First secure a long, straight, elastic pole. Then secure some pins and a small piece of wire. File off the heads of the pins, bend them in the shape of the letter U and drive them in the rod on the same side at regular intervals, beginning about 2½ ft. from the handle. Drive the pins just far enough to permit the line to pass freely under the loop. For the tip use the piece of wire bent into the form of a loop and bind it to the end of the pole. If there is enough wire on hand it is better to use it instead of pins. Loop pieces about 3 in. long and with more wire or strong waxed thread bind them to the rod, as shown in the sketch below.

A large wooden spool, an old tin can and a thick wire will serve to make a first-class reel. Run the wire through the spool and wedge it tightly so that it projects for one inch at one end and three inches at the other. From the side of a tin can cut a piece in the form of a cross. At equal distances from the ends punch a hole in each of the short arms, which should then be put upwards to form supports for the axle. Insert the ends of the wire in the holes so that the spool revolves freely, and then bend the long end of the wire in the shape of a crank. Bend or hammer the tin over the rod until it fits it snugly. The reel may be screwed to the rod or kept in place by wire rings slipped over each end of the tin.

A good landing net may be made from a forked stick and a piece of mosquito netting. Almost every tree will have several branches which may be used for this purpose. Bend the two ends until they overlap and then bind them tightly with waxed twine. Sew the netting into the form of a bag and fasten the open end to the loop formed by the forks. A better net may be made by using heavy wire for the loop. This can be firmly bound to the forks by lighter wire. The best way is to bend the wire into a loop and twist the ends together, as shown in the illustration. For a handle one may use an old broom stick, or any similar rod, into one end of which a hole has been bored just large enough to allow the wire to be firmly wedged in. For the net use twine; the process is not so easy, but the net will be better. First fasten the pole in a handy



POLE AND LANDING NET

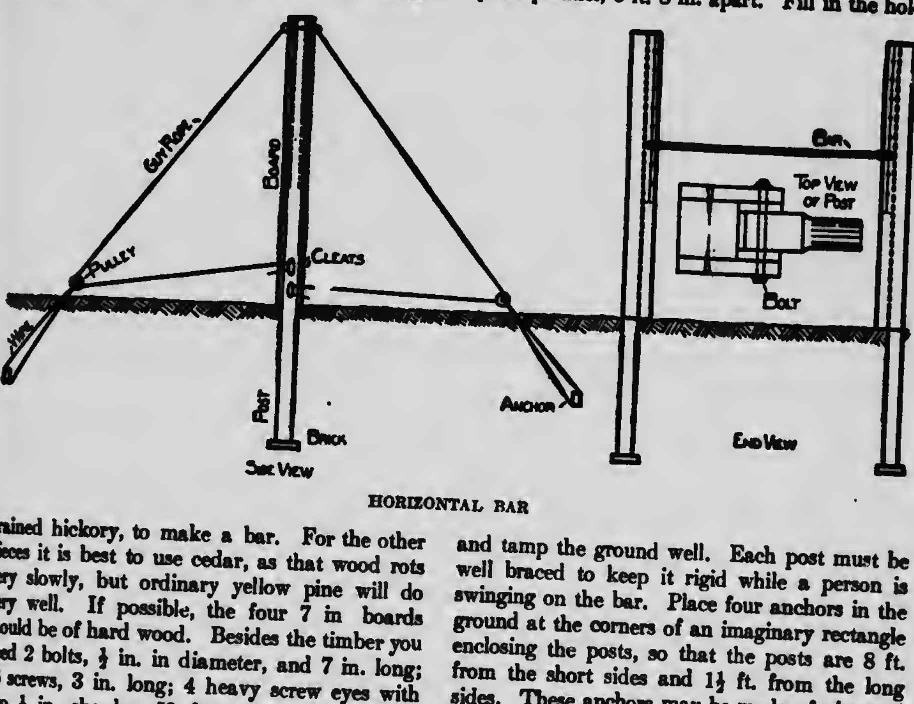
place, with the loop as high as the shoulders. Cut a number of pieces of twine about 8 ft. long. Double each piece and slip it on the loop with the loose ends hanging down. Hang these strings at short intervals all around the loop; the distance apart determines the size of the mesh, that is, the openings in the net. To make the net take a string from each adjoining pair and make a simple knot of them, as shown in the diagram. Continue all the way around the loop, knotting the strings in this way. Now begin on the next lower row, putting the second row of knots as far below the first row as that row was below the rim. Of course the mesh may be of any size you desire. Now take the third row, and so on until you think the net ought to began to taper or narrow down. This is done by knotting the strings a little closer together and also by cutting off one string of a pair at four equally distant points in the same row; that is, only four strings are cut. Then continue knotting until you come to one of the cut strings; here take a string from each side of the cut line and knot all three together, being careful to make it come even with others in the same row. Cut off the single string just below the new knot, but be sure it is the right one. This is easily done by pulling it through before tying the knot.

The Gymnasium

At the same time that the boy develops his mind he should develop his body. Gymnasiums are not always available for the boys who like exercise. An equipment of horizontal and parallel bars, horse and rings and dozens of other things, is expensive, if all the parts have to be purchased. Two or three boys with a few simple tools and the necessary lumber, bolts, and rope, can make a first-class gymnasium. The lumber should be purchased, if possible, squared and cut to length.

Horizontal Bar. The most important piece of apparatus in the gymnasium is the horizontal bar. As many boys may not have place indoors for this apparatus, set it up outdoors. Once we have accomplished that much, we shall find it easy enough to bring it indoors if necessary, or set up a new one. The material we need is as follows: two pieces of wood, 4 in. square by $9\frac{1}{2}$ ft. long; 4 pieces, 1 in. by 7 in. by $6\frac{1}{2}$ ft. long; 4 pieces, $\frac{7}{8}$ in. by 3 in. by 3 ft. 9 in. long; and 1 piece, $2\frac{1}{2}$ in. square by 5 ft. 7 in. long. This last piece should be well-seasoned, straight-grained hickory, to make a bar. For the other pieces it is best to use cedar, as that wood rots very slowly, but ordinary yellow pine will do very well. If possible, the four 7 in boards should be of hard wood. Besides the timber you need 2 bolts, $\frac{1}{2}$ in. in diameter, and 7 in. long; 16 screws, 3 in. long; 4 heavy screw eyes with two $\frac{1}{2}$ in. shanks; 50 ft. of heavy galvanized wire; 80 ft. of $\frac{1}{2}$ in. manila rope and 4 pulley blocks. Four cleats are also needed; these can be made at home.

Draw a line on the four 7 in. boards along the side of each from end to end, $1\frac{3}{4}$ in. from one edge. Beginning at one end of each board make 8 pencil dots on this line 5 in. apart. Bore holes through the board at these points with a $\frac{9}{16}$ in. bit. Fasten two of these boards on each post with the 3 in. screws, as shown in the top view, forming a channel of the edges in which the holes were bored. Two of the filler pieces should now be fastened in each channel so as to make the space fit the squared end of the bar. The ends of the boards with the holes should be level with the top of the post, so that each pair of holes in the 7 in. boards coincide. Dig two holes 6 ft. apart, each 3 ft. deep, and remove all loose dirt. Set the posts in these holes on bricks or small stones. A mixture of one part cement, two parts sand and three parts small stones will make a better foundation. Be careful that not too much water is used in mixing. The channels formed by the boards must be set facing each other with the inner surfaces of the posts parallel, 5 ft. 8 in. apart. Fill in the holes and tamp the ground well. Each post must be well braced to keep it rigid while a person is swinging on the bar. Place four anchors in the ground at the corners of an imaginary rectangle enclosing the posts, so that the posts are 8 ft. from the short sides and $1\frac{1}{2}$ ft. from the long sides. These anchors may be made of pieces of wood 2 ft. square, around whose center four strands of heavy galvanized wire are twisted, then buried to a depth of 2 ft. The wires should be carried above ground at an angle of about 45 degrees. The heavy screw eyes are turned into the posts at the top and lengths of rope tied to each. These ropes or guys pass through pulley blocks, which are fastened to the projecting ends of the anchor wires, and return to the posts where they are tied to cleats. Do not tighten the guy ropes without the bar in place, as to do so will strain the posts in the ground.



HORIZONTAL BAR

For the same reason do not change the elevation of the bar before slacking up on the ropes.

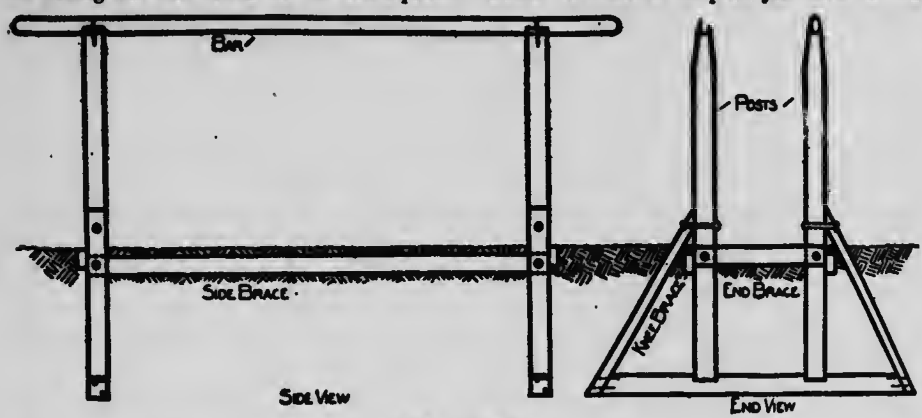
For the bar you have secured a long hickory piece, which should be planed, scraped and sand-papered until it is perfectly smooth and round, except for 3 in. at each end. Through both square ends bore a hole to admit the ½ in. bolts which will hold the bar in place. The bar should be oiled and reversed occasionally to keep it from curving and drying.

To set up such a horizontal bar indoors is just as easy. The posts should be 3 ft. shorter. Instead of the anchors we should use heavy screw eyes, which need not be set as far apart as the anchors were outdoors. To hold the posts in position you need L-shaped iron braces such as can be bought at any hardware store.

Parallel Bars. Exercises on parallel bars are among the best means for the development of the back and shoulders. One can make a set of these bars with very little trouble, if one has or buys the following material: 4 posts, preferably cedar; 4 in. square and 6 ft. long; 2 base pieces, 4 in. square and 5 ft. 6 in. long; 2 cross braces 2 in. by 4 in. by 2 ft. 2 in. long; 2 side braces 2 x 4 by 7 ft. 8 in. long; 4 knee braces 2 x 4 by 3 ft. 8 in. long; 2 bars; 2 bars of straight-grained hickory 2 x 3 by 10 ft. long; 4 wood screws 6 in. long; 4 bolts, 8 in. long; 8 bolts, 7 in. long; and one dozen large spikes.

First bevel the ends of the base pieces at an angle of 60 degrees. Chisel out two notches, 4 in. wide and 1 in. deep, beginning at a point 9 in. from either side of the center; these are to receive the lower ends of the posts. Bevel the two sides of one end of each post down to a width of the finished bar—a little less than 2 in. Cut notches in these ends to receive the oval bars. Bevel the ends of the knee braces, and fasten the lower ends to the beveled ends of the bases with spikes. The upper ends of the knee braces should be fastened to the uprights with 8 in. bolts put through holes bored for the purpose. It will be best to countersink the heads of the bolts—that is, they should be below the surface.

With 7 in. bolts fasten the end braces with their top edges 2 ft. 6 in. from the bottom of the base. Drive nails slantingly into the ends of the posts, merely to hold them to the base while the apparatus is being handled. Now we must dig two parallel trenches, 2½ ft. deep, about 5 ft. long, and 7 ft. apart, for the end braces and two more trenches just deep enough to hold the side braces. These side braces should be bolted to the posts just below the cross braces, so the bolts in both will not meet. The bars should be dressed down so that a cross section is oval as shown in the end view. Use the 6 in. screws to hold these to the notched uprights. Countersink the holes so that they can be filled with putty after the screws are in place. It would be wise to oil the bars with linseed oil to protect them from the weather.



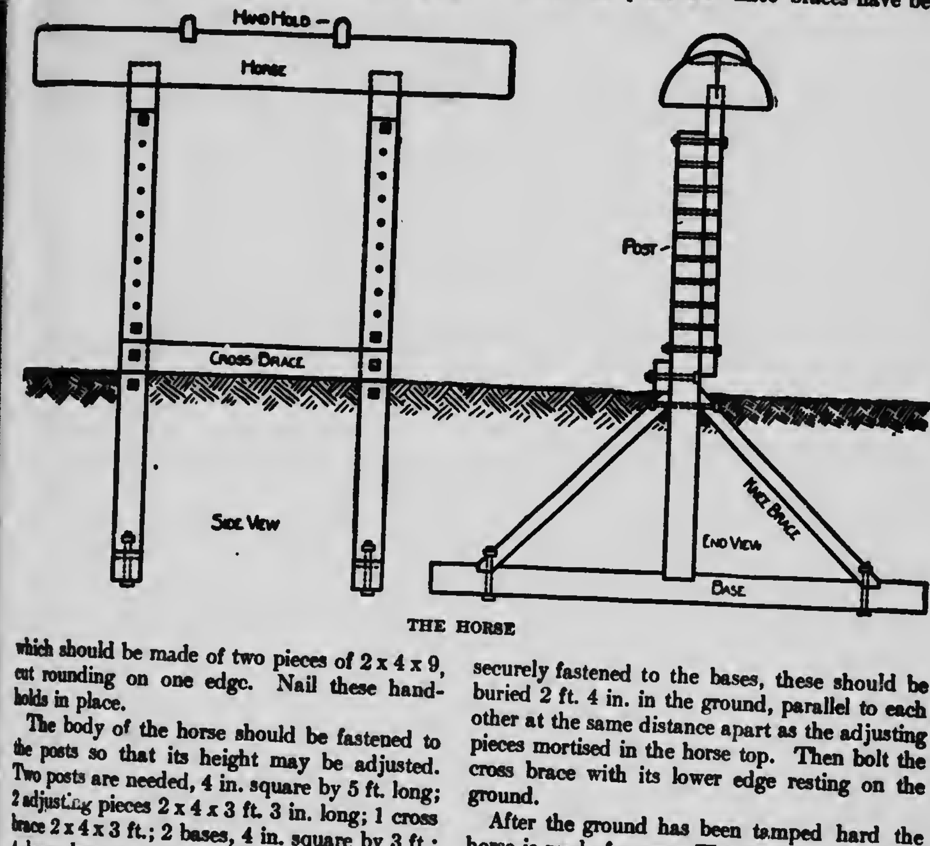
PARALLEL BARS

It is not necessary to use dressed lumber from the mill for this apparatus, except for the bars. If mill-cut lumber is used, it should be undressed, and if round is used, it should be left with the bark on it, to protect it from the weather. If the timbers, except the bars, are painted, the wood will last for years, but even unpainted cedar is very durable.

The Horse. The horse may be used as an obstruction over which to leap, slide, or swing, and also as an artificial back for a peculiar style of leap frog, and many other games which boys are constantly devising.

First, one must secure one-half of a tree trunk from a tree 9 in. to 15 in. in diameter—the larger the better—and 5 ft. to 6 ft. long. The round part must be planed, scraped and sand-papered until it is perfectly smooth. Make two parallel saw cuts 2 in. apart, straight down in the round surface of the log until each cut is 9 in. long. 18 in. away make two more cuts of the same size. Chisel out the wood between each pair of cuts and insert the two hand holds, a slanting notch 6 in. from each end for the knee braces. Bevel the ends of the knee braces, put them in place and fasten with bolts, the upper ends with a 9 in. bolt, the lower with a 7 in. bolt. Beginning 1½ in. from the top, at intervals of 3 in., bore ⅜ in. holes through each post parallel to the base. Nine or ten holes will be enough. The adjusting pieces should be bored in the same manner, then mortised into the flat side of the log 15 in. from each end and secured with screws put through the top and into the end of the adjusting pieces.

When the posts and knee braces have been



THE HORSE

which should be made of two pieces of 2 x 4 x 9, cut rounding on one edge. Nail these hand-holds in place.

The body of the horse should be fastened to the posts so that its height may be adjusted. Two posts are needed, 4 in. square by 5 ft. long; 2 adjusting pieces 2 x 4 x 3 ft. 3 in. long; 1 cross brace 2 x 4 x 3 ft.; 2 bases, 4 in. square by 3 ft.; 4 knee braces, 2 x 4 x 3 ft.; 2 one-half inch bolts, 9 in. long, to fasten the knee braces at the top; ten ½ in. bolts, 7 in. long, 4 to fasten the knee braces at the bottom, 2 to fasten the cross brace, and 4 to fasten the adjusting pieces to the posts. Cut mortises, that is, cut out notches, on the bases so that the bottom ends of the posts are exactly in the middle; then cut

securely fastened to the bases, these should be buried 2 ft. 4 in. in the ground, parallel to each other at the same distance apart as the adjusting pieces mortised in the horse top. Then bolt the cross brace with its lower edge resting on the ground.

After the ground has been tamped hard the horse is ready for use. The height of the horse is adjusted by changing the bolts in the different holes connecting the two adjusting pieces with the two posts. All sorts of jumps and leaps will be devised to keep the horse in constant use.

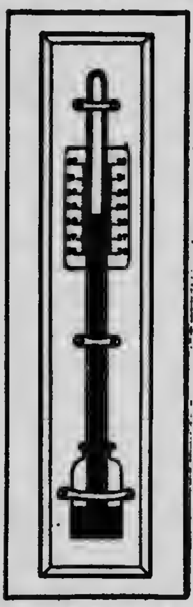
With some slight changes any of these pieces might be used indoors. The uprights would be shorter by so much as is now buried in the ground. The braces would have to be bolted at different angles. Probably the bases would have to be fastened to the floor to keep the uprights from upsetting. The apparatus bought for regular gymnasiums is made with heavy metal bases, but our apparatus will do fully as well if it is fastened to the floor. If we can weight it in some way, so much the better. Whatever we do we shall be sure to enjoy making the apparatus, and once it is made, how much prouder and happier we shall be than if we had bought everything ready-made!

Dumb-Bells. No gymnasium, whether indoor or outdoor, can be complete without a pair of dumb-bells. Any boy can make as many as he wants. First get two large tin cans—such as a quart fruit can—and cut out the ends. Shape four round pieces of wood just large enough to fit tightly in the ends of the cans. Then cut a hole in the center of each just large enough for the bar, which may be any piece of hard wood from 12 in. to 18 in. long. To one part of cement and two parts of sand add water till the sand and cement have thoroughly mixed. Pack this mixture tightly into the cans and insert the wooden disks in the ends. Push the hardwood bar through the holes in the inside disk so that it runs past the center of each can of cement and leaves a proper length of rod between. The two inner disks should first be strung on the bar and a few nails driven into the cement to give it a good grip.

After several days the cement will be dry. Then remove the tin and wooden disks. The cement may now be filed into any shape desired. If a dumb-bell of this kind is not heavy enough it may be weighted with stones or metal mixed in the cement and sand.

How to Make a Barometer

The barometer is an instrument used to measure atmospheric pressure. The meaning of the word is obvious if we think that it comes from the Greek "baro," meaning weight, and "meter," meaning to measure. The necessary parts are a glass tube $\frac{1}{8}$ in. internal diameter and about 34 in. long, a bottle 1 in. inside diameter and 2 in. high. Seal one end of the tube by holding it in the flame of a gas burner till the glass is so soft that it can be pinched together with pliers. Put a little paraffin in the bottle and melt it by holding over a small flame. When cool, the paraffin should cover the bottom to a depth of $\frac{1}{16}$ in. The tube should now be filled with mercury, which should be "redistilled"—in other words, there must be no air bubbles separating the particles of mercury. In filling care must be taken to see that the mercury completely fills the tube. The glass bottle containing the wax covered bottom is now placed over the end of the tube and pressed firmly to insure an air-tight fit. The bottle and tube should now be inverted. After a few ounces of mercury have been poured into the bottle, the tube may be raised out of the wax, but the edge of the tube must not be brought above the surface of the mercury in the bottle.



THE BAROMETER

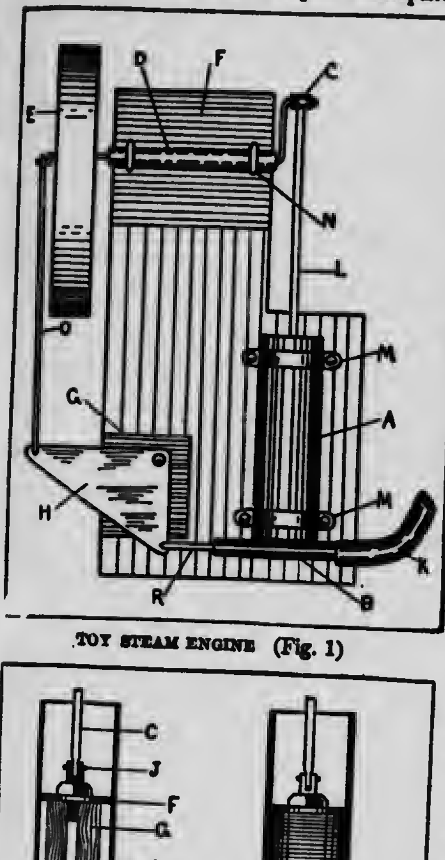
The instrument should be laid aside while the base is being made, or, if your prefer, make the base first, so that it will be ready. Cut a wooden base 3 in. wide, 40 in. long, about $\frac{3}{4}$ in. thick. Chisel a groove lengthwise to fit the tube; and at the bottom deepen and widen it, so that one-half of the diameter of the bottle rests below the surface of the board. Brass strips, or leather, if brass ones are not available, should be used to secure the tube and bottle to the base. After the instrument is in place put enough mercury in the bottle so the depth of the mercury above the bottom end of the tube will be about $\frac{1}{2}$ in.

Make the scale on a strip of cardboard 2 in. wide. Mark off 6 in., divide them into sixteenths, and number from 26 to 32. The scale should be fastened to the base with glue or tacks, either beside or behind the tube, preferably the latter because readings can be more easily taken. Before fastening the scale compare the instrument with a standard barometer and adjust the scale so that the readings are the same.

The normal pressure of the atmosphere will keep the mercury a trifle below 30 in. In general a drop of the mercury indicates stormy weather while a rise indicates fair weather.

How to Make a Steam Engine

A toy or model engine can easily be made from material found in nearly every home. The cylinder A (Fig. 1) is an old bicycle pump, cut in half. The steam chest B is part of the piston



TOY STEAM ENGINE (Fig. 1)

tube of the same pump, the other parts of the tube being used for the bearing C and the bearing D. The fly-wheel E may be any small-sized iron wheel, such as an old sewing-machine wheel or pulley wheel. If the bore in the wheel is too large for the shaft, it may be bushed with a piece of hard wood: to bush the bore cut out a circular piece of wood to fit tightly into the opening; in this piece of wood then cut a circular hole just large enough to admit the shaft. The shaft may be made of heavy steel wire, the size of the hole in the bearing D.

The base should be of wood on which are fastened two blocks F and G, ⅜ in. thick, to support the bearing D and the valve crank H, which is made of tin. The hose K leads to the boiler. The clips M are soldered to the cylinder and nailed to the base, and the bearing D is fastened by staples.

The piston is harder to make, because it must fit closely into the cylinder and yet move freely. It may be made of a stove bolt A (Fig. 2), with two washers FF which just fit the cylinder. Around the bolt wind soft string to the width of the washers. Before winding it would be well to saturate the string with thick oil. A slot must be cut in the end of the bolt A to receive the connecting rod C. Solder or a pin as shown in the diagram may be used to hold the rod C in place. The valve D is made of an old bicycle spoke E, with the nut cut in half and the space between filled with string and oiled, just as was done with the stove bolt. Bore a hole in the bottom of the cylinder and another of equal size in the side of the piston tube in which the valve D works. Then solder these pieces together so that the holes leave a free opening. The valve crank H (Fig. 1), already mentioned, may be cut from a sheet of heavy tin or galvanized iron, and is moved back and forth by a crank on the shaft. This crank must be at right angles to the main shaft.

The boiler may be an old oil, powder, or syrup can with a tube soldered to it. This tube should be connected to the engine by the rubber E of Fig. 1. A good Bunsen burner or small gas stove will furnish enough steam to run the engine at high speed.

Now that we have set up the engine we may study the manner in which it works. The water in the boiler becomes steam when the heat underneath is sufficiently great. Through the tube K this steam is let into the cylinder when the valve D (Fig. 2) is at the left of the opening. The pressure of the steam forces the piston upwards, thus turning the crank C and the fly-wheel E. The turn of the fly-wheel works the valve crank H which in turn forces the valve D to the right. When the valve is to the right of the steam in-let the steam will rush out as shown by the arrow in Fig. 3. Now that the cylinder A is empty, the piston will return to the bottom, thus turning the fly-wheel again, changing the position of the small valve B (Fig. 2) so that more steam will enter the cylinder at A. As long as there is enough steam in the boiler this process will continue. The operator should be careful that no steam escapes at the joints or connections. When the machine is in good running order we can run a belt over the fly-wheel and let it work for us.

The Woodsman and Camper

There comes a time in the life of every boy when he wants to go camping. This is a natural desire which should be encouraged and led into proper channels rather than suppressed by the objections of parents. The wish to go camping may be due to a variety of reasons, but it is inevitably a healthy desire. Nobody but the veriest "tenderfoot" now thinks of camping as necessitating hardships; the camper, young or old, can be just as comfortable as he is at home. Not only has he comfort, but he has the freedom of all out-of-doors.

Equipment and Clothing. In an article of limited scope it is possible to give only a few suggestions which may prove valuable to all campers. Each party must determine for itself what camp and personal equipment shall be taken. The question of food is also a matter which must be determined according to the likes and dislikes of the individual members. Each member of the party, if possible, should have his waterproof canvas bag for clothing—the less clothing the better. Four pairs of woolen socks, two gray flannel shirts, two sets of woolen underwear, a suit of woolen pajamas, a pair of trousers and a woolen sweater will be all the extra clothing needed for camping in the woods in the fall or early spring. Woolen garments are better than cotton, because they dry more rapidly if wet, and generally keep the body at a more even temperature. The best sort of a hat is an old soft felt one, with a moderate brim which will shed the rain. For summer outings some light clothing will be necessary, but even in the hottest months woolen clothing and a sweater should be on hand. Just what additional things to take one will know only after he has camped out several seasons. Take an extra pair of shoes and a pair of moccasins if possible, some thread, needles, buttons, a pair of scissors, a toothbrush, a pocket comb in a case, several towels, a small mirror, a note book with a place for a pencil in the back. Do not take ink. A compass and a waterproof match safe will be useful, especially in the woods. Keep this match safe only for emergencies and never leave camp without it. In any camp there must be several good jackknives, a saw, axe, nails and twine. The average boy will find that a magnifying glass and a field glass will add to his enjoyment, for both will enable him to get in closer touch with nature.

Choosing a Site. Strange as it may seem, not many people are able to select a good camping ground. Few people think that a camp really is a camp unless they can see water from the tent. There is always the temptation to make camp on the edge of a lake or stream. This should never be done, as the low ground is damp and generally infested by mosquitoes. If there is no high land near the shore make your camp on some point projecting out into the water, where the currents of air keep most of the mosquitoes away. It is more important to have the camp near a good supply of wood, as it is easier to carry necessary water than the firewood. If you can find the right sort of a place make your camp on ground sloping to the south; this will give the sun a chance to shine into your tent. Never build a camp in dense woods, on account of falling timber, or where water will settle after a rain, or near dead wood or underbrush, which is always a breeding place for mosquitoes and other insects.

Camp Fires. After locating your camp the first thing to do is to get a fire started—easy enough when there is plenty of dry wood, but difficult when there has been a long rain and everything is soaked with water. In rainy weather, if you cannot find dry wood, hunt for a cedar, as it splits and ignites easily. After you have chopped it into firewood, take some of the smaller pieces and stack them in a pyramid to make a draught. Then from the dry heart of the tree whittle enough shavings to start the fire. If you cannot find a cedar you can generally get some dry birch bark on the lee side of a tree and some dead twigs which will give enough of a blaze to dry the firewood. There may be no birch or cedar; then the only thing is to chop into a fallen tree for dry wood and whittle shavings. If it is still raining, build the fire on the lee side of some tree or boulder. Never underestimate the amount of firewood required for the night; it is better to have too much than to hunt around for more before daybreak. In the winter time never make camp fire under a tree covered with snow, as the heat will melt the snow and the water may put the fire out.

There are various ways of building a night fire; only one of the simplest will be described here. First cut two green stakes and drive them slantingly into the ground. At right angles to a line between the stakes lay on the ground two large, green logs for fire-dogs, and on these pile small stuff and dry wood. Pile five-foot logs against the stakes and then drive two more stakes to hold them in position. As the bottom log against the stake burns away the one above it will drop in its place and you will have a fire which will burn evenly all night.

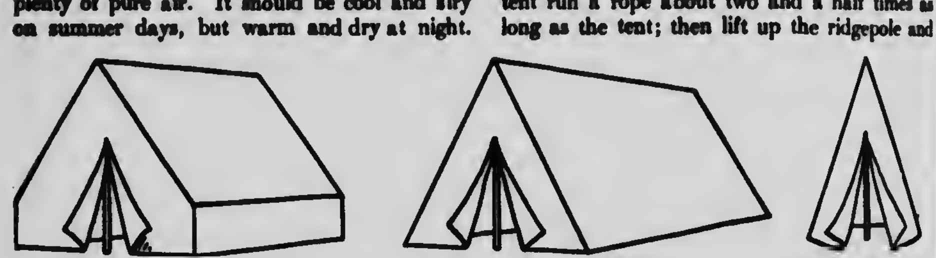
One glance at the fire will tell what kind of a camper built it. The log fire just described will throw its heat forward into a tent or lean-to, and will last for hours, but it is useless for cooking. As a general rule, hardwoods make good, slow-burning fuel that yields lasting coals, and softwoods make a quick, hot fire that is soon spent. The following woods will burn scarcely at all when they are green: Aspen, black ash, balsam, boxelder, pitch pine, sycamore, tamarack and popular; chestnut, red oak and red maple burn very slowly when green. All of the soft pines crackle and are likely to pop; certain hardwoods such as sugar maple, beech and white oak, must be watched for a time after the fire is started, because the embers they shoot out are long-lived and hence more dangerous than those of softwoods. The best of all firewoods is hickory, green or dry; it makes a hot fire, lasts a long time, and burns down to a bed of hard coals that keep an even heat for hours.

For cooking and baking, a bed of hot coals is generally better than live flame; only the novice piles on more wood when he begins to cook. There are a great many ways of building the fire for cooking and as many ways of arranging and supporting the utensils. If a high wind is blowing and the camp is in an unprotected spot, it may be wise to dig a fire hole, so that the hot coals will not be blown away. The simplest way, however, is to level off the tops of two green logs, and after laying them eight inches apart at one end and four at the other, to build a fire between them. Another method is to hang the coffee-pot or tea pail from a crane made by driving a crotched stick into the ground and resting a long green pole in the crotch, one end being held down by a stone or a log, the other end being over the fire. The common way, however, is to set two crotched sticks in the ground one on each side of the fire, and put a cross piece from one to the other; from this cross piece hang forked sticks, with nails driven into them at various heights to hold the pails. Frying may be done over two logs rolled into the fire. In a permanent camp three pieces of lead pipe, wired together, are often used as a rack.

THREE WAYS OF BUILDING A CAMPFIRE

Shelter. The most quickly constructed shelter is made by leaning three seven-foot poles against a fallen tree, and then spreading your tarpaulin or rubber blankets over the poles. Be sure the tree is flat on the ground or there will be a draught under it. The most popular brush camp is the lean-to, the only practical brush camp to have when there are more than three persons in the party. First drive two crotched sticks into the ground about eight feet apart, and on these put a stout sapling. Against this lean poles, about a foot apart, making them secure at the bottom by sticking them into the ground or by rolling a log against them. On this framework, and up and down the sides lay hemlock or spruce boughs, which should be lapped like shingles so that they will shed the rain.

These brush shelters are good enough for a temporary camp, but if you are to camp for a considerable length of time a tent will be a great convenience. The kind of tent you buy will depend on the number of people who use it and the price you are willing to pay. A good tent is a luxury, but a poor tent is an abomination; buy the best one your purse can afford. A tent should be easy to set up. It should shed heavy rains, and should stand securely in a strong wind. It should keep out insects and cold drafts, but let in the rays of the camp-fire and plenty of pure air. It should be cool and airy on summer days, but warm and dry at night.



THREE STYLES OF TENTS

Probably no single tent has ever been devised which will fulfill all of these conditions at the same time; certain kinds of tents are better for

SIMPLE "A" TENT

one purpose than another. For a fixed camp, a wall tent is generally preferred, because it is easy to set up and has plenty of head-room. For extreme lightness and ease of pitching the A-tent is recommended. In this case poles are not absolutely necessary; a strong tape may be sewed along the ridge of the tent, ending in a loop at each end from which a light rope is stretched between two trees, the ropes being made taut by two poles bracing it at each end and outside of the tent. In setting up an A-tent most campers use center poles at the front and back to support the ridgepoles; the accompanying sketch shows a simple method of setting up a tent without using the center poles. First cut a ridgepole and four diagonal supports of the proper length. Tie two of the supports with marline two feet from the ends to hold up the front end of the ridgepole, and tie the other two poles in the same way for the back end. Through the top of the tent run a rope about two and a half times as long as the tent; then lift up the ridgepole and the tent and support it by the diagonal braces. Tie the long rope to short stakes driven into the ground about ten feet from the front and back of the tent, then spread the braces till the tent just touches the ground and is ready to be pegged down. When the tent sags, as it always will during a rain, you have only to pull in the poles at the bottom in order to make everything taut again.

After the tent is up the first thing to do is to level off the ground. You should decide how you will lay your bed and level the ground so that your feet will be lower than your head. The details of furnishing a tent can be merely mentioned here; racks and hooks for pots, guns, tools, clothes and game will be needed. If you have a floor cloth, spread it out; if not, cover the ground with balsam or cedar twigs and shoots. If your tent has an awning in front, that is just the place for a dining table. Inexperienced campers generally omit one other detail which is necessary to comfort. If the ground, as it should, slopes from the back of the tent to the front, dig small trenches at the back and sides, about six inches or a foot outside the tent. In severe rainstorms no other devices will keep the inside of the tent dry and comfortable. A little expeience in adapting himself to whatever conditions he has to face will enable the camper to improve his outfit from year to year. Lack of experience should never deter any one from camping.

How to Build a Punt

The simplest kind of boat to build is a punt, or flat-bottomed boat; any boy who knows how to handle ordinary tools can build one. It is not necessary that he have any tools but a hammer, bradawl, handsaw, and some nails; but the addition of a jack and smoothing plane, tenon saw, rule, square and bevel will result in quicker and better work. Almost any wood may be used; and for nails, common iron nails, if heated to a dull red in the fire, and then allowed to cool gradually, will do. Better nails should be used, if possible, but the amateur craftsman should also learn to make the best of the materials on hand.

Before designing a punt, the builder should know the purpose for which it is intended. Incidentally it may be laid down as a rule never to start work on a boat till you have drawn plans for it. Not even the most experienced professional builders venture to build a boat without plans. The amateur's plans need not be elaborate but they should show the dimensions and general outlines. The boy who knows something of drafting will have no difficulties, but any boy can draw some sort of plans. The size and weight of the boat will depend on the purpose: for fishing, hunting and ordinary use the essentials are comfort, durability and strength, rather than speed or lightness. As a rule the length may be from three to four times the beam—the longer the boat the larger the ratio. The beam is the width of the boat at the widest part, that is, in the middle. A good size for most purposes is eight long by three feet wide at the beam, tapering to a width of two and a half feet at the bow and stern.

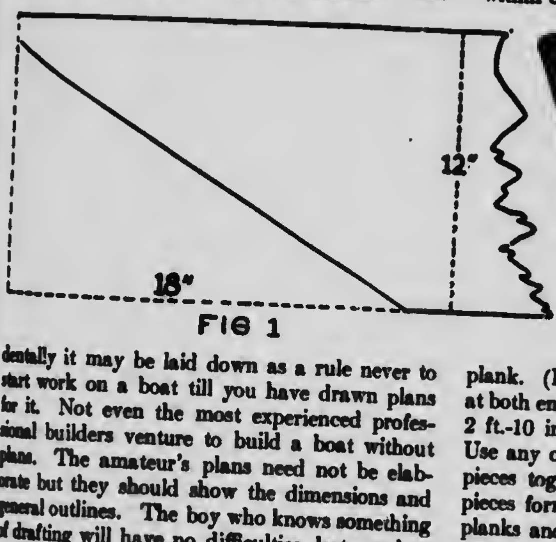


FIG 1

FIG. 2

Having fixed on the dimensions, you must select the material; for this red pine or spruce will be best and cheapest. For nails use copper boat nails or, if these are not available, galvanized iron nails. A few strong iron screws will also be needed. Before beginning to build the boat it will be best to set up two horses or trestles, so that you may work on the boat at a convenient height. These horses may be firmly fastened to the ground, if you are working out of doors, by burying the legs a few inches in the soil.

For the sides of the punt use two planks, 8 ft. long, 1 ft. wide, 1 in. thick. First draw a line from one edge. 18 in. from each end, to within one inch of the other edge and end of the plank. (Figure 1). Saw off the triangular pieces at both ends of both planks. Now cut two pieces, 2 ft.-10 in. long by 1 ft. wide and 1 in. thick. Use any odd strips of wood to fasten these two pieces together, exactly 1 ft.-6 in. apart, these pieces form the "box." Now take up the side planks and fix them with a light stay and tack to the trestle exactly 2 ft.-10 in. apart and upside down. Great care must be taken that they are exactly true to each other, that both are on the same level and perpendicular, and the ends are exactly opposite. Now put the box across the punt and exactly in the center of the length of the planks; it may be temporarily supported by stays from below. Now screw a 2½ in. screw through the side plank into each side of the box, about 2 in. from the top edge, and another about 3 in. from the bottom edge. The box will now be a permanent midship frame for the punt. Nail any two pieces of wood lightly to the edges of the planks so that the ends will be just 2 ft.-6 in. apart. The punt will have an even better shape if the bottom edges are only 2 ft. apart and the top edges 2 ft.-6 in.; the bottom edges may easily be drawn in to the desired width.

For the two side stringers cut strips of pine 5 ft. long and 1 in. square; each of these must be carefully nailed inside the punt to the bottom edge of the planks, so that they project about one-eighth of an inch. This is done so that when the bottom of the punt is put on there may be a little recess for calking (as at B, Figure 2). set. The amateur must exercise great care that these are all on the same level with the bottom of the stringers, otherwise they will make it difficult to put on the bottom. The bottom strips should all be put on the same sides of the side frames, so that the spaces between them may be even.

The ends remain to be finished. First, cut a pine strip an inch square just long enough to fit firmly between the ends of the stringers; this must be placed so as to project a little beyond the bevel of the side planks, (as shown by the dotted lines at A) and on a level with the

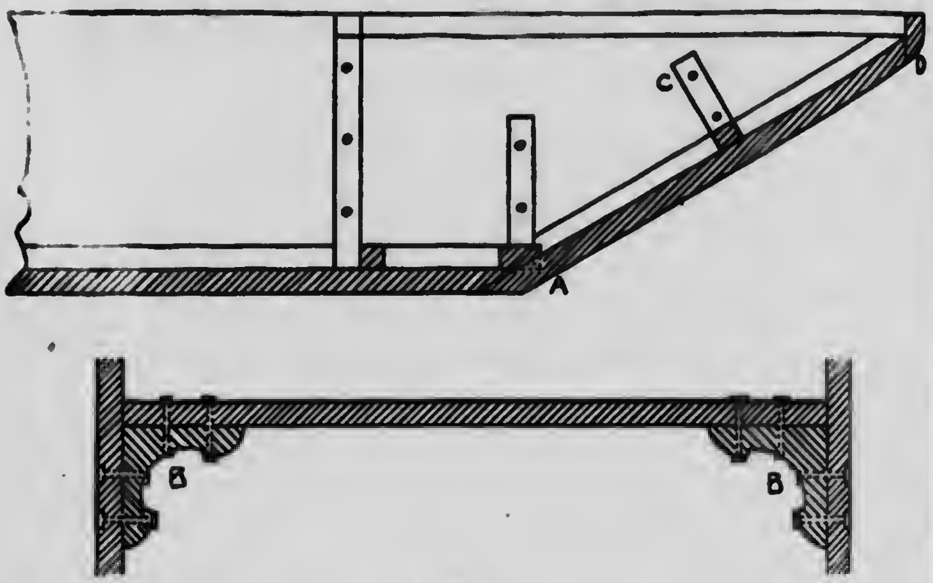


FIG. 3.

The two planks forming the well will interfere with the placing of the stringers, so they must each have a small recess cut into them to allow the stringers to pass through. In nailing on the stringers nails must be driven from the outside and riveted or clouted before proceeding further.

Now cut out twelve knees (A in Figure 2) of one-inch hardwood planks; these should be placed 12 in. apart on each side. Light iron knees are preferable; but the wooden ones, if carefully selected so that the grain runs as far as possible with the curve and for some distance up the long arm of the knee, will be fully satisfactory. For bottom strips cut pine one inch square of the length required to fit snugly across the punt. Put in each set of side knees and bottom strips complete before putting in another

stringers. To hold this in place nail a hardwood knee 1 in. high, each arm six inches long, on each end, (as shown at B, Fig. 3). Now put in a stringer from A to D, and knees and bottom strip at C. Plane the ends as shown in the illustration. All the nails must now be carefully rooved and riveted or clouted as shown.

The bottom must now be put on. If possible use three planks matched and grooved, 5 ft. long, by 1 ft. wide and 1 in. thick. Bore holes for all the nails that go through the bottom planks with a fine bradawl. Now bring the first plank down on the frames at each end and secure it lightly with one nail. Do not drive the nails home till you are sure the planks fit properly. The ends of the planking will probably project at each end of the punt; these projections may be sawed off later. A coat of thick paint on the tongues and grooves just before the planks are put on will help to keep the bottom water-tight, but be careful not to put in too much, else the planks will not close together. If the bottom fits properly drive home two more nails through each plank where it crosses the frame. You will probably need an assistant to back up these nails with a heavy hammer or anvil while you rivet or clout them. Now saw off the ends of the planks and the end frame as shown at A (Fig. 3) also at D. Put in the ends, in the same manner as the bottom, and clout the nails.

All that remains is the calking of the seams, painting and fitting. For calking you need a calking chisel made of hard wood, and any light springy mallet; if you have a calking iron, so much the better. In preparing pitch first melt it over a gentle fire, mix a little tallow with it, keep it well stirred, and be careful that it does not catch fire. To test the quality, dip a little stick into it and cool the pitch that adheres to it in cold water. If the drop that hangs from the stick is brittle it shows there is not sufficient tallow in it, so more must be added and mixed in: if the drop is soft and sticky more pitch must be added. Wind oakum into a loose cord that will fit nicely into the seam to be stopped when it is compressed under the mallet; dip the oakum piece by piece into the hot pitch till it becomes saturated, and then drive it into the openings with sharp, quick blows of the mallet and chisel. Some experience is needed to calk well, but several trials will enable even an amateur to do creditable work. Fill the cracks quite full, going over them two or three times if necessary. The chisel will constantly stick to the oakum and draw it out of the seams unless it is dipped into oil whenever the tendency to stick appears. After all the seams have been calked give the inside of the boat a thin coat of pitch; finally, after the pitch is thoroughly dry, the inside should have a coat of paint to fill up all the little cracks and joints. The builder may if he desires, deck the ends and the box in the middle; this is such a simple matter that explicit directions are unnecessary. For painting, dark gray or green is the best color; two or three coats should be applied at intervals of five to seven days.

The punt is now completed. If you have built with only moderate skill you will yet have a serviceable craft that will last for many years. With a pole or an old oar you will be able to propel your boat in any direction you wish.

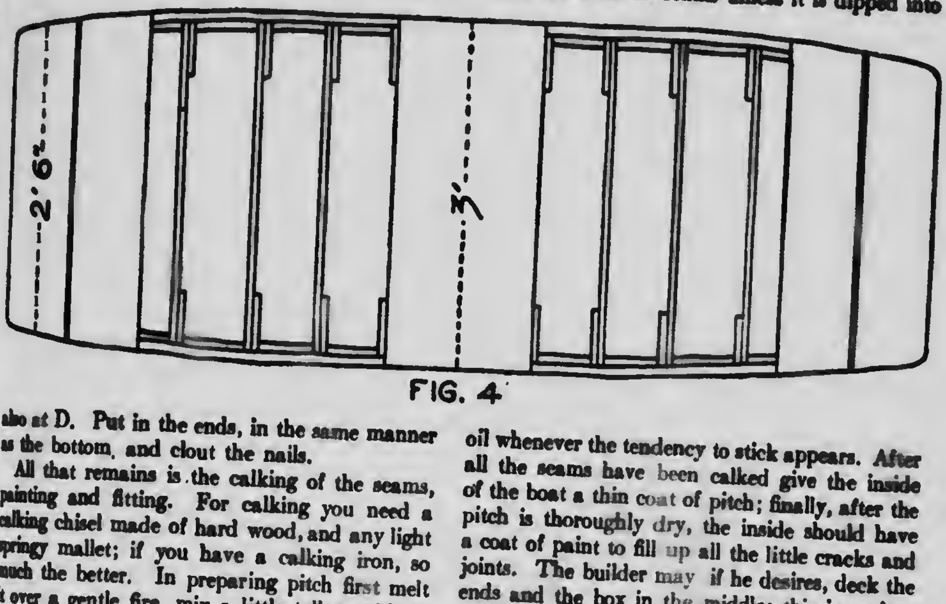


FIG. 4

Electricity for Boys

Introductory. Before we study some of the uses to which electricity can be put, we should try to understand its nature. Many years ago people believed it to be an invisible fluid. So we still speak of currents of electricity, just as we speak of currents of air or of water, though we have long since realized that the expression is only a comparison.

Let us see where this resemblance lies. Our diagram represents a pump P, from which flows a stream of water controlled by a valve V. When we open the valve V, the signal apparatus D enables us to perceive the flow of water. Thus we see the "circuit" completed or "closed." When we close the valve the stream of water ceases to flow. Meanwhile, the pump drives a steady stream of water; in other words, it supplies a water-driving or water-motive force.

Instead of the water "circuit" let us now study the simple electric circuit. We have wires instead of pipes; a battery instead of a pump, a transmitting (or sending) key instead of a valve; instead of the signal apparatus D we have a "receiver" or "sounder;" instead of water we have electricity. Before, we had water-motive force, now we have electro-motive force. If we apply pressure to a stream of water, the particles

of water will first resist, then slowly change their course. These tiny particles are called "molecules," from the Latin word "moles" meaning mass, and the ending "culus" meaning small. In much the same way a wire and the air about it resist an electric current. If the molecules yield quickly and take up the electricity we speak of a "low resistance." Just as a long small pipe will offer considerable resistance to a large stream of water, so a long thin wire offers a "high resistance" to an electric current. Thus we see that the electric circuit its very much like the water circuit. Yet it must be remembered that electricity is not a real fluid, like water. Scientists today are coming to believe that electricity only travels along the wire, that is, really in the air, not through the wire at all.

Now you will ask, "Where do I get this current?" and "What is a battery?" For the purposes of experiments such as boys can perform at home we use "cells," or groups of cells called "batteries." Any boy can make enough cells for a home-made telegraph or wireless telegraph system, as well as for doorbells and dozens of other useful things.

Tools. Before we start work of any kind we must have tools. It is not necessary to begin by purchasing an elaborate set. Little by little, additions can be made as they are needed. Still, here are certain tools that are indispensable:

1 large pocket-knife.
Fine pen-knife.
Drill and bits.
Pair of cutting pliers.
Pair of large scissors for cutting metal.
Pair of small scissors.
Several files, large and small.
Hammer.
Mallet.
Brad awl, gimlet, pincers.
Small bench vise.
Small saw.
Soldering iron.
Spirit lamp.
Wheel glass cutter.
Pair of compasses.
A two-foot or three-foot rule.

Of course, such tools as planes, chisels, screw-drivers, will always be used. A pair of old gloves will be found useful, especially when working with batteries.

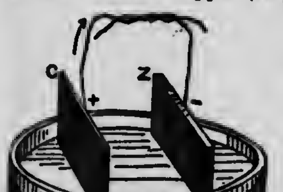
If the amateur plans to keep a little stock of materials and tools as he needs them, and especially if he keeps his workshop in order, he will do better work than if he has many useless tools but is careless and slip-shod. The following materials, however, should be kept on hand:

Glass rods, from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in diameter.
Ebonite rods, from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in diameter.
Glass tubes, from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in diameter.
Guttapercha.
Glass bottles.
Sheets of glass; every piece is useful.
Tinfoil.
Sheet zinc and sheets of tinned iron (such as clean beef tins or sardine tins, which may be cut into pieces).
Sheet copper and brass.
Brass rod, about $\frac{1}{8}$ in. in diameter.
Solder and soldering iron.
Chloride of zinc, rosin, needles, watch springs, white hard varnish, red lead, glue, copper wire of various sizes (better buy as needed), and at least a dozen telephone terminals or binding posts for making good connections.

Batteries. We are now ready to study some of the simpler forms of cells and their arrangement into batteries. Cells may be classified as single-fluid and double-fluid. To the first class belong all such as do not require a partition of any kind between the fluids surrounding the two plates (or "elements") in the cell.

The second class includes all those in which the fluids are kept from mixing directly. This may be done by a porous cup, sawdust, sand, difference of specific gravity or weight, etc. Most of [illegible] erials can be purchased cheaply from any [illegible] electrical supply house. Many of them [illegible] made or found at home. Old glass fruit jars can always be used as containers. Acid-proof cells may be constructed by gluing together with good tape, stout brown pasteboard in any size or form required. After they are thoroughly dry, these cells must be soaked for a few minutes in hot melted paraffin wax, and then allowed to dry and harden. Cells of this kind will withstand any acid, and even a solution of copper sulphate. Porous cups for the double-fluid cells are cheap, but they can also be made from any good clean yellow clay, kneaded to free it from stones. This may be moulded to the desired shape, allowed to dry perfectly, and then gradually heated to redness in any ordinary fire. The addition of powdered graphite or even charcoal will improve the quality.

The simplest cell is known as the "simple voltaic," named after Volta, an Italian physicist. This consists of two plates, one of sheet zinc, the other of sheet copper (or graphite) set in a mixture of twenty parts of water to one part of sulphuric acid. Every cell is composed of two elements, positive and negative. The positive element in this case is copper; that is, it is the element from which the current is supposed to start. It is the element which remains; the zinc decomposes if left in an active battery for a great length of time. If two negative plates (i. e. zinc, graphite, etc.) be used, one on each side of the positive, much better results will be obtained. To hold these plates in position a simple device is the following: Cut several strips of paraffined wood, $\frac{1}{8}$ in. thick and from $\frac{1}{2}$ in. to 1 in. wide, according to the size of the battery, a little longer than the diameter of the containing cell. With the aid of a binding screw or clamp, these strips may be held between the tops of the plates in the cell.



A SIMPLE BATTERY OR CELL

It is better to make wooden covers for cells. These can be cut from pieces of board one inch thick. They should be cut a little larger in diameter than the top of the jar, and made into as true a circle as possible by filing round the edges with a rasp. Round the edge of the cover draw a line $\frac{1}{2}$ in. from the top; then with a flat rasp or file make a shoulder by rasping away the wood on one side of this line for a depth of $\frac{3}{8}$ in., so that the cover can enter loosely into the neck of the jar and rest on the shoulder. The cover should be soaked in melted paraffin wax, till bubbles cease to appear, evidence that the wood is now waterproof and will act as insulator. It will now be necessary to bore holes through which the wires from the plates in the cell may pass. To hold the wires regular "terminals" or binding posts should be used, if possible. For amateur work in general it is better now to connect the "negative pole" (that is, the wire coming from the copper plate) of one cell with the positive pole (that is, the wire coming from the zinc plate) of the next. These wires should be soldered to the plates or otherwise fastened so that the connection is clean.

A useful cell for amateur work is known as the "chromic acid cell," which gives a heavy current for a short time. Two carbon plates and one zinc plate give excellent results. The zinc plate must be amalgamated by moistening with diluted sulphuric acid (1 part acid to 20 parts water), a drop of mercury being put on the surface of the plate while the rubbing is going on. The zinc must be polished till it shines, then rinsed and allowed to dry. To charge the cell, the following mixture may be used:

Chromic acid	6	oz.
Water	1	qt.
Chlorate of potash	$\frac{1}{2}$	oz.
Oil of vitriol (sulphuric acid)	6	oz.

Dissolve the chromic acid in water; add the chlorate of potash, and stir till dissolved; then add sulphuric acid slowly and allow the mixture to cool.

When not in use the plates should be removed from the cell, kept in boiling water for five minutes, then allowed to dry. Extreme care should be used in handling sulphuric acid, to avoid splashing, as a drop of this acid on the hands will cause a bad burn.

To give a list of all cells made today is impossible. Different manufacturers give different names to cells which are essentially the same. Practically all cells in commercial use today use zinc as the negative element; it is with the positive element and with the exciting fluid that new combinations are formed. There are a number of standard cells, however, which are of use to the amateur and may be bought from any dealer. Below are a few of the better known:

Name of Cell	Negative	Positive	Exciting Fluid
Bunsen	Zinc	Graphite	Diluted sulphuric acid
Daniell	Zinc	Copper	Zinc sulphate solution
Grove	Zinc	Platinum	Diluted sulphuric acid
Lalande	Zinc	Copper or Iron	Caustic potash solution
Leclanche	Zinc	Graphite	Ammonium chloride solution

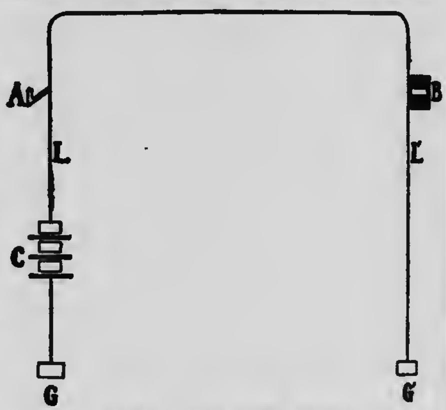
Dealers' catalogs and books will give information about dozens of other cells. In putting together a double fluid cell care should be taken that the plates do not touch each other. One plate must be set in the porous cup and the other in the container. The ingenious boy will easily arrange these details when he has the materials at hand. In any case, it is wise to ask advice of experienced electricians, who will always be glad to answer intelligent questions.

Storage Battery. No doubt every boy has heard of a storage battery and has wondered how to make one. For connecting door bells and other uses for which a current is necessary for a long time, a storage battery should be used. It must be charged from a working battery, but it has then stored enough electricity to serve a long time. Take two sheets of $\frac{1}{16}$ in. lead, each about 6 in. wide and of any convenient length. Place one on a flat table, then place lengthwise on this sheet three strips of india-rubber (asbestos cloth or other insulator), but only $\frac{1}{2}$ in. wide, at equal distances from each other. Over these lay the second lead sheet, over this three more rubber strips. Roll the sheets into a tight spiral on a wooden cylinder and solder a strip of lead or "lug" to one end of each sheet to make connections. A glass or glazed earthenware jar should now be fitted with a cover of paraffined wood, such as has already been described, with two small holes for the connections. The spiral should be tied together on the outside with a guttapercha or indian rubber band. Pour a mixture of ten parts of water to one part sulphuric acid into the jar and then insert the spiral. In mixing sulphuric acid with water it must be remembered that the *acid* must be added in a fine stream to the water, and must be stirred, preferably with a glass rod. Never add water to the acid. We now must "form" or "charge" our battery. A current of electricity must be passed into it until small bubbles show themselves at one of the plates. Then reverse the current, by reversing the wire connections. This process will probably take a week or more, till the sheets have become sufficiently spongy to hold a considerable charge. An easy way to shorten the time of "forming" is to dress the surfaces of the plates with a paste made of red lead and sulphuric acid before rolling the sheets. Two or three charges will then probably be enough to "form" the storage battery.

The Telegraph

We have now reached the point at which we can begin to make use of the principles we have studied. We can explain only a few of the uses to which the boy with a turn for mechanical or electrical work can put this knowledge. Once he has grasped the chief principles he will find many uses for their application.

One of the first uses to which this knowledge may be put is in the construction of a telegraph system. Our diagram illustrates a simple tele-

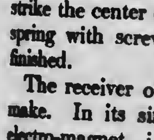


SIMPLE TELEGRAPH SYSTEM

graph circuit, in which LL is the wire, A and B are the stations, C is the battery, and G and G are metal plates, water pipes, or any metal that will conduct the current into the ground, thus completing the circuit. The simplest instrument is the sender. Any boy can make one with a piece of hard wood, planed and squared, about 5 x 2$\frac{1}{2}$ in. x $\frac{1}{2}$ in. for the base; a piece of thin spring steel (side steel such as used in corsets will do) 4 in. long and $\frac{1}{2}$ or $\frac{3}{8}$ in. wide; 2 telephone terminals, or nuts and bolts, one thumb tack, one $\frac{3}{4}$-in. wood screw, a strip of thin sheet brass $\frac{1}{2}$-in. wide and 1 in. long, a bit of round brass rod ¾ in. long and $\frac{1}{16}$ in. in diameter. Drill a hole through the brass strip, ½ in. from one end, just large enough to admit the shank of one of the "terminals" or bolts. At one-half inch from the opposite end make another hole just sufficient to let the point of the drawing pin pass through. Place this brass strip on the base board with smaller hole inward, as shown in the sketch. Drive the thumb tack through this hole, giving one or two taps with the hammer to make sure that the head of the drawing pin makes good contact with the brass strip. Then fasten the bolt. To get the steel spring in proper shape heat the ends over the flame of a spirit lamp till they become dull redhot. Allow the steel to cool gradually, then, at 1 in. from end, bend the spring to an angle of 45 degrees. Punch or bore an ⅛ in. hole one inch from the end, large enough for the wood screw; another hole a half inch from the end for the other terminal. About ½ in. from the other end of the spring drill a hole to admit the $\frac{1}{16}$ in. bit of brass rod, to which a brass button or piece of polished hard wood should be fastened. If the brass button is used it should be soldered. The spring should be cleaned with emery paper. Then place the buttoned rod half way through the hole last made and solder it at right angles to the spring. Then place the spring on the base board in such a position that the projecting end of the rod shall strike the center of the thumb tack. Fasten the spring with screw and bolt. The key is now finished.

TRANSMITTER, OR KEY

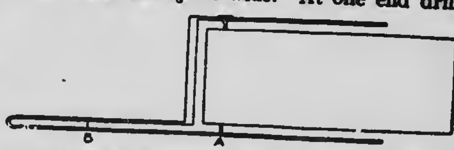
The receiver or sounder is a little harder to make. In its simplest form it consists of an electro-magnet—i. e., iron which becomes a magnet when an electric current passes through it—with an "armature," or arm, which is attracted to the magnet when the current passes through the circuit. Thus when the key is pressed down the current flows through the magnet, which attracts the armature. When the key is released the arm flies back to its original position. All sounders in common use have an additional brass pin or other substance which the arm strikes when it flies back. The tap and release of the key therefore causes two taps of the sounder. A code of taps can easily be learned.



RECEIVER

To make the electro-magnet, a piece of soft iron or iron wire is needed as a core or center. If wire is used the process is simple. Around a smooth pencil or rod ⅜ in. in diameter roll six or seven turns of stout brown paper 2 in. wide, fastening down each successive turn of paper after the first with a little paste or thin glue. Cut two disks of stiff cardboard 1 in. in diameter with a hole in the center just large enough to fit over the roll. These disks should be firmly glued to the ends of the roll so as to form a spool or bobbin. Fill the tube with a sufficient number of straight pieces of iron wire, each exactly 2½ in. in length. The ends of the wires must be flush with the tube at one end and project about ⅛ in. at the other, where they must be filed perfectly flat. At this projecting end a small piece of platinum wire is pushed in between the wires and the external portion coiled round upon itself so as to form a little button about ⅛ in. in diameter; this should be tapped to lie flat and smooth. The bobbin should now be wound with No. 36 silk covered copper wire, leaving a length of 3 in. free at the start and finish. Wind regularly and evenly from end to end, backwards and forwards, until the wire is wound on in layers. In order that the finishing end may not fly back and uncoil, it must be tied down to the bobbin by means of a length of fine silk thread. This completes the electro-magnet.

To make the armature we file a small piece $\frac{1}{16}$ soft iron till its dimensions are 1½ in. long, of in. thick, and ⅜ in. wide. At one end drill



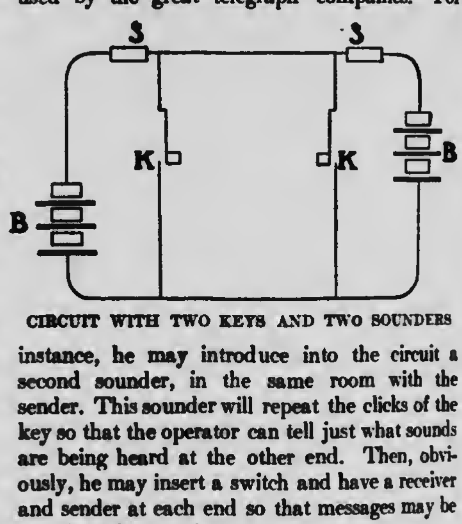
on each narrow edge a hole, exactly in line, with a small drill (for example, a $\frac{1}{32}$ in. drill) to the depth of about $\frac{1}{16}$ in. Across the broad edge, and about $\frac{3}{16}$ in. from the other end, place a piece of platinum wire, and having bent the ends round to the thin edges, solder the platinum to the rim at these edges only. Now we need a bracket for the armature. For this take a strip of brass, $\frac{1}{25}$ in. thick, ½ in. wide, 2½ in. long, and bend it to the shape shown in the illustration. A pin point ½ in. long is soldered to the center of the lower projection at A. Directly opposite in the upper projection drill a hole into which fits a $\frac{1}{16}$ in. metal screw, which must be tapered to a very fine point by filing. Then drill a hole at B which shall hold the bracket to its base. After inserting the armature, with platinum button to the left, with the under hole on the pin point, screw down the upper screw till it enters the upper hole, so that on lifting the bracket the armature can swing freely on the two points.

Set the parts on the base as shown in the sketch. A strap of leather placed over the center of the bobbin will hold it firmly in position. To complete the sounder a heavier strip, or pin of brass, should be placed so that the armature strikes it when it is released by the magnet. A light spring could easily be fastened to the armature to draw it back from the magnet.

The sounder bought from an electrical supply house is more complicated, but any simple device such as is here illustrated will do. It should be needless to point out that to ensure good electrical contact the ends of the connecting wires must be bared of their silken covering, and be well cleaned with emery paper, before being fastened to the terminals.

We now have our parts ready to use, but there remains the important problem of wiring. It would be wise first to connect the sending key and receiver in the same room with our battery, to make sure that the instruments are in good working order. For outdoor connections a bare galvanized iron or hard-drawn copper wire, usually from 0.083 in. to 0.204 in. in thickness, is generally used. The shorter the line the finer the wire that may be used. The copper wire is better because it has greater conducting power. For short distances it will be comparatively easy to stretch wires. Care must be taken, however, to "insulate" (from the Latin word for *island*) the wire, that is, keep the current on the wire by preventing contact with other conductors. Glass and porcelain are best for this purpose. If the wire is run through a wall it should be carefully wound with tape and enclosed in a short porcelain tube, to insulate it. Most boys will probably run the wire through a window. A small hole through a pane will give good insulation. Outdoors, use will probably be made of trees. Care should be taken to keep the wire from contact with leaves and branches. For this purpose the glass insulators can be bought. Small bottles, pieces of water glasses, etc., can occasionally be used. The amateur should bear in mind the fact that the better the insulation at every point, the stronger the current. Consequently, the results will be better if the work is well done. There still remains the problem of connecting the wires to the instruments. Telegraphic circuits may be divided into two kinds, the closed-circuit and the open-circuit. For our purposes the open-circuit is much more useful, because it does not work the batteries when the line is idle. The closed circuit has a switch which "throws" the circuit "open," thus allowing the operator to open and close at will by the use of the key. We need not concern ourselves with these details. Nothing remains but to fasten the wire from the sender to the wire from the receiver, put the batteries in connection, as has already been explained, and then run a wire from each end to connect with a waterpipe or into the ground. The earth, being a good conductor, completes the circuit of the current. This is known as the simple ground-circuit, and is commonly used today. The cut shows a simple arrangement for a short distance line. Closing either key will operate both sounders.

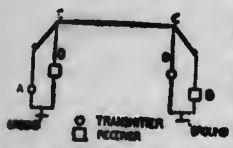
The boy who has studied the telegraph carefully will see many points and improvements which will make this amateur line more like that used by the great telegraph companies. For



CIRCUIT WITH TWO KEYS AND TWO SOUNDERS

instance, he may introduce into the circuit a second sounder, in the same room with the sender. This sounder will repeat the clicks of the key so that the operator can tell just what sounds are being heard at the other end. Then, obviously, he may insert a switch and have a receiver and sender at each end so that messages may be sent from both ends.

A two-point switch can be inserted so that by throwing it to one side the transmitter is put in circuit, and by throwing to the other side the receiver is connected. Of course there must be a switch at each end. In this simple diagram the arrangement of wires and switch is shown when A is telegraphing to B. When B wants to telegraph to A the switches must be thrown to the position indicated by the dotted lines CD, thus reversing the connections. In a case of this kind it makes no difference at which end of the wire the batteries are placed. Only one ground wire is necessary at each end, for the wires from receiver and transmitter may be connected and only one buried in the earth. After a little experience with wiring it would be easy to bring a third boy into the circuit. The more stations on the line the more power is needed. The boy will then learn and enjoy much by using his ingenuity to work out new details once he has mastered the principles.



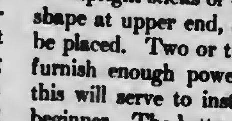
TELEGRAPH CIRCUIT

Wireless Telegraph

Many boys have doubtless thought that they would like to experiment with wireless telegraphy, but have not tried because the principles seemed hard to understand or the expense too great. A set suitable for short distances can easily be constructed at small expense. Instead of a wire for transmission we have to work with the atmosphere; we produce a current of air, not in a steady stream, to be sure, but in *waves*.

To produce these waves we need a sparking device, or "oscillator." If we consider the origin of this word it will help us to understand what the instrument is; the word is derived from "oscillare," which means to swing or vibrate. What we want, therefore, is a device which will cause vibrations of the air. One of the simplest "sparkers" is an old buzzer or electric bell, connected to the key and a coil (or electro-magnet) similar to the ones we have already described under the heading Telegraph. Good spark coils suitable for this and many other experiments can be bought for a dollar or more, but the home-made will do. The key, coil and buzzer should be connected so that when the batteries are connected and the key is pressed the buzzer will "buzz." Connect the binding post C to one side of the interrupter on the buzzer, as shown at H. The other side is connected to one point of a two point switch, whose blade is connected to a second binding post. One of these posts should be connected to the ground and the other to the "aerial." The "aerial," that is the part in the air, consists of several wires placed as high as possible perhaps on the roof, and insulated from all surrounding objects.

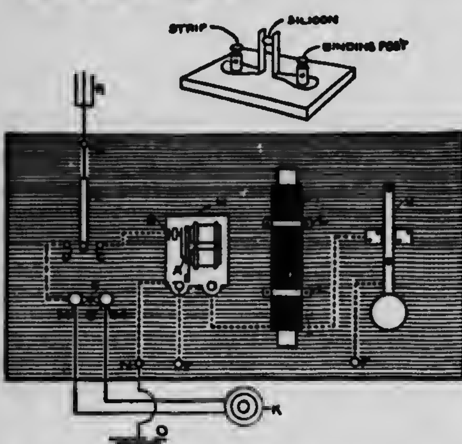
The receiving apparatus consists of a telephone receiver and a "detector." The detector is a piece of "silicon," which may be purchased from any supply house, held in place by two upright strips of springy brass bent to shape so that pressure is sufficient to hold the silicon. One of these strips should now be connected to one point of the switch and the other lead to the ground. Another good detector can be formed by using two upright sticks of carbon, sharpened to wedge shape at upper end, across which a needle may be placed. Two or three chromic acid cells will furnish enough power. Such an apparatus as this will serve to instruct as well as amuse the beginner. The better the instruments, the better the results. A better sparker can be made of three round brass bedstead balls (or brass rods). The middle one is fastened to a base board by means of a paraffined wooden peg screwed into the flange of the ball. The other two are fitted with 6 in. lengths of ⅛ in. brass rod passed through a plug of wood which is then screwed into the ball. Care must be taken to ensure good contact of the brass rod and the inner surface of the ball. Remove all lacquer from the ball by means of fine emery paper, and always keep the balls polished by rubbing with chamois. If the terminals are fastened to the upright pegs as shown, the apparatus is ready for wiring, one of the terminals to be connected with the battery and the other with the coil. When the key of the sender is pressed down a practically continuous stream of sparks should flow between the three balls. If not, they must be moved back and forth till the sparks fly continuously. If three balls are not at hand almost as good results can be obtained by using two, by simply leaving out the center one.



SPARKER

A more elaborate device for receiving can be made if the operator desires further to improve his set. Let us begin by making a base board 12 x 6 x ½ in.; next we make a groove $\frac{1}{16}$ in. deep and ½ in. wide centrally along the length of the board. Glue another board of the same size with its 12 in. edge in the groove; two screws reaching into the upright board through the lower board will help keep the upright in place.

The first part necessary is the electro-magnet, which we have already used as sounder for our telegraph line. We may use the sounder just as it is mounted. Then we must make the "coherer." We shall see in a moment why it is called "coherer." A small empty brass cartridge shell should be brightly polished both inside and outside with emery. To the center of the closed end we solder a 4 in. length of No. 18 bare copper wire; to the open end we fit a stopper cut out of any hard wood, which should enter into the cartridge shell only to a depth of $\frac{1}{16}$ in. Through the center of this stopper we drill a small hole to admit one end of another 4 in. length of copper wire. The wire should be pushed into the stopper to within $\frac{1}{2}$ in. of the closed end. The inside of the shell should be polished aga i before we pour in clean nickel or iron filings until the shell is about half full. The filings must be free from rust or grease. Now insert the stopper. When the current passes through this shell the filings cling together, or cohere—hence it is called coherer. Instead of the brass cartridge, a small glass tube with corks for the ends may be used.



R, aerial; Q, binding post to aerial; C C′ points to switch; H, buzzer; I, electro magnet; J, key or sounder; G, detector; A, armature of buzzer; N, binding post, connect to ground; P, binding post, connect to battery.

In addition to the sounder and the coherer we need an electric bell and several dry cells of any good make. The bell should be screwed to the upper right hand corner of the vertical board, with the hammer of the bell downwards. A single screw through the center and near the top of the smaller board on which the sounder was originally mounted will probably hold this in position in the left upper corner of the vertical board. Just below the level of the bell, at 3 in. on each side of the bell hammer, insert two terminals. Insert the coherer wires in the holes in the terminals, and adjust the wires so that the hammer of the bell just clears the tube of the coherer, so that the hammer taps lightly on the tube when the bell rings. A wire from the right terminal of the electro-magnet should be inserted in the left terminal of the coherer. Connect the right coherer terminal with a binding-post near the bottom of the left-hand corner of the upright board. About 1 in. from each end insert a terminal in the top edge of the upright. From the top right-hand terminal of the sounder lead a wire to the top right-hand terminal on the edge of the upright. A second wire is made to connect the top right-hand terminal of the relay to the top of the bell; finally a third wire is brought from the top right-hand terminal on the edge of the board to the lower terminal of the bell. To complete the receiver connect the terminal of one dry cell to its terminal, and the terminal of another dry cell to their terminals. The cells should be placed at the sides or behind the apparatus, as it is essential that no metal be in front of the coherer. If all the connections have been properly made this receiver should give excellent results over a distance of four or five miles.

The Telephone

If we have gradually mastered the principles of electricity we shall find their application not as difficult as it may have seemed at the start. The telephone is one of the most interesting instruments with which to experiment. In its simplest form it consists of a bar magnet, around one end of which is coiled a fine insulated copper wire; the ends of this coil of wire are attached to two binding screws or terminals, by means of which connection is made to transmitting wires; in front of the end of the magnet around which the wire coil is wound is a circular plate of very thin iron, gripped at its edges but free to vibrate at the center. Nothing more is essential to the construction of the telephone. To carry on a conversation two identical instruments may be employed. The sound waves of speech striking the disk of iron cause it to vibrate sufficiently to touch the magnet; these vibrations are carried by an electric current to the magnet at the other end, where these vibrations are repeated. It is interesting to notice that we may still keep our figure of speech by speaking of sound *waves* that induce electric or magnetic waves.

To construct a telephone capable of transmitting to a distance of two or three miles we need a pair of square bar-magnets, about 3 in. long. These should be capable of sustaining each other if the marked end of the one be presented to the unmarked end of the other. In addition we need two small boxes, preferably round, about 2½ in. in diameter and 1½ in. deep, a pair of thin iron plates such as are used for "tin-types," two pairs of small binding screws, of any pattern, so long as they are small, a piece of cylindrical white wood—a thick broom handle would do—about 1 in. in diameter and 12 in. long, and one-fourth ounce of No. 36 silk covered copper wire.

Let us first cut off two pieces of the wooden rod 4½ in. in length, and with a sharp knife split each one down the middle. With a ½ in. chisel we cut grooves in the flat face of each half cylinder just deep enough to allow the magnets to lie between halves when these are fitted together. The grooves should extend the whole length of the rods, but at one end for a length of two inches the channels should be a trifle wider than the bar-magnets. The half cylinders must now be glued together so that we now have two cylinders with a square channel through the middle. Next we cut a round hole, of exactly the same diameter as the wooden cylinders just finished, in the center of the bottom of the little box. The top end of the cylinder (the end at which the groove is smaller) is then thrust into the bottom of the box from the *outside*, until it is just flush with the *inside* of the bottom of the box. A little glue should be used to make sure that the cylinder will not shift. Now in the center of the lid of the wooden boxes cut a circular hole 1¾ in. in diameter, then glue a cone of stiff pasteboard into this hole. The cone should open and extend outwards for about an inch and be cut off flush with the inside of the lid; its purpose is to collect and reënforce the sound waves created when we speak into the telephone. The next step is to cut two circles out of the tin-type plates of such a size as to fit exactly into the inside of the lids of the boxes. As any dents or kinks would destroy the usefulness of the plates extreme care must be used. Having measured the exact diameter of the inside of the lids, lay out a corresponding circle on a stout piece of cardboard; cut out this piece with scissors, and then, laying this cardboard piece over the iron plate, scratch lightly a line all around with the point of a pin. It is easy now, with sharp scissors, to cut the desired plate to size.

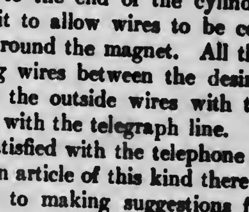
An even simpler receiver can be made from an old baking powder tin—one-half pound size is large enough. Solder a piece of heavy wire on the inside about 1½ in. from the bottom. If we have a piece of hard steel or piece of an old file we can make the magnet either by contact with another powerful magnet or by passing a strong current of electricity around it. One end of the core should now be wound with wire, just as was explained above.

For short distance experiments no farther materials are needed; for longer distances it will be necessary to introduce an electro-magnet near the permanent magnet. The details of the many varieties do not interest us now. Put the magnet in its wooden cylinder, the iron disk in the round box so that the magnet is just clear. The magnet can easily be adjusted by sliding it in the grooves. In practice a gentle tap on the disk will tell whether or not it is touching the magnet—a clear ring shows it is free to vibrate; a dull thud that it is touching. The coil of the magnet should be at the further end from the disk. A disk of wood or stiff cardboard can be screwed or pasted to the end of the cylinder, holes cut through it to allow wires to be connected to the coil around the magnet. All that remains is to string wires between the desired points and connect the outside wires with the inside, as was done with the telegraph line.

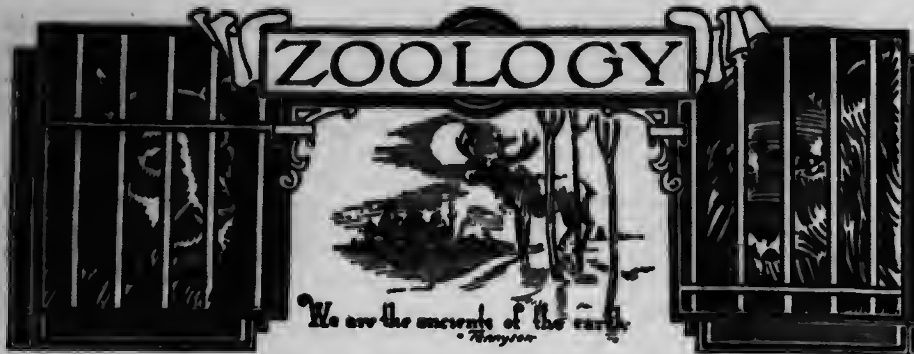
No boy will be satisfied with the telephone as here outlined. In an article of this kind there is no space to devote to making suggestions for finishing or polishing the wood, making brackets, etc., for the instrument, and the many fine points which will be developed. It will be easy to make the instrument look more like the Bell telephone in commercial use by using more expensive materials. Several dry cells connected with the magnets will help to make the experiment useful for greater distances. In short, there is almost no limit to the improvements which may be made.

How to Make a Lightning Arrester

To prevent lighting from damaging any apparatus we can make a "lightning arrester." The sketch shows how to cut and mount three pieces of brass 1 $\frac{1}{16}$ in. thick. The upper binding posts on A and B should be connected to the live wires; the lower binding posts to the instrument, and the post on C to a ground wire. Any charge of lighting will jump from A and B to C and will run into the ground without harming the instrument.



LIGHTNING ARRESTER



Why We Should Study Zoölogy. We are all interested in animals, and like to watch them and to learn about their habits; but it does not often occur to us that such an interest has any connection with a science with so forbidding a name as zoölogy. And indeed zoölogy is much more than a knowledge of the looks and the habits of animals; in its various branches it considers the form and structure of organisms, their activities and their relations to one another and to their surroundings.

To be sure, one may be happy and prosperous and fairly well equipped mentally if zoölogy be never studied, but certain facts relating to this science should be known by everyone. An elementary knowledge of the subject will save one from frequent embarrassment. For instance, if the statement be made that a whale and a man belong to the same class of animals, the uninformed person may be tempted to deny the fact. The household cat and the lion, king of beasts, are related, and only a little study is required to trace the relationship and to learn why scientists so classify them.

The fact of these relationships has not always been known even to scientists; indeed, it is only in comparatively recent times that exact classifications of animal life have been made. Far back in ancient times, Aristotle made studies of animal life, dissected specimens, and made a certain classification, and his work stood for the most part unquestioned until after the Middle Ages. Some of it is accepted today, modern scientific investigation having confirmed the theories of the old Greek scholar.

Plants and Animals. The word "biology" means "science of life," and the science of biology treats of all forms of life, plant and animal. The fact that this one science of life is composed of two distinct sciences, one of which—botany—treats of plants, while the other—zoölogy—treats of animals, indicates that the two forms of life are distinct. Indeed, it seems to be a very simple matter to distinguish members of the plant world from animals. Usually it is easy; a bee on a flower, an ox grazing in a field of grass, a moth fluttering on a blossom are instantly classified. But there are among plants some with very simple organisms and among the lowest species of animals some whose organisms are not in the least complex; to tell which is plant and which is animal is difficult indeed. One may say that the animal is alive and can move, while the plant, though alive, has no power of motion. This is an error, as witness the sudden closing of the Venus's flytrap (page 200) when it entraps its food, the turning of some flowers so they will continually face the sun, and the twining of tendrils around sticks and strings. Most green plants live on inorganic matter—on carbon and carbonic acid gas—and this is what gives them their greenness. But some plants, the fungi, live on organic matter and are not green, and exist because they are able in a wonderful manner to change the organic matter they select for food into inorganic substance. When a plant substance is single-celled and has cell walls in many respects like those of single-celled animals, it is impossible for the wisest scientist to tell them apart.

What All Animals Need. A fish that has been taken from the water and left high and dry on the shore will not live long; a cat or a horse or a man will die in even shorter time if held under water. This does not mean, however, that a fish and a land animal breathe different substances—that one breathes water and the other breathes air. They both require

ZOOLOGY

ANIMALS

Protozoa—One-celled animals.

No definite shape; jelly-like substance; root-like projections of body for feet, with which they seize their prey and absorb it.

Coelenterata—Many-celled.

a. Simple organisms. Capture food by long tentacles. No distinct circulatory system or body cavity. Two types: Those bell-shaped and cylindrical.

b. Examples: Sponge, anemone, coral, hydra, etc.

Echinodermata. Sometimes called radiates.

a. Consists of five parts around a center. Covering sometimes a hard shell; others soft and leathery. Alimentary canal separate from body cavity.

b. 3,000 living species found in all seas—such as starfish, sea-urchin, etc.

Vermes—Worms.

a. Made up of joints or segments, head, tail, upper and lower surfaces, heart, nerves, etc.

b. Many species, but all have same characteristics.

Mollusca. Sometimes called shellfish.

a. Possess alimentary canal, distinct nervous system, digestive apparatus, mouth, gullet, stomach, intestines.

b. Examples: Oyster, clam, cuttlefish, etc.

Arthropoda. Sometimes called articulates.

a. Possess well-organized nervous systems; usually have simple or compound eyes. Some species are parasites.

b. Examples: Insects, spiders, lobster, crab, etc.

Vertebrates.

a. Possess backbone. Two cavities: Upper containing brain; lower, heart, digestive organs, etc.

b. Examples: Mammals, reptiles, fishes, birds, amphibians, etc.

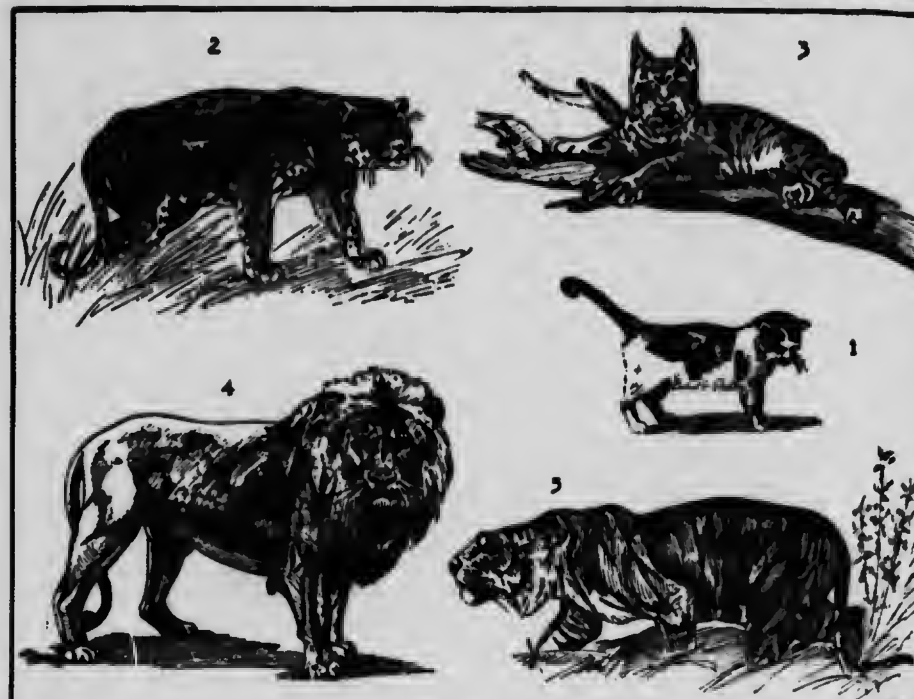
General Facts

1. One-celled animals bear strong resemblance to lowest orders of plant life.
2. This simple cell has the power to do all things necessary for its life.
3. Higher formed animals have many cells, and whole sets of organs. These vary in different animals but their function is the same.
4. Animals require oxygen, while plants require carbonic acid.
5. Animal intelligence. Many animals possess the senses of man—touch, sight, etc. Higher animals possess memory. Animals draw inferences from what they see, but it is doubtful whether an animal can put together different facts and establish a conclusion.

SUGGESTED FOR BLACKBOARD OUTLINE

the same substance, and cannot live without it; that substance is air. But a fish is so formed that it draws the air it needs from the water, which a land animal cannot do. No animal, from the lowest to the highest, can live without air, or rather without that element of air which is called oxygen.

Relationships. Earlier in this discussion brief reference was made to some of the odd relationships that exist in the animal world. This is one of the most interesting topics with



THE CAT FAMILY
1. Cat. 2. Jaguar. 3. Lynx. 4. Lion. 5. Tiger.

which zoölogy deals. The word "cat" ordinarily means to us the little animal, gray or white or black, which plays about our homes; but after we have made the acquaintance of this science, the word "cat" gains a new meaning. It means the powerful lion, the lithe tiger, the graceful leopard, the sharp-eyed lynx—all wild, ferocious beasts that seem as different as possible from the household pet which we are used to thinking of as the most domestic of the animals.

The dog family is not so surprising. The wolf, the dog, the fox, the coyote look much alike, despite their numerous points of difference. If we can imagine ourselves as never having seen any of the animals before and then as being shown a wolf, a collie and a little black-and-tan, we will admit that we should be likely to assume that the wolf and the collie were more closely related than the collie and the little terrier. We have all watched cattle and sheep grazing in a field, but it has probably never occurred to any of us to think of them as belonging to the same family. And yet a study of the picture on page 748 shows us that not only these animals belong to the ox family, but the goats, buffalo and the bison of our western plains as well.

The bob white is a plain little bird, dressed in quiet colors. Who would ever suspect for a moment that he belongs to the same family as the great bronze turkey or the gorgeous peacock? He may, however, claim such a relationship; and the guinea fowl, the partridge and our barnyard hens and roosters are members of the same family, together with the bird which has given its name to the whole group—the pheasant.

Resemblance. Among the most interesting of the many wonderful facts about the animal world with which zoölogy acquaints us is what is known as resemblance or mimicry. We have perhaps looked, in a zoölogical garden, at the bears—the grizzly bear, the cinnamon bear, the huge brown bear, and stands out with startling distinctness against the white ground. Would he ever be able to come close to his prey unobserved? But the polar bear harmonizes with his surroundings, and is almost unnoticeable against the white background. In the forest

THE DOG FAMILY
1. Saint Bernard. 2. Fox terrier. 3. Fox. 4. Coyote. 5. Wolf.

polar bear; and we have known that the polar bear came from the arctic regions where snow covers the ground during most of the year, while the other bears come from more temperate regions—regions of forest and rock and mountain. But probably it never occurred to us that there was any particular reason for the differences in color.

Let us imagine, in the region of perpetual snow, a bear creeping upon his prey. He is a regions or mountain regions a white bear could be seen a long way off, while the darker-haired animals are much less conspicuous. The foxes and hares of the polar regions are pure white also, while a certain kind of weasel which lives in a region where snow covers the ground during only a part of the year changes from its summer coat of reddish brown to a winter coat of white.

There is one example of this changing of colors with which we are all familiar; that is in the little lizard which we call the chameleon. Its ability to make its color match that of its surroundings is commonly overestimated—it cannot change to any or every color; but it does grade through various shades of brown and green.

Perhaps the most wonderful of these resemblances are shown among the insects. There is the insect known as the walking-stick, which, with its long, slender, wingless body and its dull color looks so like a dead twig that when at rest it cannot be distinguished from the twigs to which it attaches itself; there is the green-leaf insect, which has broad, leaf-green wings, which show the veins, the markings and even the discolorations of leaves; and most wonderful of all, there is the huge dead-leaf butterfly. The upper side of this remarkable butterfly's wings are dark, with orange and purple markings; but when it settles on a branch to rest it folds its wings close over its back, hides its head, and looks so exactly like a withered leaf that even close scrutiny cannot always distinguish it. The dead-leaf color is there, the short tail which looks exactly like a leaf stalk, the midrib, the veins, and even the two colorless spots which resemble holes eaten out by insects.

There is one other type of resemblance or mimicry. This is seen in the case of the harmless, non-poisonous insects which imitate exactly in their color and markings certain poisonous insects which really differ from them widely. By this mimicry the harmless insects are saved from the birds which would otherwise devour them. (See color plate *Mimicry*.)

When we use the words mimicry and resemblance, we must constantly bear in mind one fact: that is, that there is no consciousness, no intention on the part of the mimic. The insect or animal does not voluntarily imitate.

The Struggle for Existence. If all the animals that are born were to live, in a very

THE OX FAMILY
1. Cow. 2. Head of antelope. 3. Rocky Mountain goat. 4. Sheep. 5. African buffalo. 6. Bison, or American buffalo.

short time the earth would be crowded to suffocation. For instance, it is stated that if all the eggs laid by the conger-eel were hatched, and every little eel grew and reproduced itself, it would take less than ten years for the sea to become solidly full of conger-eels. It is clear that only a very small proportion of the animals born survive. So fierce, indeed, is the struggle, that it is usually only by means of superior strength, cunning or agility or by means of some means the animal population of the world is kept down. In most districts which are uninhabited, the number of a certain species of animals remains nearly constant; where man joins his destructive forces with those of Nature, the forms of wild life diminish rapidly.

Zoölogy in these Books. THE NEW PRACTICAL REFERENCE LIBRARY has an extensive department of zoölogy. Besides the numerous articles on the various kinds of animals, there

THE PHEASANT FAMILY
1. Peacock. 2. Turkey. 3. Domestic hen and rooster. 4. Partridge. 5. Guinea fowl. 6. Bob white. 7. Golden pheasant.

special protective device, such as the mimicry spoken of in the last paragraph or poisonous secretions, that animals can live and thrive. First there is the struggle within the species—fox fights against fox, and the stronger wins. Then there is the struggle with animals of other species, and finally with the conditions of life, or forces of nature. If, in any given locality, only enough food exists for a certain number of animals, all above that number must starve or migrate. Innumerable birds, insects, fish, animals of all species die of starvation; many die from climatic conditions; in settled parts of the country many are killed by man. By all of these are general articles on such topics as *Zoölogy, Mimicry, Parasites,* etc. All of the articles which bear on the topic will be found listed in the Classified Index under *Zoology* and *Animals.*

In preparing an outline of a science a serious problem presents itself at the start: shall it be technical or shall it avoid scientific terms and arrangement? An elementary treatment of a subject, prepared for teachers and young pupils, must avoid the technical phraseology of the specialist; the outline below includes all the important divisions of animals and disregards the many forms of life of which only the expert can take notice. It differs somewhat from the classification adopted in the article on *Zoölogy* in Volume VI, but only in the omission of matter that seems unessential to a general study of the subject. The derivation of technical words is explained briefly, in order that the pupil may understand that they really mean something and are more than a mere jumble of letters.

Outline on Zoölogy

I. Definition
II. Divisions
  (1) Systematic zoölogy
  (2) Distributional zoölogy
  (3) Animal morphology
  (4) Animal physiology
  (5) Ecologic zoölogy
  (6) Evolutionary zoölogy
III. Classification of Animal Life
  (1) Protozoa (first + animal)
    (a) Monera (single + substance)
    (b) Rhizopoda (from two Greek words meaning "root" and "foot")
      (1) Foraminifera (having an opening or orifice)
      (2) Radiolaria (so called because of the spiny projections which radiate from the center of the body)
    (c) Infusoria (so called because found in infusions after exposure to air)
  (2) Coelenterata (hollow + intestine)
    (a) Medusae (so called because of the fringe supposed to resemble Medusa's locks)
    (b) Polyp (polypus, meaning many-footed)
      (1) Sponge
      (2) Coral
      (3) Sea anemone
  (3) Worms
    (a) Platyhelminthes (flat + worm)
      (1) Flat-worm
      (2) Tape-worm
      (3) Fluke-worm
    (b) Nematelminthes (thread + worm)
    (c) Star-worms
    (d) Annulata (so called because of the ringed markings)
      (1) Leech
      (2) Earth-worm
      (3) Sea-worm
  (4) Echinodermata (spiny + skin)
    (a) Crinoidea (lily + like)
    (b) Star-fish
    (c) Sea urchin
    (d) Sea cucumber
  (5) Mollusca (originally meant a soft body)
    (a) Bivalves
      (1) Oyster
      (2) Clam
      (3) Mussel
      (4) Scallop
    (b) Cephalophora (head + to bear)
      (1) Whelk
      (2) Snail
    (c) Cephalopoda (head + feet)
      (1) Squid
      (2) Cuttle-fish
      (3) Nautilus
      (4) Octopus
  (6) Arthropoda (jointed feet)
    (a) Crustacea
      (1) Water-flea
      (2) Shrimp
      (3) Lobster
      (4) Crab
      (5) Barnacle
    (b) Myriopoda (numberless feet)
      (1) Millipede (thousand feet)
      (2) Centipede (hundred feet)
    (c) Arachnida (from the Greek word for spider)
      (1) Spider
      (2) Scorpion
      (3) Mite
      (4) Tick
    (d) Insects
      (1) Thysanura (fringe tail)
      (2) Dermaptera (skin + wings)
      (3) Orthoptera (straight wings)
        (a) Grasshopper
        (b) Locust
        (c) Cricket
        (d) Katydid
        (e) Cockroach
      (4) Platyptera (flat + wing)
        (a) White ant
        (b) Bird-lice
        (c) Bookworm
      (5) Hemiptera or bugs (half or semi + wing)
        (a) Louse
        (b) Squash bug
        (c) Chinch bug
        (d) Locust
        (e) Cochineal (from the Latin word for scarlet)
      (6) Neuroptera and allied groups (nerve + wing)
        (a) Dragon fly

(b) May fly
(c) Scorpion fly
(d) Caddis fly
(7) Beetles
(8) Fleas
(9) Diptera (two wings)
(a) Fly
(b) Mosquito
(10) Lepidoptera (scaly wings)
(a) Butterfly
(b) Moth
(11) Hymenoptera (membrane + wing)
(a) Bees
(b) Wasps
(c) Ants
(d) Gall-flies
(7) Vertebrata (having vertebrae or bones)
(a) Fishes
(b) Amphibians (from the Greek word meaning "double life")
(1) Salamander
(2) Frog
(3) Toad
(4) Blindworm
(c) Reptiles
(1) Lizards
(2) Snakes
(3) Turtles
(4) Crocodiles
(d) Birds
(See detailed outline, page 606)
(e) Mammals
(1) Duck-billed platypus
(2) Marsupialia (having a pouch)
(a) Opossum
(b) Kangaroo
(3) Edentata ("without teeth," but the term is misleading, as most of them have teeth)
(a) Sloth
(b) Ant-eater
(c) Armadillo
(4) Rodentia (gnawing)
(a) Rat
(b) Mouse
(c) Squirrel
(d) Porcupine
(e) Beaver
(f) Hare
(5) Insectivora (insect + to devour)
(a) Mole
(b) Shrew
(6) Chiroptera or bats (from words meaning hand and wing)
(7) Cetacea (from the Latin word for whale)
(a) Whale
(b) Porpoise
(8) Sirenia (i. e., sirens)
(a) Manatee
(b) Dugong (Malay word)
(9) Proboscidia or Elephants (before + to feed or graze)
(10) Ungulata (from *ungula*, a hoof)
(a) Odd number of toes
(1) Horse, ass, zebra
(2) Rhinoceros
(b) Even number of toes
(1) Tapir
(2) Peccary
(3) Pig
(4) Hippotamus
(5) Deer
(6) Sheep
(7) Ox and bison
(8) Camel
(11) Carnivora (flesh + to devour)
(a) Aquatic
(1) Walrus
(2) Seal
(3) Sea lion
(b) Land
(1) Bear and racoon
(2) Mustelidae (from *mustela*, the Latin word for weasel)
(a) Otter
(b) Skunk
(c) Weasel
(d) Badger
(e) Mink
(3) Dog family
(a) Fox
(b) Wolf
(c) Dog
(4) Cat family
(a) Hyena
(b) Lynx
(c) Panther
(d) Leopard
(e) Tiger
(f) Lion
(12) Primates (from the Latin *primus*, meaning first or highest)
(a) Lemur
(b) Marmoset
(c) Monkey
(d) Ape
(e) Man

Questions

NOTE—For additional questions on animal life refer to *Nature Study*. In that department will also be found interesting outlines on animals, birds, fish, insects, etc.

What is zoölogy?

What is the derivation of the term zoölogy?

What does "cold-blooded' signify when applied to animals?

What are the difficulties of classification in the case of the lowest forms of animal life?

What are the causes of the migratory habit of animals?

Which are the more abundant, the higher or lower forms of life? Why?

What animal is born without a covering? Why?

What are the most useful animals to man for domestic purposes?

What animals are known as ruminants?

What parts of the deer are of commercial value?

How are flesh-eating animals equipped to eat their food? To obtain it? They are satisfied with one meal at a time, eaten rapidly; why?

Why does live stock have to graze so continuously?

What is the difference between an animal and a plant?

Name some of the many ways in which nature has provided for the safety and preservation of wild animals?

What animals produce the most expensive furs?

What do you mean by vertebrates?

In general, what one part of wild animals is of commercial value?

Name the domestic animals in what you think to be the order of their usefulness.

INDEX TO VOLUME VI—THE EDUCATOR

This Index, extending to page 749, classifies and summarizes the contents of Volume VI only, enabling one to locate by page numbers all topics and sub-topics of the Educator volume together with the outlines, charts and graphic illustrations. On page 751 will be found an index to the entire six volumes.

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MICROCOPY RESOLUTION TEST CHART

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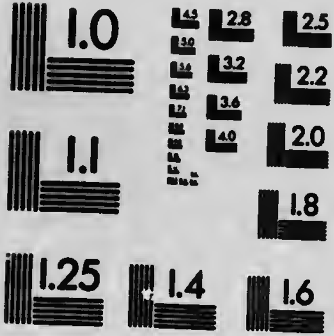

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CORRELATIVE INDEX

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THE NEW PRACTICAL REFERENCE LIBRARY

VOLUMES I TO VI

In the first five volumes of The New Practical Reference Library all topics are arranged in alphabetical order, and the Roman numerals, I, II, III, IV, V, in this Index indicate the volumes in which the topics may be found. In Volume VI, the Educator volume, page numbers are indicated, as its many special features do not lend themselves to the alphabetical arrangement.

The Index which is printed on the following pages was made to correlate the subject-matter of the *entire six volumes* of The New Practical Reference Library. By its use the teacher, parent and student will find references which will uncover without waste of time all the information these books provide on every department of knowledge.

Classifications have been carefully made. For example, under Africa will be found a classified list of all topics contained in the six volumes relating to that continent. In the treatment of a state, all topics and special features, such as the graphic illustrations, are completely given and plainly classified; one may study the cities as a group, or the rivers, mountains, or lakes, and thus cover an entire state without repetition or confusion.

The industries, the sciences, nature study, each separated into logical groups, are classified for the reader. One who would study birds with care is assisted by a grouping of different species; he may devote himself to warblers only, or to waders, or to scratchers, and thus with ease master the facts relating to each group.

In biography the names of the great men and women are arranged in groups, as physicians, lawyers, educators, poets, statesmen, rulers, and they are classified by countries. It is thus easy to compare, for example, the astronomers of all countries, or to make a comparative study of a group of scientists belonging to a single country.

All these advantages are obtained through this unique and exhaustive Index, which correlates the vast amount of useful knowledge found in this Library. This plan of Index, then, makes available for instant use information on all subjects treated, and is in accordance with the approved methods of study and investigation used by the best schools of the entire country.

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See Medicine and Surgery

SWEDEN

Cities and Towns

Gulfs and Bays

History

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SWITZERLAND

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