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Always Read this Notice.

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THE usual sketch and portrait of a Canadian author is held over for this number, and will be resumed in January. Next month the REVIEW will publish a Christmas number.

THE REVIEW is often asked to publish certain notes on the literature of the reading books. In some cases they have already appeared in the series that Miss Robinson is writing. The only way for a live teacher to keep up with these and similar articles is to take the REVIEW, keep on taking it, and preserve the numbers on file.

MR. RICHARDSON'S "Notes on Mathematics," continued in this number, are original, and will provoke thought and discussion. That is his object. He will write a number of articles on these lines during the year, and teachers who are not in the habit of keeping the REVIEW on file, should do so for reference.

A TEACHER asks: "Is there anything published giving the origin of names of places in the Maritime provinces and their meaning?" There is no complete list. The "Studies in Place-nomenclature," by Professor W. F. Ganong, is pretty full, but is out of print. The columns of the REVIEW are open to Professor Ganong to publish in brief his valuable series, which would be appreciated by our teachers.

THE October number of *Acadiensis*, edited by David Russel Jack, closes the third volume of that interesting quarterly. In wealth of illustration and in the variety of its table of contents, it is not behind its predecessors. Mr. Jack has spared no pains and expense to make the magazine creditable in every respect, and it is gratifying to note that the past year has been the most successful, financially, in its history.

TWO NOTED English educationists have recently passed away—Sir Joshua Fitch and Inspector T. G. Rooper. The former was one of the most experienced and earnest educators in Great Britain, a man of great refinement, and of a kind and genial personality. He will be remembered by many of our readers on account of the part he took in the Interprovincial Educational Association held in St. John in 1887. His lectures on teaching is a practical and useful volume, and has given inspiration to many teachers. Mr. Rooper held the office of inspector of schools for the Isle of Wight, and was one of the most conscientious and inspiring educational workers.

Death of Inspector Smith.

Mr. George Smith, Inspector of Schools for Westmorland County, passed away at his home in Sackville on the 28th October. Though his death was expected from his long and serious illness, the announcement was heard with deep regret by friends and in educational circles. Mr. Smith's social disposition and his many excellent qualities attracted and retained friendship. As a teacher, he was always regarded with confidence and respect by his pupils, many of whom are now filling positions of usefulness and honor. When he was called to the position of inspector, the tact, thoroughness and originality which had marked his career as a teacher, combined with his sound and impartial judgments, earned for him the respect and confidence of teachers and trustees.

Mr. Smith was the oldest school inspector of New Brunswick, both in years and seniority of appointment. At the time of his death he had reached the age of fifty-nine, and was within a few months of attaining twenty-four years of inspectoral work. He was born at Norton, Kings County, October 26, 1844, was educated in the common schools of the county, and at Mt. Allison, Sackville, from which he was graduated in 1874 with the degree of A. B. In 1879 he was appointed inspector of schools for inspectoral district number three.

What Teachers' Unions May Do.

Nearly every one who writes or talks on the subject of teachers' salaries complains that they are too low, and yet few common-sense propositions have been put forward to remedy this state of affairs. Talking will not influence the average ratepayer or business man. He will say, "We want good teachers, but we do not propose to pay two dollars where one will do." This represents the prevailing sentiment in town and country to-day. Speakers will dilate on the advantages of free public schools, but when it comes to a proposal to increase the expenditure, they will take a very tight grip on their purses.

If teachers unite with the sole object of securing higher salaries, they will not accomplish their object. Chief Superintendent Dr. Inch, of New Brunswick, in addressing a teachers' institute a few days ago, plainly stated that he had very little hope that anything definite would result from such unions.

But if teachers will unite to study actual conditions, they will be in a fair way to accomplish something. For instance, if a community wants a good teacher—and all do, whether rich or poor—a teachers' union should be prepared to do some missionary work. It should show by actual figures what it costs to fit the teacher for good work, and what it costs a teacher to live, to wear good clothes, to buy books for improvement, to have money to expend for church, charities, travelling, amusements, etc. And as every teacher, worthy of the name, wishes to advance, the salary should be sufficient to enable him to lay up something each term to take an advanced course of study at a college or normal school, or at least to have a state of mind made peaceful by being able to save a little. In brief, let teachers and teachers' associations get down to actual conditions and show by actual figures what it costs to produce and maintain a teacher of good ability, good scholarship, and one fitted with a worthy ambition of improvement of self and school.

Our columns are open to those who have reasonable propositions to make along this line, and any common-sense ideas will be gladly published in the REVIEW. But the time has gone by for mere complaint about low salaries.

Comment on Things Seen and Heard.

BY THE EDITOR.

An excellent suggestion was made by Inspector Mersereau in his address at Chatham last month before the Northumberland Teachers' Institute. He recommended that the teachers of the place in which the institute is held next year, teach their classes the first day, while the other members of the institute look on. This is one of the most practical suggestions yet made for a good working programme for local institutes, and accords with the idea expressed in last month's REVIEW that institutes should have more illustrative work and fewer papers. Many of the subjects discussed at county institutes are worn threadbare.

The following from a contemporary is also suggestive: "When the institute first started it was largely a school for the review of the common branches. Then the long winded lecturers invaded the field, and it was very fashionable to have lecturers from abroad to give learned dissertations, and the teachers had nothing to do but sit still and

listen and forget. Just now there seems to be something of a return to the old method of reviewing the common branches, and right here we want to say that there has never yet been found a better or more practical way to teach pedagogy than the plan of taking up the lesson in the institute much as it is done in the school, and then and there reciting, teaching and discussing together. The successful institute is always that meeting where the teachers take part in the work, where they have something to do, and they do it."

The REVIEW has frequently cautioned its readers to beware of schemes that promise something for nothing, or next to nothing. It has been watchful about inserting in its columns any advertisement of the nature of a "fake." The result is that its advertising columns contain reliable statements from well-known firms and institutions. Quack medicine notices or "fakes" of any description are denied entrance on any condition, no matter what inducement is offered. A few weeks ago we were asked to insert an advertisement of a doubtful character. To make sure that our impression was correct, we submitted it to a firm on whose judgment we could rely. The answer we commend to the careful attention of our readers: "Many persons tell us that if they had not been induced to throw away good money on such advertisements as you enclose, they would have been much better off at present. Our teachers will be better off without such a work. If they subscribe for it because they saw it advertised in the REVIEW, and therefore think it good and reliable, they will not entertain kindly feelings toward you. That this proposition is impossible and of the 'fake' nature is very evident."

The following case is one which illustrates that teachers should not invest their small earnings in concerns which promise a high rate of interest. A teacher received a circular from a Wall street concern claiming to have a reserve fund of $131,000. She invested and was soon told she had a handsome dividend to her credit. She told her friends, and forty or fifty teachers sent on money, amounting in all, it is said, to $20,000. All these had "dividends" declared of such a handsome size that they let them remain. At last no reply to letters was received, and the teacher who had first invested began to investigate. She found that she was one of the many who had foolishly put in their money, expecting to double it in a year. No teacher should put money into concerns at a distance without competent advice. Untold sums of money have been lost, and untold anguish and misery caused by people believing in schemes that promise to enrich them in a short time. Heartless scoundrels are always on the alert to thrive at the expense of credulous people. These should think twice and consult business men of undoubted integrity before yielding to first impulses.

Some time ago the editor received the following note from a boy in one of our schools: "*Dear Sir*: Would you please write me a composition about trees? I want to read it in public, and if you will, would you please have it here by the —" (mentioning the date). Perhaps the teacher is in part to blame for this species of dishonesty in giving a subject for composition without sufficient explanation or without regard to the capacity of the children. In such cases a weak pupil is lead to steal the ready-made composition from a book or paper, or to attempt to gain it by the ingenious expedient of the writer of the above. The matter is one requiring careful oversight on the part of the teachers, for essay manufacture is far too common, to judge from a circular that has come to our notice. In this a certain "firm" guarantees to provide essays, orations, theses, debates, ranging in price from 35 cents to 90 cents per hundred words, according to style and nature of the subject. In the list of subjects is the following: "High School Orations and Essays, $3 to $8." The "firm" speaks of its "constantly increasing business for the past nineteen years, during which time it has increased from a merely local institution to the limits of the English-speaking world."

Gabriel Oak's Night-Dial.

"The Dog-star and Aldebaran, pointing to the restless Pleiades, were half way up the southern sky, and between them hung Orion, which gorgeous constellation never burst more vividly than now, as it swung itself forth above the rim of the landscape. Castor and Pollux, with their quiet shine, were almost on the meridian; the barren and gloomy square of Pegasus was creeping round to the northwest; far away through the plantation, Vega sparkled like a lamp suspended amid the leafless trees, and Cassiopeia's chair stood daintily poised on the uppermost height. 'One o'clock,' said Gabriel."—*From Stars and Their Names, by Hardy, in Littell's Living Age, January 25, 1902.*

[Can any of our readers tell the time of night by the stars as well as Gabriel?—EDITOR.]

English Literature in the Lower Grades.

By Eleanor Robinson.

The Lady of Shalott.

So many questions have been asked, and difficulties suggested in connection with this poem, that I think it must be a hard lesson to teach. I shall, therefore, devote rather more space than usual to my notes on it.

We may take for our starting point the words in the fourth verse, "'Tis the fairy Lady of Shalott." For the story is what children call "a kind of fairy story," by which they mean a story in which things do not happen, nor people act, as they do in real life, and which is to be accepted, not for what we may learn from it, but purely for the pleasure that it gives us. For while different people have read different meanings into the story—I have even been told that it is an allegory—and while it is quite natural for an imaginative reader to find various lines of thought suggested by the idea of the life that was never more than a shadow in a world of realities, and that faded away at the first contact with the real, still Tennyson has treated it in a purely romantic fashion. That is, he has told the story for the story's sake. It seized upon the poet's fancy—the island in the river, the lady in the tower, the mirror, the magic web, the gallant knight riding by, the curse and its fulfilment. There is no moral, no character drawing; it is simply a striking story that lends itself to a picturesque background. And the poet has adorned it with all the beauty of description that he knew so well how to work. An eminent critic, Mr. Stopford Brooke, says of Part 3, "Horse and man, sunlight and scenery, gleaming river and glancing armour — how they fit together, into what unity of impression they are knit! The verse flashes and scintillates like the armour. A wonderful piece of gold and jewel work, and only Milton can excel it in its own sphere."

But just because of this series of brilliant pictures in which it is told, most children will find it hard to get hold of the story itself. It might be well to tell it to them first in some such words as these: "Once upon a time, long ago, there was a beautiful city, surrounded by towers and walls, and full of busy people. A river flowed under the walls of this city, and up the river, not very far away, was an island where water lilies grew. The country people told strange stories about this island. No living person had ever been there, but sometimes men working in the fields near by, early in the morning, or late at night, would hear sweet singing that echoed down the river. Then they would whisper to each other, 'That is the fairy lady of Shalott.' The fairy lady lived all alone on the flowery island, and wove night and day a web of many colors. She had been told that if she ever left off weaving or looked out on the river or the city, some terrible thing would happen to her. She did not know what the terrible thing might be, so she thought of nothing but her weaving. But she had one way of seeing what passed her island, for hanging before her was a great mirror, and looking into it she could see all the people that came and went on the highway, going to and from the city. Market-women, shepherd boys, gaily-dressed pages, quiet workingmen, laughing girls, knights on horseback, funerals, bridal pairs,—all these she saw in the mirror, and she took pleasure in weaving pictures of them all into her work. But she grew very tired of seeing only reflections and nothing real. At last one bright day there came riding by a gallant knight in full armour. The sun flashed on his shining helmet and sparkling shield; the bells on his horse's bridle rang merrily, his armour clashed, and as he passed he sang a gay little song. The poor fairy lady could bear it no longer; when she saw the knight riding so gallantly and so happily along, she left her weaving and took three steps toward the river. For one moment she saw the water-lilies, and the knight, and the city in the distance, and then—the work she had been weaving flew out loose from the loom, the great mirror cracked from side to side, and she knew that the terrible thing had happened. She could no longer stay in the flowery island; she found a little boat floating under a willow tree, and on it she wrote her name, 'The Lady of Shalott.' Then she got into the boat, and when evening came, a stormy, rainy evening, she floated down the river to the city. As she went she sang her last song, and just as she came to the city she died. The boat floated on under the walls, and all the people came out to look at it. They read her name, and were afraid. But the gallant knight whom she had seen looked long at her lovely face, and prayed that God would grant her His mercy."

The story might be given for an exercise in reproduction. When the children read the poem, get them to visualize each picture, and draw their attention (which does *not* mean tell them) to such bits of truth to nature as,

"Willows *whiten*, aspens *quiver*,
Little breezes *dusk* and *shiver*."

"The broad stream in his banks complaining,"

and to the brightness and color in Part 3. If they are not already familiar with the knight of chivalry, a little talk should be given about this picturesque figure. Kindergartners make a great deal of use of the knight in their teaching. Tell how he had to serve faithfully and humbly for years, first as a page, then as a squire, and learn how to obey, and to be brave, generous and courteous, and finally how he had to do some deed of daring before he could be made a knight. His duty was to defend his religion, his country, and all who were oppressed and helpless. The red-cross knight, who was kneeling before a lady in the device on Sir Launcelot's shield, is typical of the attitude of reverence that a true knight held to his lady.

Words needing explanation:

Wold = plain, or open country.

Shallop = a little boat, usually with two masts.

Churl = a rustic, a peasant.

Pad = an easy-paced horse.

Greaves = armour for the legs.

The golden Galaxy = the Milky Way.

Blazoned = *either* shining, brilliant; *or,* decorated in colors; probably the latter.

Baldric = a richly ornamented belt, worn over one shoulder, across the breast and under the opposite arm.

Burgher=an inhabitant of a borough or burg, that is, of a town which sends members to parliament.

Line seven, in the last verse but one, should read,

"Knight and burgher, lord and dame."

And line eight, in the last verse of Part II, should read,

"'I am half sick of shadows,' said"

CHAMELOT, a town of which we read a great deal in Malory's *Morte d'Arthur* and Tennyson's *Idyls of the King,* has been identified with Winchester by some writers, and with different places in Wales by others, but the majority seem to place it in Somersetshire. Of course, it does not make any difference to the enjoyment of the poem where it is.

"A skeleton," said a little tot in school, twisting her apron in her fingers, "is a man who has his insides outside and his outsides off."—*Denver Times.*

"The equator is a menagerie lion running around between the North and South Pole," was what a schoolboy wrote from dictation in his exercise book.

Characteristics of a Primary Teacher.

1. True womanhood, with genuine womanly instincts, such as kindness, patience, sincerity, cheerfulness, sympathy, tact.

2. Native ability — intuitive insight — the power to comprehend the purpose of education and that vigor of mind that enables one to interpret the laws of mind and apply the principles thus deduced to the educational process.

3. A genuine love for children and a due appreciation of their worth.

4. An enthusiastic love for the work of teaching, itself—aptness to teach, pride in her vocation and an over-mastering belief that she is engaged in the grandest of all professions.

5. A complete mastery of the subjects to be taught and a fair knowledge of related subjects—an intelligent understanding of child-mind and child-development and a firm grasp of educational principles and the best method of applying them to the needs and varied capacities of those under her care.

Teachers having these characteristics in any fair degree can not fail of success in its highest and truest sense.—*D. W. Thomas, Elkhart.*

Co-Education.

For more than fifty years the country has been educating the two sexes side by side in the public schools. The plan was, when adopted, confessedly employed as a matter of economy, for fifty or sixty years ago the education of girls was felt to be necessary as well as that of boys; and was undertaken with like means. In the period anterior to the one referred to the education given to girls had been imparted in separate schools; but in schools doubled in size economy caused them to be brought together in the same classes.

No small number of teachers protested against this at the outset; women teachers especially opposed the plan. After a half century of experiment it must be said that opposition has increased and not diminished. At the Boston meeting of the N. E. A. President G. Stanley Hall voiced this opposition, and his words are well worth most serious consideration. It must be understood that there is a general agreement that both sexes may properly be educated together in the kindergarten and the primary classes; probably a majority would favor co-education in the advanced classes of the common school; the controversy is over the high school and the arguments will be equally valid against the college.—*N. Y. School Journal.*

Mineralogy and Geology in Schools — No. 2.

L. A. DeWolfe.

Having studied granite and its constituent minerals, we shall now follow the changes that led to our most abundant sedimentary rocks. As is well known, granite is eruptive. It, with many allied rocks, such as felsites, diorite, etc., may therefore be considered the source of all later formed deposits. By weathering, the granite breaks up into particles of quartz and feldspar, the former grinding into sand and the latter to clay. This change is readily seen on the seashore, or on any exposed granite cliff. A simple experiment, such as shaking up a handful of loam in a glass of water, will show that the clay, owing to its finer particles, will remain suspended longer, and therefore be separated from the sand. Running water in the gutter shows the same thing after a rain storm. This simple lesson teaches the origin of soils, and why some soil is sandy, some clayey, and some loam. What gives soils their color? Why are some sand-beaches white, while others are brown? How does it happen that some clay is red and some is white? What are some of the uses of clay? Are white clay bricks suitable for any purpose where red bricks are unsuitable? The teacher will think of many questions similar to these.

We got our granite broken up into sand and clay. This will spread out in layers under water, and after a long time, through the agency of pressure and cementing material, the sand particles stick together, forming sandstone, and the clay becomes shale. One or both of these rocks in layers are visible in many parts of the Maritime Provinces. They occur exposed in alternate layers on the seashore—especially near coal-mining districts,—but carboniferous strata everywhere illustrate this formation. Under further influence of heat and pressure these rocks become further changed in their physical condition, the sandstone becoming quartzite (locally called *whin*), and the shale becoming slate. These last two are usually spoken of as metamorphic rocks. Why is some slate hard and gritty, while in other cases it is soft? Is some clay free from sand, and other mixed with sand? Some teachers may know arenaceous and argillaceous shales. They help explain the above differences of texture in slates.

At this juncture the children would like to help build up a mineral map of their province—not on paper, but of real rocks. Take a table of convenient size, mark off the outline of the province, and then cover this with rocks distributed as they are in the country itself. Place a piece of iron ore where each iron mine is, and be sure to place the right kind of ore. If hematite is mined in Annapolis County, don't represent it by limonite. Locate other minerals the same way. A glance at such a map of Nova Scotia would show that the southern counties consisted largely of granite, quartzite and slate, and contain the gold mines, while the northern and eastern part is chiefly limestone, gypsum, sandstone and shale, and contain the coal and iron mines. Such a map teaches the association of minerals. After studying it, a prospector would not likely look for coal among the granites of Shelburne County. It teaches the mineral wealth of the province, and in connection with geography and history gives a reason for the location of centres of industry. It teaches, too, the distribution of the best farming land, for the soil conditions depend largely on the kind of rocks and their durability.

Besides this map, I should have two shallow boxes, one containing quartz fragments, sand, sandstone and quartzite; the other, feldspar, clay, shale and slate. Arrange them so that a large piece of granite may be common to both. These boxes, if their contents are graded in various stages of disintegration, etc., will illustrate very well the changes indicated above. In connection with sandstone and its origin, teach conglomerate, for the general method of formation is the same. Wherein do they differ? What lessons can be drawn from the individual particles of conglomerate — their shape, composition, etc.? What is the cementing material? Beds of conglomerate show ancient shores. They are merely the shingle of the beach cemented together. Samples of rock showing ripple-marks help prove the formation of sedimentary rocks. In the sandstone and shale little glistening scales often show themselves. What are they? How did they get there? (The pupil will remember that mica was one of the constituents of granite).

To all except the lowest grades, I should teach something of the composition of minerals. Perform simple experiments to show that granite contains *calcium*, which is the metal in lime; *sodium*, the metal of common salt; and *potassium*, a metal common in many salts, *e. g.*, saltpetre. The pupils of higher grades could test for these metals themselves, and can see the last two in the laboratory.

The next paper will show the necessity of this work. Teachers who do not know how to test for the common elements may get hints from any good text-book on chemistry. An excellent little guide book is Qualitative Analysis, by Dr. J. T. Stoddard. For the geological work, Crosby's Common Rocks is good. To illustrate this paper, see Fig. 1, p. 129, and Fig. 2, p. 132, Crosby. Also Fig. 4, p. 137, if the left hand part were extended upward into a mountain of granite, the right hand horizontal layers would represent alternate beds of sand and clay under water. For more advanced work, Class-Book of Geology, by Geikie, and Manual of Mineralogy and Petrography, by J. D. Dana, are good.

The new principal of Upper Canada College has an article in *The School World* for August, 1903, on "The Teaching of Latin Prose," in which he says: "It is a common complaint now-a-days, not only amongst teachers, but amongst all employers of brain-workers, that the modern boy and young man has not the power of initiative, the capability of independent thought and work, which his father had, or is thought to have had, at his age." And in a note on the words "modern boy," he adds: "Perhaps rather 'the modern English boy.' . . . Since writing this, I have made the acquaintance of 300 Canadian school-boys, and, unless I am much mistaken, these remarks about lack of initiative do not apply to them. They are more hard-working, self-reliant, and more interested in things in general than the average English public-school boy."

This opinion from a new-comer is pleasant and encouraging. In reference to his original remark, and to all such disparaging comparisons of the modern school-boy with his father, it is well to remember the qualifying clause, "*or is thought to have had.*"

In complaining that the text-books in the common schools lead away from the farm, Dr. John Graham Brooks says: "Look with me into an average school-house. Its arithmetic, its geography, its penmanship, its bookkeeping and its reading books are still dominated by clerk and trading point of view. As one listens to the teaching, it is as if the one subject were to create discontent with the country life, to make every bright child hate his surroundings. The instruction seems to assume the failure of the farm life. The inexhaustible charm and resource of the country have no part in this teaching."

The Attractively-Dressed Teacher.

Little children love to see the teacher look pretty. An attractively-dressed teacher not only feels more cheerful, but she exerts more influence. Until teachers are paid better salaries they will always have to study economy, and their wardrobes are necessarily limited, but variety and attractiveness can be accomplished by little things. First the hair should be especially considered. It is said that Queen Alexandra studied her own style of hair dressing that is best suited to her, and has never changed from it. The French, who understand so well all the arts of attractiveness, lay great stress on the dressing of the hair. It isn't enough that it shall be combed neatly, it must be dressed becomingly, and with a little thought it takes no longer to dress it becomingly than it does unbecomingly, and the children will like to see a flower in it, or a gay bow to match the neck ribbon. You will have to economize on gowns, and very likely they will be made of serviceable neutral colored materials, but don't economize on neck ribbons; strive to have just as many gay colored stocks and neck ribbons as you can, and don't wear the same one two days in succession. And give thought to aprons. Pretty ruffled little aprons with a bow on the pocket to match the neck ribbon will please the little people. These are all little things, but they have a wonderful influence.—*Primary Plans.*

ARNOLD'S IDEA OF A TEACHER.—I want a man who is a Christian and a gentleman. I do not so much care about scholarship—and yet, on second thought, I do very much care for it because I think even the elements are best taught by one who has a thorough knowledge of the matter. However, if one must give way, I prefer activity of mind and interest in his work to high scholarship; for the one may be acquired far more easily than the other. A teacher should have the power of not saying what he does not mean; of saying what he does mean; of doing what is right; of speaking what is true; and of thinking what is good independently of any professional or conventional notions that so to act, think or speak is becoming or expedient.

The startling assertion is made that food substances can now be produced by electricity without the need of plant life. Grape sugar is said to have been thus formed.

DRAWING—No. 1.

By F. G. Matthews.

INTRODUCTION.

In the series of articles which are to follow, the writer will endeavour to show how the principles of perspective may be taught by the use of geometrical solids. There are various opinions as to the value of drawing from these type-forms. Naturally, to confine the attention solely to objects which are in themselves uninteresting would be exceedingly dull work, but as the principles of grouping and foreshortening must be thoroughly grasped before a satisfactory drawing of any subject can be made, geometrical solids, type forms, or models, as they are variously called, are made use of to exemplify and give an intelligent idea of those principles. The majority of teachers of this subject give as their experience that the laws of perspective can be learnt far better experimentally and from observation, than from the actual study of geometrical perspective, the mechanical laws of which are liable to lead one astray. A reason for this is shown in the fact that about fifty years ago the plane upon which objects are supposed to be traced, was invariably imagined to be exactly vertical, and directly in front of the spectator, while now this plane is supposed to be movable, and may be practically at any angle with the ground plane, according to the direction in which the spectator is supposed to be looking. The science of perspective has been developing continually since the sixteenth century, and this last change has been brought about largely through the influence of French art. One other point should be noted. Art as it is now known is not a slavish copying of nature, or the photograph would be the acme of perfection; hence we find in the works of well known painters a certain artistic license, which is the outcome of a cultivated taste and wide knowledge. This, however, should not be an excuse for the inaccurate drawing of a model by a beginner; hence if the student is to benefit, accuracy and close observation should be insisted on from the first.

1. Horizontal Rectangular Planes.

Every one has noticed how parallel lines, such as the metals on a railway track, appear to approach each other as they recede in the distance. An observer looking down a street may see the same effect in the row of street lamps, and the roof and window lines of houses; but that these lines would ultimately meet in one fixed point is not so evident. On looking at the accompanying sketch (Fig. 1), it will be seen that the right and left sides of the court are parallel, while the further side is at right angles, the whole forming three sides of a rectangle. Now, if the student places a sheet of glass in front of him, and traces all the principal lines upon it, he will find that they will, if produced, meet in a point. Again, if the student were to place a point on the glass exactly opposite his eye, and draw a horizontal line

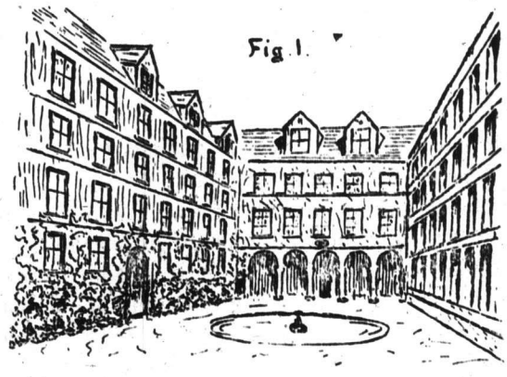
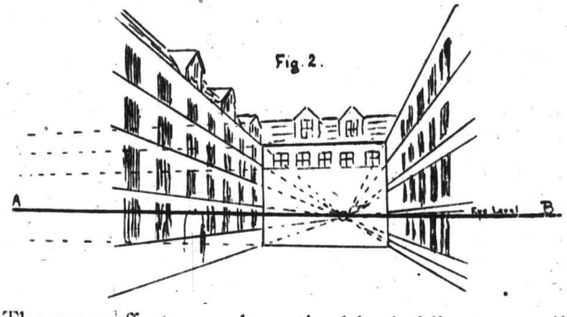


Fig. 1.

through this point, it will be found also to pass through the point at which the lines met. On looking at the buildings at the far end of the court it will be seen that these lines also if produced will meet in a point on the same eye level. Fig. 2 will show these lines meeting in points on the horizontal line marked eye level. The sketch will also show us a few more facts. The lines above the level run down the paper to meet the level, and the lines below run upward, hence we find one line,—the middle of the lower windows on the left—running parallel to the top and bottom edges ot the paper. It is therefore evident that the height of this line from the ground is the same as the height of the eye of the observer.



The same effects may be noticed by holding a pencil horizontally at the height of the eye, and looking beyond it down a long room. The lines of the ceil-

ing, windows, and floor will act the same as the lines in the sketch. If the spectator will then stand on a chair to alter the eye level, a corresponding change is seen in the lines. These simple facts form the basis for the correct drawing of all horizontal lines.

The sketch will show us yet another fact. The ground line of the large buildings on the right will be seen to be actually shorter than the ground line of the much smaller buildings at the far end. This

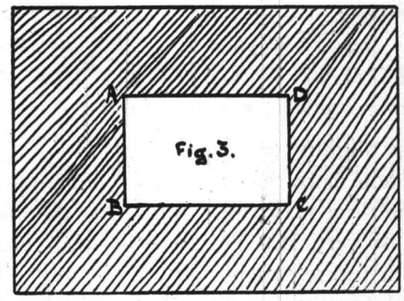


Fig. 3.

is termed fore-shortening, and is always apparent in lines receding before us.

We will now endeavour to confirm these observations by making, with a little mechanical aid, a drawing of a horizontal rectangular surface, say a drawing board. Place the drawing board flat on a table with one corner nearer the observer than the others. (Fig. 4, 1.) Now take a piece of cardboard about 7 by 5 inches, and cut a hole in it about 3 by 2 inches. (A. B. C. D. Fig. 3.) Hold this card upright and move it backwards and forwards in front of one

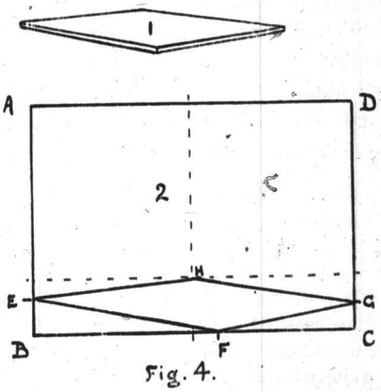


Fig. 4.

eye, the other eye being closed, until three corners of of the board appear to touch the edges of the hole. (E. C. G. Fig. 4, 2.) Mark these points on the card, and note the position of the fourth (H) with reference to the other three. Next place the card flat on a drawing paper and transfer the points to it. Join these points by lines, and we shall have the apparent view of the drawing board. The difference between the apparent and the real shape of the board may now be distinctly seen. For instance the distance from F. to H. appears much less than from F. to G., although in reality much greater.

The same board may now be placed with one edge towards the observer. (Fig. 5, 1.) Hold the card in such a position that the near edge of the board appears to coincide with the lower edge of the opening in the card. The apparent height of the back line

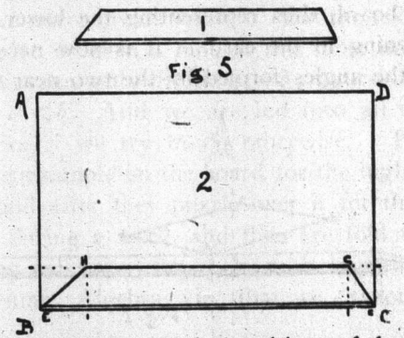


Fig. 5

of the board and the relative positions of the two far corners may now be marked on the card. (Fig. 5, 2). This result when transferred to the paper will give the actual appearance of the board. On comparing this with the pavement of the courtyard in Fig. 1, we find that although the distance from side to side is the same all the way, the sides being parallel, the far end appears about one-half of the near end, and the distance from front to back is very small. As a further and more convincing proof of the above results the student should take a piece of glass and hold it practically upright at a convenient distance from the eye. Closing one eye as before, trace with

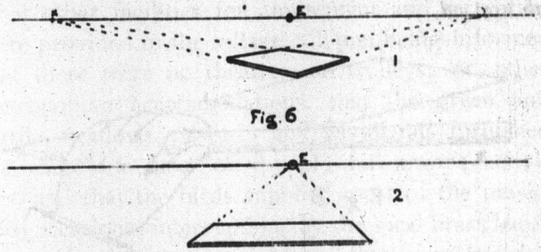


Fig. 6

a piece of moistened chalk or with a brush and whitening, the lines of the board, placed in the same position as before, on the glass, also placing a point directly in front of the eye. In doing this care should be taken that the respective positions of head and glass remain the same throughout. If the lines forming the sides of the board be now produced till they meet, a horizontal line drawn through the meeting points will be found to pass also through the spot in front of the eye (Fig. 6). Compare eye level in Fig. 2.

Although the glass plane may be useful for confirming the principles of perceptive, the student should now endeavor to do without such mechanical aid, as *the important object is to train the eye to recognize the direction of lines and the proportion of masses.* To attain this result, let us place the drawing-board again in the first position. Now hold the pencil horizontally about fifteen inches from the eye, bringing it into line with the nearest corner of the board, thus representing the lower edge of the opening in the card. It is now necessary to judge the angles formed by the two near edges of

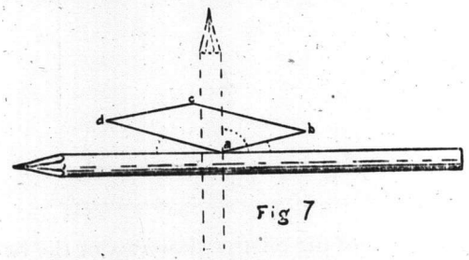


Fig 7

the board with the pencil (Fig. 7). A good way to do this is to hold the pencil alternately horizontally and vertically in line with the point *a* until the proportion of the angles, as compared with a right angle, be realized (Fig. 7). To commence the drawing, place a horizontal line on the paper, to represent the lower edge of the opening in the card, or the upper edge of the pencil. At a convenient position on this line mark a point to represent *a,* and from this point draw lines right and left forming angles with the base line equal to those observed over the pencil, and representing the direction of *ab* and *ad.*

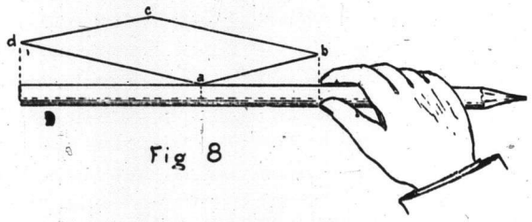


Fig 8

The next step is to obtain the comparative lengths of *ab* and *ad.* Holding the pencil horizontally again in the right hand, place one end in line with *d,* and bring the thumb in line with *b.* Then by noting the spot on the pencil opposite *a,* the lengths of the lines may be compared, and transferred to the paper in any proportion required (Fig. 8). To obtain the point *c,* lines may be drawn from *b* and *d,* converging slightly with *ad* and *ab* respectively. The amount of convergence may be tested by again holding the pencil alternately horizontally and vertically, and comparing the distance *ac* with *bd.* If it be required to represent the thickness of the drawing-board, *vertical* lines should be dropped from *d, a* and *b* to the required thickness, noting that those from *d* and *b* will be shorter than that from *a,* so that the lines joining the lower ends of these will

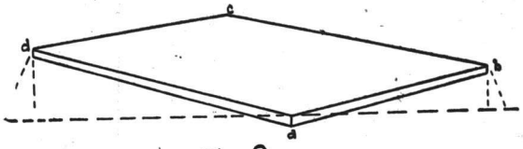


Fig 9

converge slightly with *ad* and *ab* (Fig. 9). It is well to note here that it is a very common error to draw the three short lines splayed at the lower ends instead of vertical. This will be dealt with, however, in a future article.

Useful practice can now be obtained by placing the board in various positions, and drawing it, afterwards comparing the drawings with tracings taken from the same point of view.

Punctuation buttons are being used with considerable success in Indiana schools. The buttons are given to the children at the beginning of the school month, and they are worn by each pupil until he is absent or tardy, when they are forfeited until the beginning of another month. The buttons are not worn for ornament, but to influence the subconsciousness of the child to the end that he may learn the lesson of punctuality and live up to it always. These buttons worn about the homes have aroused many indifferent parents to become interested in the schools and the education of their children.

October is the month that seems
All woven with midsummer dreams,
She brings for us the golden days
That fill the air with smoky haze;
She brings for us the lisping breeze
And wakes the gossip in the trees,
Who whisper near the vacant nest
Forsaken by its feathered guest.
Now half the birds forget to sing,
And half of them have taken wing,
Before their pathway shall be lost
Beneath the gossamer of the frost;
Now one by one the gay leaves fly
Zigzag across the yellow sky;
They rustle here and flutter there,
Until the bough hangs chill and bare.

—*Frank Dempster Sherman.*

Notes on Mathematics—No. II.

By R. G. D. Richardson.

In the October number, we gave a few suggestions about the teaching of Geometry. At a later date we may continue that discussion. The present article will be confined to Algebra.

We often hear the expression, "with mathematical rigor or exactness." This sounds very well, but if the exactness of some of our text-books is taken as a standard, it is a hollow boast. As was said of a treatise in elementary Algebra recently written by a professor in a Chicago University, it is a "brilliant example of ignorance." We presume our text-books in Canada are not the worst, for those used in New England are just as bad. But this discussion is not designed to be academic. Its only claim to the teacher's notice is that it may be of practical aid in teaching.

Before the fundamental processes of algebra are learned, the child comes face to face with numbers. What does $a-b$ signify where $b > a$? We believe the text-books are singularly silent on this question. A child can get an idea of 5 from concrete objects, but what does -5 mean? Ask the pupil! Perhaps it may best be *illustrated* by the graduations on a rod, extending in both directions from zero, as on a thermometer. But *fundamentally* it is only the difference between two numbers $(a-b)$ where $b > a$.

Later, irrational quantities are introduced, *e. g.*, $\sqrt{2}$. Half the pupils, and, we might add, half the teachers, never get any definite idea whether this is a *number* or not. $\sqrt{2}=1.414\ldots$, but if we carry this out to ten million places, we have not reached the end, nor found $\sqrt{2}$, for the decimal is not recurring. Is it a number? Further, what is the idea conveyed to the mind by $7^{\sqrt{2}}$. It is easy enough to raise 7 to an integral power, but what does this new expression mean? Some will resort to logarithms for an explanation, but that is making a bad difficulty worse; for the foundations of logarithms, as ordinarily given, are simply rotten. We may try to explain that $7^{\sqrt{2}} > 7^{1.414}$ which is true enough, but there are millions of numbers which satisfy that relation.

But we have no desire to continue this discussion to any greater length, nor to enter into the intricacies of number theory. All we wish is to get the teachers to consider the symbols they are handling, and think what they are. Then indirectly we may reach the pupils. It cannot be too often repeated that mere tutoring from a text-book, letting the bookmaker think for the pupils, is of no use to the mind of the boy and girl. Even if they cannot understand the whole theory, let them have a chance to see that our system of *real* numbers consists of four classes,—integers, as 1, 2 . . .; fractions, as 1-2, 1-3 . . .; negative numbers, as -3, $-3\text{-}5$ and irrational numbers, as $\sqrt{3}$, log. 2, cos. 20°.

We can never divide by zero. But the text-books do not give us even a hint of this most important fact We can only divide a_2-b_2 by $a-b$ when $a > b$ or $a < b$. And we are led into all sorts of absurdities if we try to do otherwise. Put the following example on the board for the high school pupils, and after they puzzle over it for the spare minutes during a week, and then are told the fallacy, they will never forget the most important fact in elementary Algebra, viz., that we cannot divide by zero.

Let $a=b$, then $ab=a^2$

$\therefore\ ab-b^2=a^2-b^2$, or $b(a-b)=(a+b)(a-b)$

$\therefore\ b=a+b$, and $b=2b$.

or $1=2$.

Yale University, Oct. 27, 1903.

The school board of Barre, Mass., engaged a woman to teach a village school. While she was being conveyed from the station to the boarding place that had been engaged for her on September 7th, she asked where the theatres were located, how often the trolleys ran by the schoolhouse door, and what other facilities for amusement and recreation were provided in the village. Upon being informed that there were no theatres, no trolleys, or other metropolitan accommodations, that the green and fertile meadows, pastures and woodlands furnished the stage for most of the old hill town's activities, and that the birds supplied most of the music, with occasional interruptions by the local brass band, this young woman straightway threw up her job and returned whence she came. Such a girl should work in a shop in the city and not set herself up as an example to children.—*N. E. Journal of Education.*

Potted plants should be, at this season of the year, in every schoolroom. Apart from their value in object lessons, they have a wonderful influence upon the mind and hearts of children. Did you ever see a scolding teacher and a "hard class" in a room where pictures and flowers abound?—*Ex.*

The Belted Kingfisher—(Ceryle alcyon).

By R. R. McLeod.

The family of Kingfishers is a very large one, containing 125 species and 19 genera. They are distributed as follows: Australia, 59; India, 25; Africa, 24; northern Europe and northern Asia, 2, and the continent of America has one genus and five or six species. Our kingfisher is common, and distributed pretty generally over the Dominion. One can hardly mistake him for any other bird. About one foot in length; all the upper parts and a broad breast band a dull blue; under parts white excepting this belt, and a chestnut band across the belly; a long slender crest, very short legs and a stout pointed bill of considerable length, say a little longer than his head. No song, no call, but a hoarse rattling cry that seems to give him some satisfaction as he comes flying heavily over the water-ways in a business-like fashion. I never saw one of them attempt to walk, and he would make an awkward attempt, if I can judge, by his short legs and clumsy feet. This is a specialist among birds like the woodcock that I noticed in the last Review.

As the bird class became differentiated from the ancestral reptile stock, and multiplied on the face of the earth, there was a pressing demand for food with them as with all other living things. No two of them being exactly alike, there was offered in this organic diversity opportunities for some, that others could not enjoy. Where competition for morsels was so keen a very slight structural advantage would be of vital importance. To illustrate this point: Rabbits in Australia, where they had been imported, multiplied so rapidly that they became a wide-spread pest, and millions of dollars were expended in making wire-netted fences to keep them from crops and pastures. It was found that a few of them climbed over the barrier, and on examination they proved to have claws somewhat hooked instead of straight, as the rule is among them. Doubtless *all* tried to get over the fence, but only the exceptional variety succeeded. Had the species all been cornered there, only those exceptions would have escaped alive. The presence of men with shot-guns in this instance defeated what seemed a stroke of good luck.

Our kingfisher is a fisherman and nothing else, no odds and ends for him, like crows and jays and many other birds accept with readiness. His distant ancestors, in an extremity for food of insects, seized a finny fellow creature and found him well worth having. I am acquainted with a cat that waded into the water, only think of it, and captured frogs that she enjoyed like a Frenchman. If one fish could be caught so could another. Habits are readily set up with all of us, and they can be handed down to the offspring, where they for the most part appear as instincts. If my reader does not think this is a rational way of accounting for the beginning of kingfisher tactics to obtain a living, he must take the other view that the creature was made at one cast by creative fiat just as we find him now. If that were the case then the very first thing he would needs be about would be to satisfy the demands of an empty stomach, for he would hardly have been called forth with a fish inside of him. To do that would be to capture a minnow, and as they were made in pairs, there would be an end of that species. No young fish had yet time to make an appearance. Let us be rational and find great delight in learning how the infinite wisdom reached its ends in all these forms of life about us everywhere. Said Bacon: "God hides in the universe to the end that we may have the pleasure of finding Him out," and in Holy Writ we read: "Ask now the beasts and they shall teach thee, and the fowls of the air, and they shall tell thee." When a fish-hawk dives for his prey he seizes it in his claws, but a kingfisher captures his victim with his bill; the hawk soars high and drops like a bullet directly upon the unsuspecting fish that can see in any direction but directly above and below him. The kingfisher perches on a limb over a locality where there is likely to be an opportunity for his line of business. When the time comes he plunges into the water, and if not in vain, bears his struggling fish to a convenient limb, where he grasps him in his feet and proceeds to make a meal of him. I have also observed them when flying but a few feet above the water, make a sudden turn downward into the stream and secure an unexpected dinner.

The feet of this bird are modified to the extent that they have a rough hand-like sole that is produced by the union of the third and fourth toes and broadening the bottom of the hinder toe. The result is a capital instrument for holding fast the scaly, slippery prize that objects to being eaten. Such a foot contrivance would be acquired by natural selection, inasmuch as those individuals which most securely held their food would outlive others less fortunate in that direction. I very much doubt if a kingfisher would follow a fallen fish to the ground in case of accidental dropping, but they generally satisfy their hunger on a perch, more likely than not to be over

the water. A fish hawk has more gumption and bears his victim to a treetop well away from a chance to regain the water.

The plumage of the kingfisher is very compact and oily, thus well resisting the entrance of water. This is a special feature not to be gained in less than many scores of generations of selection. The advantage of it is of great importance, for without such a protection the bird would be drenched from morning till night. This fishing habit was doubtless gained gradually, at first but serving to help a scanty menu of other provisions, and the structural changes of the feathers would be acquired as the mode of life shifted into other lines. Here we may notice the interesting fact that in Australia and India many species of kingfishers do not fish at all, but live upon insects, slugs, and land-snails, and live away from localities where fish can be obtained. They evidently went out of the fishing occupation and returned to the primitive ways of remote ancestors, because the supply of waters failed, or they were crowded out by their own kind. The whole family is noted for brilliant and many-colored plumage.

Our kingfisher shows his peculiarity also in nesting habits. He is not well calculated to build on a tree, or get in and out a hollow stub like some other birds, so he decided to get out of sight with his family affairs. A bank of sand or gravel is selected, and into it the pair of them drive a tunnel six feet in length, using their bills for picks and their broad feet for shovels. At the far end the quarters are enlarged and there is the nest. The eggs are white, and that fact is worth thinking about. If a robin's eggs were white, but few of them would escape jays, crows, and other hungry marauders. In the dark tunnel white is not conspicuous, and as it is a natural color it remains thus without detriment to the species. We see the same feature with woodpeckers, that make their nests in hollow trees, and the eggs are white; the same is true of the stump swallow, the bank swallow, the burrowing owls and others of that group that nest in tree cavities. Color in eggs is of a protective origin, and to study this matter well, is worth the effort of any person, and a school teacher especially.

The old Greeks, those marvels among men, had it that Halcyone was a daughter of Aeolus, and her husband was drowned in the Aegean Sea, and as she wandered on the shore she saw afar the dead body of her husband. The gods in pity changed her into a kingfisher, and her husband shared the same happy fate. Halcyon means brooding on the sea, and it was pretended that the kingfisher made floating nests on that element, and during fourteen days, while the eggs were hatching, the winds went down; and these were Halcyon days. The older English poets often allude to this myth. Drayton has it thus:

> "The halcyon whom the sea obeys
> When she her nest upon the water lays."

Dryden writes,

> "Amidst our arms as quiet you shall be
> As halcyon brooding on a winter sea."

Milton says:

"While birds of calm sit brooding on the charmed wave."

Great improvement in rural schools has resulted from the daily bringing of the children from the farms by wagons into the central village; so that one large graded school can be carried on at the centre, instead of many widely-scattered small schools in which accurate grading is impossible. This improved machinery would be a doubtful blessing if its smooth working did not require and encourage the employment of a superior class of teachers; but the evils of the machine—the lack of attention to the individual child, the waste of time for the bright children, and the tendency to work for a fair average product instead of one highly diversified—are done away with so soon as a large proportion of teachers to pupils is employed—such as one teacher for from sixteen to twenty-five pupils—while the many advantages of the good machine remain.—*Pres. Charles W. Eliot, in the November Atlantic.*

To Check Whispering.—Whispering is a hackneyed subject, but the following device, I think, will help to subdue the habit. Draw on the blackboard, or on a large sheet of cardboard or manila paper, with colored crayons as many stars as you have pupils. You can number these stars, or if the stars are large enough, write the pupil's names on the centre of each star. I would draw three or four rays out between each two points of the star. At the close of the session for the day, if the pupil has whispered, erase one of the rays, and if the pupil should whisper or disobey the rules more times than there are rays, erase the points of the star, and if necessary the entire star, and let a blank stand opposite each pupil's name. You will find that each pupil will strive to keep his star shining. When the pupil enters the school in the morning, he will first look to see whether his star is shining. This device is worthy of a trial, especially with the primary grades.—*Popular Educator.*

Primary Arithmetic — Multiplication.

By Principal P. O'Hearn.

Put on the board two groups of squares, or circles, as before directed, having two circles in each. "How many groups are there?" "Two." "How many circles in each group?" "Two." "How many circles altogether?" "Four." Show that two groups having two things in each make one group of four things. Similarly arrange three groups having two units in each, and show that they make one group of six things, and so on. Next exercise with groups having three things in each.

Put three groups on the board having two things in each. Instead of former question, say, "Three times two?" or, "How many are three 2's?" Show that multiplication is merely addition, and introduce the sign of multiplication.

Put on board:

$$2+2+2=\ ?\ ;\ 3+3+3=\ ?$$
$$2\times 3\ =\ ?\ ;\ 3\times 3\ =\ ?$$

John had 2 cents in his right hand, 2 in his left, and 2 in his pocket. How many had he altogether? 3 times 2? How many eyes have four boys? 4 times 2? How many feet have five girls? 5 times 2? If a top costs 3 cents, what will three tops cost? 3 times 3?

In this way by associating the terms of the multiplication table with *things,* the connection between such questions as, "How many apples in 3 baskets if there are 2 in each basket?" and "3 times 2?" will be soon perceived.

Write the number 3 in columns:

		3
	3	3
3	3	3
3	3	3

"How many 3's in first column?" "Twice 3?" "How many in next column?" "3 times 3?" Here also show that multiplication is another form of addition. 3+3 is two times or twice 3. 3+3+3 is three times 3.

(*a*) I bought 4 stamps and paid two cents a piece for them. If I gave 10 cents in payment, what change should I get? (*b*) I had 10 cents and bought 3 bananas at 3 cents apiece. How many cents had I left?

Explain on board;

$$a\begin{cases} 10-(2+2+2+2) = ? & \text{(Addition).} \\ 10-(2\times 4) = ? & \text{(Multiplication).} \end{cases}$$

$$b\begin{cases} 10-(3+3+3) = ? & \text{(Addition).} \\ 10-(3\times 3) = ? & \text{(Multiplication).} \end{cases}$$

The introduction of the brackets at this stage may appear premature, but I think the simple use here made of them need not be postponed—certainly not very long. It is, of course, presumed that the sign of equality has been explained to the pupils.

Bishop William Croswell Doane, of Albany, was at one time rector of an Episcopal church in Hartford, and at this church Mark Twain was an occasional attendant. Twain one Sunday played a joke on the rector.

"Dr. Doane," he said at the end of the service, "I enjoyed your sermon this morning. I welcomed it like an old friend. I have, you know, a book at home containing every word of it."

"You have not," said Dr. Doane.

"I have so," said the humorist.

"Well, send that book to me. I'd like to see it."

"I'll send it," Twain replied.

And he sent the next morning an unabridged dictionary to the rector.

The following conversation took place during one of the intermissions at the great N. E. A. meeting in Boston: Mr. S., one of the best known superintendents in New England, withal one of the best story-tellers, happening to overhear a remark of one of his teachers to the effect that she would like a situation in the West, says to her, "Oh! Miss M., you do not want to go West. Stay in the East and make some young man happy." Quick as a flash came back the answer: "Oh! Mr. S., this is so sudden!"—*American Primary Teacher.*

Principal Auden, of Upper Canada College, complains that in this country boys leave school too soon—before they have attained that maturity of thought which is essential to a good start in life. He shows that he has quickly become cognisant of one of the weak spots in Canadian national life, when he assigned as a reason for this the lack of moral courage on the part of parents to say "No" when their sons want to adopt a course which their riper experience teaches them is not well advised. —*Orillia Packet.*

School Examinations—No. IV.

By John Waddell, D. Sc.

Units.

A few days ago I heard a lady remark, on seeing a very long loaf of bread: "It seems that here they sell bread by the yard."

It is said that Sir John A. Macdonald replied to the late Queen's enquiry, "How many feet long is the Victoria bridge at Montreal?" "When we Canadians name a bridge after your Majesty, we measure it in miles, not in feet."

These two examples illustrate the use of units in an unusual manner. It is not customary to buy bread by the yard, or to measure bridges by the mile, and that is the peculiarity in the two cases.

The units employed in our country frequently differ from those in another; here we buy apples by the dozen or by the peck; in Britain they are retailed by the pound. Here we measure long distances in miles; in France and Germany they are measured in kilometres.

Quantities of different kinds of material are usually measured in different units. We buy wood by the cord, coal by the ton, flour by the barrel, strawberries by the box, cotton by the yard, thread by the spool or reel, yarn by the skein, clothes by the suit, shoes by the pair. Since each of these things has weight, they might be bought by the pound; but as the weight is not the most conspicuous or important property in many of the cases, it is not regarded.

In every case where a number is concerned, a standard or unit is involved, either expressed or understood. Sometimes in a single phrase, one unit may be expressed and another unexpressed, as when we say that a man's height is five feet ten, where "ten" stands for ten inches. In expressing a quantity there are two factors, the *unit* and the *numeric*, or number of units.

Though so many units are in common use, all physical measurements can be reduced to at most three units, which are therefore called fundamental. These units are those of length, mass and time. We may choose whatever units we wish for these three, but once they are chosen the units of all other physical measurements are fixed. We may choose the mile if we like for our unit of length, and can give a man's height in miles, and the area of a clover leaf in square miles. For mass we might employ the ton as unit, and a doctor might prescribe for his patient a certain small fraction of a ton of strychnine. Time might be measured in years, and one might be asked for how much of a year one wished an egg boiled. These units might not be convenient, but they would be possible. Given the above units of length and time, the unit of velocity would be fixed. The unit of velocity would be one mile a year, and the velocity of a snail, or of a cannon ball, or of light, would be expressed in miles per year.

In physical measurements, the foot, pound and second are more usual units, and still more usual than the foot and pound are the French measures, the centimetre and gramme, both systems taking the second as unit of time. A centimetre is between one-half and one-third of an inch, and a gramme is about $\frac{1}{454}$ of a pound.

In ordinary life some multiple of these measures is sometimes more convenient. One hundred centimetres is a metre (a little more than a yard), and a thousand grammes is a kilogramme (a little over two pounds). For long distances the kilometre (one thousand metres) is a convenient unit.

For work in the laboratory the centimetre is a convenient length, and the gramme a convenient mass, and the second a convenient time, and sometimes measurements with these as the fundamental units are said to be made in *absolute* units.

Our conception of physical measurements is much clearer if we have a clear idea of the units in which the measurement is made; and if we have been accustomed to one set of units, we may need to convert any number into that particular set of units before we realize its value. If you tell an Englishman newly arrived in this country that a particular suit of clothes cost $18.75, you will almost invariably find that he will ask how many shillings that is; or if a Canadian in London is asked four guineas for a suit, he will probably change the amount into dollars before he decides whether it is dear or cheap. Most people accustomed to railway travel could give a pretty shrewd guess as to whether they were travelling at the rate of thirty, forty or fifty miles an hour; but if you were to ask them if they ever went at the rate of thirty feet a second in a train they would be totally unable to answer.

The changing from one system of units to another is sometimes a little confusing, but the careful application of common sense will keep one right. The fundamental principle is that if the unit is large

the numeric will be small, and conversely if the unit is small the numeric will be large. A man's life is expressed by a relatively small number if the unit of time is a year, but by a larger number if the unit is a second. A velocity of forty miles an hour would be a very large number if expressed in feet per century.

I was led to write this article on account of a question in the physics paper of Grades XI and XII in the Nova Scotia educational examinations in 1903, and I shall endeavor, by two or three illustrations, to show how such problems may be attached.

As has been indicated above, a velocity involves two of the fundamental units—that of length and that of time, and a body has unit velocity when it passes over unit distance in unit time. A train moving at forty miles an hour has a velocity forty when the unit of length is a mile, and of time, an hour. But the velocity is expressed by an entirely different number if the unit of length is a foot and the unit of time is a second. The velocity of a body falling freely for a second is slightly over thirty-two feet a second. We might wish to compare the velocity of a train going forty miles an hour with the velocity of a falling body at the end of the first second.

Forty miles an hour is 211,200 feet an hour; and since there are 3,600 seconds in an hour, the velocity is $\frac{211200}{3600}$, or a little less than sixty feet, a second, so that the train has nearly twice the velocity of the falling body. Or a person would be hurt by jumping on the platform of a station from a train going twenty miles an hour as much as if he had fallen sixteen feet, which is the distance he would fall in a single second.

The velocity of a falling body is not uniform, but increases continually; in other words, there is an acceleration. How are we to measure the acceleration? It is not uncommon to say that the acceleration of a falling body is thirty-two feet a second, but a little consideration will show that the expression is inaccurate; what is meant is that *in a second* there is an increase of velocity of thirty-two feet per second. We have just calculated that a velocity of thirty-two feet a second is more than twenty miles an hour, so that in a second a falling body acquires a velocity of over twenty miles an hour, and the acceleration may be said to be more than twenty miles an hour per second.

No railway train ever acquired a velocity of twenty miles an hour in a second; the acceleration of the railway train is much less than that due to gravity acting on a falling body. Suppose a train acquires a velocity of forty miles an hour in three minutes (that is, suppose its acceleration is forty miles an hour per three minutes), how does this compare with the acceleration due to gravity? We found that forty miles an hour is sixty feet per second, and it takes three minutes or 180 seconds to acquire this velocity, so that in one second it would acquire a velocity of one-third of a foot per second. The acceleration of the train would then be one-third of a foot per second, per second, whereas the acceleration due to gravity is thirty-two feet per second, per second.

The above illustration shows the force of the expression per second, per second. In the *c., g., s.* (centimetre, gramme, second) system of units, 981 expresses the acceleration due to gravity; the acceleration is 981 centimetres per second, per second.

It may be well to give an illustration showing how some other physical units depend upon the fundamental units. For this purpose the unit quantity of electricity may be taken. Unit quantity of electricity is that quantity which at unit distance from an equal quantity exerts unit force. It is evident that if the unit of length is a centimetre, the unit of electricity will be different from what it would be if the unit of length were an inch. But it will be noticed that the unit of force is involved, and the unit of force involves the unit of mass, and will be different if the unit of mass is a gramme instead of a pound. The unit of force not only involves the unit of mass, but the unit of acceleration, which, as we have seen, involves the units of length and of time. So it is evident that the unit of electricity involves the units of length, mass and time in a complicated manner. As the unit of electrical quantity depends upon the fundamental units, so do the units of electric potential, capacity, current, etc. The same thing holds true of magnetic and heat units.

It is not possible to go fully into the subject of units in a short article, but it is hoped that some idea has been given of what is meant by the phrase, and that the hints given will be useful to those readers of the EDUCATIONAL REVIEW who are interested in physics and are not familiar with this branch of the subject.

School of Mining, Kingston, Ont.

A Good Teacher.

Will you spend an hour with me in a country school? 'Tis a small one-story building with windows all the way round, and doors at one side and at the front. The playground reaches back to the woods where we hold camp meeting in summer.

The doors of the school are closed now, and the scholars are seated, nearly half a hundred strong.

As we enter every eye is directed toward us. Excuse them, 'tis a childish habit. They want to see who you are and they look right at you to find out. Even during the short prayer you may catch a bright eye here and there glancing your way, but, if you were not looking yourself you would not have seen them.

The sweet maid teacher will, if you notice, tolerate anything but real rudeness. That, she will reprove gently, but with such resolute firmness that she will not have to reprove again during that session.

There is a little organ near the side door, and, after the prayer, the teacher plays "Good-bye, Good-bye to Summer." And the scholars sing heartily and in fairly good time.

The little girl in the middle aisle with the plaid dress and hair done in two little tight braids that curl up in the back, has a voice like a nightingale. See that hardy young democrat across the aisle turn his freckled face toward her and listen, so absorbed that he forgets to sing. There is a quartette back in the room. They sing together every day and make harmony for the whole school, but they are about the largest pupils in the school.

The teacher has to tap the bell for order after the song, they make such a noise putting away the song books; but that is the way with children; when they move at all they have a way of changing their whole physical condition.

Are you not surprised at the promptness and precision with which class after class is brought up and dismissed? At the easy masterful way in which the country girl imparts her knowledge?

That is why the scholars grasp it so readily. They see what she tells them, just as plainly as they see the book in her hand. Those two boys over there by the window whose heads are met over one book, are French. At the age of nine and eleven they are just mastering the weighty problems of the English primer, but they have only been a few months in this country.

There are three Indian children in the room; a sprinkling of Irish and German, and five negroes. These last as neat and clean and quite as bright as many of their white fellows.

A kind of invisible noise (so to speak) that always prevails in a schoolroom, increases as the time for recess draws near; pencils drop, hands go up,—a spirit of unrest is abroad. At the first tap of the bell there is a rapturous putting away of books. Two taps: they are on the feet in line; three taps: march!

They can hardly wait until they clear the door before they hoot and yell, pelt each other with snowballs, and race about looking wildly for something new to do. Shinning up trees (forbidden), jumping off the coal shed (strictly forbidden), but teacher has company,—indeed doing nearly as they do every day and that is like no other body than themselves.

The nightingale is screeching like one bereft, and the little Frenchman's yellow curls are full of snow. They are taking a fifteen minutes' lesson in physical culture from nature, and meanwhile the teacher offering us a temptingly rosy apple and eating one herself, shows us the maps, pictures, drawings, etc., on the walls. Two windows where the sun comes in most have boards nailed to the sills are quite full of plants, and of these she is very proud. Her face lights up with pleasure as she notes a flower here and there that was only a bud yesterday. Her broad white brow is as smooth as a child's.

Do you know, I consider a good teacher a gift direct from God just as a great poet or artist.

But we are reminded that recess time is over and prepare to take our leave. One look down the silent empty room, with the sunshine quivering over the scratched, ink-stained desks and board floor;—a lingering look at the pretty flower-decked windows in such delicate and beautiful contrast to the gaunt, snow-laden landscape without;—a covert glance at the teacher's gracious, smiling face, and we are bowed out, just as a rush of footsteps announce the arrival of an army that almost makes us turn pale; but that only makes her assume the least bit more of dignity, for you see children are dreadful critics.

—*I. W., in Popular Educator.*

"I have enjoyed the REVIEW very much. It has helped me greatly in my work. I shall do what I can to get others to subscribe. L. A.

Halifax County.

Weakness Advertised.

The teacher gave a direction to the whole class. She waited a moment and then said: "Two boys are out of position." Of course, the two were the last to get the force of that remark. They had the attention of the whole class before they pretended to know they were the culprits. And the joke was on the teacher. She could not control her room, and she had called the attention of everyone in the room to her weakness.

"Somebody's humming!" Scowls and sharp tones announce to all that some lively girl or boy is having sport at the teacher's expense, and she has been weak enough to announce the youngster's triumph to the enemy. Everybody will be the enemy soon where that sort of thing goes on. Even the principal and superintendents, who would all help her if they could, seem to get something against such a teacher.

"Why don't you get at work?" This is a prize among fool questions. The one who asks it knows very well that the boy won't tell why, and his refusal to answer is disobedience that is very hard to deal with. Besides, the teacher knows well why he is not at work, and everybody present knows what she knows. It is because he doesn't have to obey such a weak teacher, and he likes to see her storm and stop every one else who otherwise might have been at work but for the teacher's unwise interruption. Every pupil looks up when this prize question comes out.

"You may stay in at recess and do that work." This tells the pupil and his mates that he is superior to you in school hours, and that you intend to take advantage of him when you get him alone. The joke in this game is that you have less advantage over him then than at first. Any teacher who can get any good out of this performance can get the same good in an easier and less humiliating way. It advertises the teacher's inability to those who delight in giving that kind of teachers trouble.—*Watt's Extra Teacher.*

We hope the articles on Drawing which are begun in this number of the Review will prove useful to teachers. They are prepared with that end in view by Mr. Matthews, principal of the Manual Training School, Truro. He has had much experience in teaching this subject.

Memory Gems.

(Selected for the Review by A. B. J.)

Who overcomes by force, hath overcome but half his foe.—*Milton.*

Count that day lost
Whose low descending sun
Views from thy hand
No worthy action done.

I hold it truth with him who sings
To one clear harp, in divers tones,
That men may rise on stepping stones
Of their dead selves, to higher things.

—*Tennyson.*

Temperance and labor are the two best physicians of man; labor sharpens the appetite, and temperance prevents him from indulging to excess.—*Rousseau.*

Hymn to the Spirit of Nature.

Life of Life! Thy lips enkindle
With their love the breath between them:
And thy smiles before they dwindle
Make the cold air fire; then screen them
In those looks, where whoso gazes
Faints, entangled in their mazes.

Child of Light! Thy limbs are burning
Through the veil which seems to hide them,
As the radiant lines of morning
Through thin clouds, ere they divide them;
And this atmosphere divinest
Shrouds thee wheresoe'er thou shinest.

Fair are others: none beholds thee;
But the voice sounds low and tender
Like the fairest, for it folds thee
From the sight, that liquid splendor;
And all feel, yet see thee never,—
As I feel now, lost forever!

Lamp of Earth! where'er thou movest
Its dim shapes are clothed with brightness,
And the souls of whom thou lovest
Walk upon the winds with lightness
Till they fail, as I am failing,
Dizzy, lost, yet unbewailing!

—*Shelley.*

Public *vs.* Private Schools.—The growth and multiplication of private schools, as evinced in their aggressive advertisements and larger enrolment, is attracting new attention this fall. A writer in the N. Y. *School Journal*, in explaining the essential difference between the private and public school, says that their ideals are different; that of the public school is scholarship, while that of the private school is culture—meaning by culture, manners and conduct, as well as scholarship.

Teachers' Conventions.

Gloucester County Teachers' Institute.

The Gloucester, N. B., County Institute met September 24th and 25th, with a large number of teachers present from all parts of the county. President J. Edward De Grace occupied the chair. Four well prepared papers were read and discussed: The Relation that Should Exist Between Parents and Teachers, by Mr. D. T. Robichaud; Attention, by Principal R. D. Hanson, of the grammar school; a bright paper read in French, on La Bonne Institutrice, by Miss Laura Cormier, of Caraquet; Reading for Beginners, by Miss Gosnell, of Bathurst. A public meting was held on the evening of the 24th, addressed by Rev. S. J. Doucet, Mr. Joseph Poirier, M. P. P., Principal J. E. O'Brien, Principal Hanson and President De Grace The following were elected officers for the ensuing year: President, R. D. Hanson; Vice-president, Miss Bernadette Cormier; Secretary-treasurer, D. T. Robichaud; additional members of the executive, Jean G. Robichaud and Miss Gosnell.

Westmorland County Institute.

The teachers of Westmorland County, N. B., met at Moncton, October 1st and 2nd. Papers and addresses were given as follows: On the Use of Good English in the Schools, by Roy D. Fullerton, B. A., of Port Elgin; the Use of Globes instead of Maps in Teaching Geography, by Principal G. J. Oulton, of Moncton; on Nature Study in Primary and Intermediate Grades, by Miss Brownell, of Sackville, and F. R. Anderson, of Moncton. A lesson was taught by Principal B. P. Steeves, of Dorchester, to a Grade VII class, illustrating the use of simple equations for beginners in algebra. Professor Scott, of the University of New Brunswick, gave an address on wireless telegraphy at the public evening meeting, October 1st. An address of sympathy to Inspector Geo. Smith, who has been suffering from a severe and protracted illness, was passed by a standing vote of the Institute. Mr. R. E. Estabrooks, President of the N. B. Teachers' Union, addressed the Institute on the advantages of association. A resolution was passed to form an association, and an executive committee was appointed to arrange the details. A resolution was passed protesting against the granting of local licenses to teach. The following were elected officers of the Institute: President, T. T. Goodwin, Dorchester; Vice-president, Miss Mary Moore, Moncton; Secretary, S. W. Irons, Moncton; additional members of executive, F. J. E. McGinn, Sackville; Roy Fullerton, Port Elgin; Miss Jennie McDougall, Shediac.

Victoria County Institute.

The teachers of Victoria County, N. B., met at Grand Falls, October 8th and 9th. An excellent address was given to the teachers by Inspector Meagher, and the following papers were read: On the Duties of Parents and Teacher Towards the Pupil, by Principal Wm. Veazey of the grammar school; on Composition, by Principal J. C. Carruthers, of the Grand Falls superior school; on the Teachers' Institute, by Miss Bessie M. Fraser, of Grand Falls. The presence of Chief Superintendent Dr. Inch and Mr. John Brittain was a great assistance to the Institute. The latter conducted an excursion to the gorge below the Grand Falls, to inspect the plants, rocks and "wells" of that noted place. A resolution was adopted forming a teachers' union for the county, with the following officers, who are also the officers of the Institute for the current year: President, J. C. Carruthers; Vice-president, Thos. Rogers; Secretary, Miss Bessie M. Fraser.

Northumberland County Institute.

The teachers of Northumberland County, N. B., met at the Chatham Grammar School on the 8th and 9th of October. Inspector Mersereau addressed the Institute in stirring and effective words. The following papers were read: On the Teaching of English, by Principal M. R. Tuttle, of Blackville; on Discipline, by Mr. C. J. Mersereau, M. A., of the grammar school; on Nature Work in Primary Grades, by Miss Smith, Chatham; on the Use of the Imagination, by Principal A. E. G. MacKenzie, of Harkins' Academy, Newcastle; on Geometry, by Dr. P. Cox, Principal of the grammar school. Inspector Mersereau gave a talk on the Practical in Education, in which he recommended more attention to manners, facility of expression in English, and accuracy in arithmetic. The following officers were elected for the year: President, James MacIntosh; Vice-president, Miss Beatrice Ellis; Secretary-treasurer, A. E. G. MacKenzie; additional members of executive, Miss Stella Carruthers and C. J. Mersereau, M. A. A Northumberland County Teachers' Union was formed, with Dr. Cox, President; J. Brown, Vice-president; and M. R. Tuttle, M. A., Secretary.

Kent County Institute.

The Kent County Teachers' Institute was held at Richibucto on Thursday and Friday, October 22nd and 23rd. Inspector Mersereau was in attendance. The president, Geo. A. Coates, gave an opening address, followed by Inspector Mersereau. Miss Crystal, teacher of the primary department of the Richibucto Grammar School, gave an instructive

lesson on geography to a primary class. Dr. J. R. Inch, Chief Superintendent of Education, was then introduced. Miss Mazerall, teacher of the primary department of the Buctouche Superior School, read an excellent paper on How to Write Correctly. Miss Caie opened the discussion, which then became quite general. Miss Carruthers, principal of Bass River Superior School, read a comprehensive paper on Nature Study. The inspector opened the discussion on this paper.

A public meeting was held on Thursday evening, President Coates in the chair. Addresses were given by Inspector Mersereau, Dr. Inch, and others.

On Friday morning a resolution expressive of sympathy for Inspector Smith, on account of his serious illness, was passed by a standing vote of the Institute.

Miss Caie gave a talk on plant study, and R. B. Masterton, principal of the Rexton Superior School, read an interesting paper on Mistakes in Teaching Arithmetic. The discussion was opened by the secretary, A. E. Pearson. Inspector Mersereau then addressed the Institute on External Aids to Education.

The following officers were elected for the ensuing year: Geo. A. Coates, president; Miss Kate Keswick, vice-president; A. E. Pearson, secretary-treasurer; A. Dewar and Miss Alethea Wathen, additional members of the executive. Harcourt was chosen as the next place of meeting.

After the usual votes of thanks, the Institute adjourned, immediately after which a discussion on Teachers' Union came up, and the teachers present formed themselves into a union, known as the Kent County Teachers' Union, with the following officers: A. Dewar, president; Miss Crystal, vice-president; A. E. Pearson, secretary-treasurer. A. E. Pearson was appointed as a representative to meet with the executive of the N. B. T. U. at Moncton on December 21st.

On Friday evening a reception was held. An enjoyable evening was spent in games and amusements of various kinds.—*Condensed from Secretary's Report.*

The *Chautauquan* for November has an excellent article on the Beautifying of School Grounds, and the nature study subject for this month, by Anna Botsford Comstock, is on the Sugar Maple and the Red Squirrel.

Usually it is the blunders of students that are shown up in humorous exhibits of examination papers, but in Mr. Ellis's Scholarship Howlers, which *The Living Age* for October 31 reprints from *Longman's Magazine*, the tables are turned: and the errors described, some of which are irresistibly funny, were perpetrated by teachers.

A Trip to Africa.

Having entered the —— Sea from the Atlantic Ocean, through the Straits ——, we stopped for a short time at ——, the capital of Algiers, purchased some ——, ——, and ——, then went on to ——, where we called upon the ——. We passed by —— and landed on Saturday at A——, the largest seaport of ——. Monday we started on a trip up the ——. The first day we passed the city of ——, near which are the —— ——, built many thousands of years ago. The most peculiar of these is the ——, and the largest is ——. The inhabitants of this country are ——, —— and ——, and it is governed by the ——.

Continuing our journey we at last came to the lakes ——, ——, and ——, the sources of this great river, while in the distance we could see the peaks of —— and ——. Travelling southward, overland, we reached the —— river, which flows east and empties into ——. We followed this river up its course until we came to the beautiful ——, which almost rival our own Niagara. Still travelling southward we crossed the —— Desert, and at last reached —— on the river, the centre of the —— mining of South Africa. After spending several days here and purchasing some —— we went on to ——, where we owned some —— mines.

From here we went to ——, the capital of ——, where we saw the house in which President —— had lived before he went to Europe. We visited ——, the capital of ——; crossed the —— river, and reached —— just in time to catch an Atlantic steamer bound northward. We embarked, and the vessel touched at many interesting places to take on cargo. At the mouth of the —— we received a large quantity of ——, ——, and —— from the interior. We steamed through the Gulf of ——, past the mouth of the ——, stopped at ——, the capital of ——, which, you know, was named for our own President ——. Thought of Cevera's fleet as we passed the ——, felt the hot, dry winds from the ——, and finally, after many days, reached London in safety.

We brought with us, besides our diamonds, —— for our winter hats, fine —— and —— from the —— States, some relics and a mummy from ——, and some coffee from ——. We afterward imported a cargo of salt from ——, cork from ——, and coral and sponges from ——. We expect to make another trip soon to purchase ——, ——,

——, ——, ——, ——, for the London Zoological Gardens.

Answers to the above: Mediterranean. Gibraltar. Algiers. Fruit. Wine. Leather goods. Tunis. Bey. Tripoli. Alexandria. Egypt. Nile. Cairo. Great Pyramids. Sphinx. Cheops. Copts Arabs. Turks. Khedive. Albert. Albert Edward. Victoria. Kenia. Kilimanjaro. Zambezi. Mozambique. Victoria Falls. Kalahari. Kimberley. Vaal. Diamond. Diamonds. Johannesburg. Gold. Pretoria. South African Republic. Kruger. Bloemfontein. Orange Free State. Orange. Cape Town. Congo. Rubber. Palm oil. Ivory. Guinea. Niger. Monrovia. Liberia. Monroe. Cape Verde Islands. Sahara. Ostrich feathers. Shawls. Carpets. Barbary States. Egypt. Abyssinia. Kawar. Tripoli. Barbary States. Elephants. Hippopotami. Ostriches. Zebras. Lions. Baboon.—*Fillmore County Teacher.*

Received your Canadian History Readings. I have almost finished reading the volume, and find it very interesting. S. U.

CURRENT EVENTS.

Another uprising in Santo Domingo is announced, and the capital is menaced by the insurgents.

The export of Nova Scotia apples of this year's crop is estimated at 450,000 barrels.

The Russians have re-occupied Mukden, the capital of Manchuria, an the plea that the Chinese administration is inefficient.

The Glasier expedition, which set out from New York to explore the interior of Labrador, has failed for lack of proper equipment.

Both Russia and Japan are making preparations for the possible outbreak of a war, which now seems inevitable, for the possession of Corea.

The idea that rheumatism is contagious is gaining ground, and in Germany patients are now isolated to prevent the spread of the disease.

The government has decided to establish naval stations at Halifax, Montreal and Kingston. The Imperial government will supply ships and instructors.

Russia and Austria are preparing to take strong measures against Turkey if the Sultan delays too long in accepting the new reform schemes for Macedonia.

In Macedonia the approach of winter is putting an end to the disturbances for the present. It is possible that the promised reforms may avert the threatened war.

A new alcohol lamp will furnish light at about one-fifth the cost of that obtained from petroleum. It is a French invention.

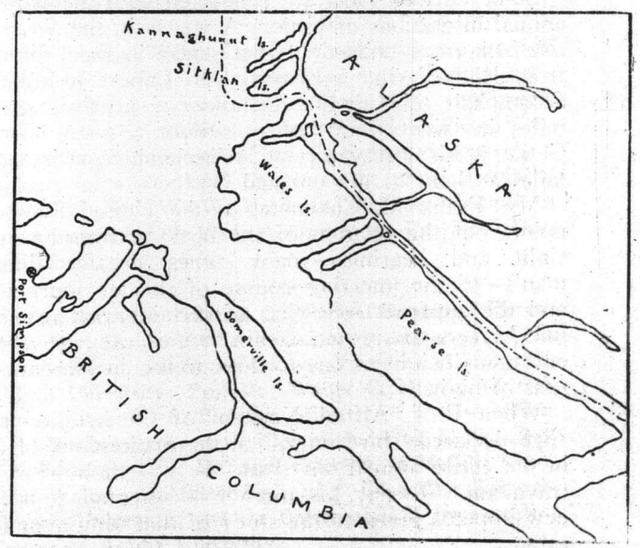
The Marconi system of wireless telegraphy has been put in operation between Pekin and the coast.

A customs union of the South African colonies was formed in March last. In return for tariff concessions, the Canadian government has the same tariff preference now given to Great Britain.

France has concluded with Great Britain a treaty of arbitration somewhat similar to that refused by the United States senate. Under its terms, disputes arising between the two nations will be referred to the Hague tribunal. A similar treaty is being negotiated between France and Denmark.

A former resident of the Atlantic Provinces who has just visited the upper part of the valley of the Skeena to report upon its mineral wealth, finds the climate of the region almost identical with that of the Annapolis valley, and believes it destined to be a great fruit growing region. Deposits of copper and other minerals of more or less value were found in some places.

The Alaskan boundary decision gives about five-sixths of the disputed territory to the United States. The line, as now fixed, begins at Cape Muzon and passes through Dixon Entrance to Tongas Passage, between Wales and Sitklan Islands; thence along the narrow channel north of Wales Island and



Pearse Island, which, according to the decision, was the Portland channel of the treaty. This gives to Canada the two important islands in Portland Inlet which had been occupied by the United States, Wales and Pearse Islands. Two smaller islands, Sitklan and Kannaghunut, were also claimed by Canada. They go to the United States. The channel north of them is not so deep and wide as Tongas Passage; and they are of comparatively little value because

they are commanded by high land on the western part of Wales Island. From the head of Portland Channel, the line runs north to the 56th parallel, and thence follows the highlands. This decision is also in favor of the Canadian contention, for the United States claimed that there were no mountains that could be taken as defining the boundary; but it is a worthless victory for us, as the mountains fixed upon by the majority of the commissioners are so far back from the coast as to give to the United States practically all the width they claimed. The very important question as to whether it was intended that there should be a continuous fringe or strip on the mainland separating the British possessions from all the bays, ports, inlets, and waters of the ocean, was decided in favor of the United States; and so Canada loses not only the ports on the Lynn Canal, but all other harbors, known and unknown, north of Portland Channel. We have gained the whole width of the body of water in front of Port Simpson, and the islands that command the entrance to it. We have virtually lost everything else in dispute.

The award of the Alaska Boundary Commission is final, so far as the governments are concerned. But in the United States the government does not govern. The senate does that: and it may refuse its consent to the award, as it refused to accept the treaty of arbitration with Great Britain.

Some curious facts are connected with the semi-annual migrations of birds. A writer in the *Scientific American* points out that storks in their flight from Buda-Pesth, in Hungary, to Lahore, in India, accomplish this air-line distance of nearly 2,400 miles in twenty-four hours without a rest. Dr. Gatke, in his observatory at Heligoland, regards 240 miles an hour as not unusual.

Mr. Frank M. Chapman, of the United States, points out the relation of the bird's extraordinary sight and hearing — many times greater than man's—to the unerring course of the air journey, and the apparent following of certain great earth lines, rivers, basins, mountain ranges, etc., at the enormous height of one to three miles in the darkness of night.

When Prof. Alfred Newton, of Cambridge, in 1878 declared "bird migration the greatest mystery in the entire animal kingdom," he was thought extravagant. To-day his dictum is accepted and a new impetus given to the study of that semi-annual event.

Every school boy knows that Columbus sailing due west in 1492 was diverted from his course by land birds flying in a southwesterly direction; and, following his winged guides, he landed, October 12th, on Guanahania Island, two hundred and fifteen miles nearer than the coast of Florida, toward which he had been steering. The effect of the birds upon the admiral and his mutinous crew is a matter of record. But it was reserved for Frank M. Chapman to point out the value of the coincidence. Had Columbus set sail ten days later from Palos, the face of the world might have been changed, for he would then have missed the autumnal migration.

Amid the intense excitement of a vast crowd, consisting largely of experts, the Siemens electric train on October 23rd achieved the record speed of 207 kilometers, or about 129¾ miles per hour, beating the record of the last previous trial by six kilometers.

After the recent trial on the experimental Marienfelde-Zossen line, near Berlin, when a speed of 125 miles an hour was attained, the engineers declared that this would be exceeded, and that a speed of even 140 miles an hour was practicable. The tests have been going on for several weeks, and are being watched with great interest by the Emperor William. The Reichstag has devoted the sum of 280,000 marks toward the cost.—*Scientific American.*

Manual Training.

Since the last issue of the REVIEW the remaining unengaged teachers of mechanic science have secured profitable employment. There is at present not an unemployed mechanic science teacher in Nova Scotia, *i. e.,* teachers who are open to engagement as mechanic science instructors. Two teachers are needed, one for the manual training department in the consolidated school at Middleton, and an assistant teacher for the Halifax Public Manual Training School.

In this connection it is interesting to note that the twentieth manual training school in Nova Scotia is now almost ready to open. The action of Sir William MacDonald and Prof. Robertson in establishing the different model schools throughout Canada is amply justified in the case of Nova Scotia, which province leads Canada in manual training. If the present law and the present efficient supervisor remain, three years more will probably see double the present number of mechanic science departments established.

It is pleasing to mention the fact that our kindred subject, domestic science, which is taught concurrently in most schools with mechanic science, is about to be introduced into Yarmouth. In this subject, as in mechanic science, Nova Scotia leads in Canada.

The special summer course in manual training given at Truro last July and August makes it necessary to make some changes in the term of study for mechanic science teachers. The terms for teachers' license are (*a*) For candidates who have not had

previous training in mechanic science: from the first Wednesday of October to the last Thursday in June. (*b*) For such candidates as hold normal school diploma of first rank, with distinction in mechanic science, and have attended the summer course in this subject, the minimum period for qualification shall be four months, beginning either the first Wednesday of October or the first Wednesday of February. The same period is required for public school teachers of successful experience who do not hold normal school diploma of first rank, but who have attended two summer courses in mechanic science.

The following constitution and by-laws of the M. T. T. A. of N. S. is printed for the information of all concerned. Persons who are likely to need a copy for reference are requested to preserve the page containing the constitution, as it will not appear again.

CONSTITUTION AND BY-LAWS ADOPTED BY THE M.T.T.A OF NOVA SCOTIA, AT TRURO, AUGUST 27, 1903.

1 This association shall be known as "The Manual Training (mechanic science) Teacher's Association of Nova Scotia."

2. The object of the association shall be "To disseminate information in reference to manual training, and to promote its interests as a branch of education."

3. The membership of the association shall be open to all recognized teachers of the subject.

4. Any persons interested in manual training work may be elected by vote of the association as associate members.

5. Associate members shall not be eligible to vote on any question affecting the constitution of the association.

6. Honorary members may be elected as the association sees fit.

7. All candidates for membership must be proposed and seconded by existing members and approved by the executive.

8. The annual fee shall be determined by the association from year to year. It shall be payable in advance.

9. The executive of the association shall consist of the president and secretary, ex-officio, and two elective members, elected at the annual meeting.

10. The association shall meet yearly during the first week of the opening of the town schools, at Truro, or other convenient centres, preferably in conjunction with the Provincial Educational Association.

11. No alterations of the constitution and by-laws shall be made except at the annual meeting, or at an extraordinary meeting called for the purpose. Notice of proposed alterations must be sent to the secretary in writing one month before the meeting.

H. W. HEWITT
Sec'y M.T.T.A. of N. S., Dartmouth, N. S.

SCHOOL AND COLLEGE.

Halifax city has taken a progressive step in advancing the salaries of several teachers, an example that is worthy of imitation.

Mr. James Little, vice-principal of the Truro Academy, has given $2,000 to the First Presbyterian church of that town for a new pipe organ.

The 25th annual session of the Carleton County Teachers' Institute will be held in Woodstock on Thursday and Friday, December 17th and 18th.

The enrolment at the opening of the N. S. Normal School, says the *Midland Times*, was larger than in the two preceding years, and the ratio of young men to young women is greater than in those years. The A class has an enrolment of fourteen, the D class thirty-one, and the B class seventy-six. It is interesting to note that nearly one-half of the students in attendance have already served a period as teachers in the public schools of the province.

On Saturday, October 24th, Mr. Edward Manning, A. M., secretary of the St. John Board of School Trustees, celebrated the 70th anniversary of his birthday. Mr. Manning has long been connected with educational affairs in St. John, both as an honored and respected teacher, and more recently as the efficient secretary of the school board. He is still vigorous and alert, with the prospect of years of usefulness yet before him.

The Trenton, Pictou County, school, made an excellent display of drawings and modellings at the county exhibition held a few weeks ago. Some maps very neatly drawn were also exhibited by the pupils of the Pictou Convent. The Trenton school had the honor of receiving a diploma for a shorthand exhibit at the recent provincial exhibition. Mr. W. W. Herdman, the late principal, is now a member of the grade A. class at the Provincial Normal School.

At the formal installation of Principal Gordon of Queens University, October 15th, the honorary degree of LL. D. was conferred, among others, on President Allison, Mt. Allison University; Professor Walter C. Murray, of Dalhousie; Hon. W. S. Fielding, Minister of Finance; Hon. R. L. Borden, leader of the Opposition; Hon. G. W. Ross, Premier of Ontario; Principal Peterson, of McGill; Chancellor Wallace, McMaster University; Chancellor Burwash, Victoria University; and the degree of D.D. on President Trotter of Acadia University.

Write it on your heart that every day is the best day in the year.—*Emerson.*

Don't let the song go out of your life;
Though it chances sometimes to flow
In a minor strain it will blend again
With the major tone, you know.

RECENT BOOKS.

LESSONS IN ASTRONOMY. By C. A. Young, Ph. D., Professor of Astronomy in Princeton University. Cloth. 420 pages and 2 maps. Illustrated. Ginn & Company, Boston.

This is a brief introductory course to astronomy without mathematics, a revision of the author's former work containing many new illustrations and about fifty pages of new material, including all the latest discoveries and theories.

Irving's BIOGRAPHY OF OLIVER GOLDSMITH. Edited with introduction and notes by Willis Boughton, Ph. D. No. 155 of the *Riverside Literature Series*. Houghton, Mifflin & Company, Boston.

Few biographers have been more successful than Washington Irving in his sympathetic sketch of the life of Goldsmith. The present volume is edited with few but helpful notes.

Tennyson's GARETH AND LYNETTE, LAUNCELOT AND ELAINE, THE PASSING OF ARTHUR. With an introductory sketch and explanatory notes. No. 156 of the *Riverside Literature Series*. Houghton, Mifflin & Company, Boston.

An excellent likeness of Tennyson, with his signature, a reduced facsimile of a page of Sir Thomas Malory's Morte D'Arthur, printed by Caxton in 1485, and a well written introduction, are attractive features in this booklet.

POETRY OF THOMAS MOORE. Selected and arranged by C. Litton Falkiner. Cloth. Pages 253. Macmillan & Company, London.

A well selected series, with an introduction containing a sketch of the life of Moore, forming a neat little volume of the *Golden Treasury Series*.

ERRORS IN ENGLISH COMPOSITION. By J. C. Nesfield, M.A. Pages 322. Macmillan & Company, London.

This work is adapted to no particular grade, but is useful for all above the lowest. It consists mainly of examples culled from literature or journalism, by means of which the student can acquire a great deal of practice in the detection and correction of errors in grammar and construction. As the book contains its own key, it can be used in private study as well as in class.

INSECT FOLK. By Margaret W. Morley. Cloth. 202 pages. Illustrated. Ginn & Company, Boston.

This book invites young readers into the fields and woods to become acquainted with the insect people and with their habits and customs. The life histories of the more important insects in the principal insect orders, from the dragon flies to the butterflies, are given in readable form. The work presents a clear and careful account of the ever-wonderful transformation through which so many of the insects pass.

THEORETICAL GEOMETRY FOR BEGINNERS. Part II. By C. H. Allcock, Senior Mathematical Master at Eton. Cloth. Pages 123. Macmillan & Company, London.

This contains the substance of Euclid Book 3, propositions 1-34, and Book 4, propositions 1-9, as well as other important ones with a large number of riders to each.

THE MEDIAL WRITING BOOKS, published by Ginn & Company, Boston, show that a plain business hand with no flourishes can also be elegant and artistic. The chief advantages claimed for the system are that it retains the legibility of the vertical writing and makes possible the rapidity of the old fashioned slant system.

THE ODES AND EPODES OF HORACE. Revised Edition. Edited, with Introduction and Notes, by Clement Lawrence Smith, Pope Professor of Latin in Harvard University. Cloth. lxxxvii+443 pages. Ginn & Company, Publishers, Boston.

The essential feature of the present edition is the series of indexes. These consist of (1) an Index to the Poems by first lines; (2) an Index of Citations, giving a long list of the passages in Greek and Latin literature which are illustrated by the Odes and Epodes; and (3) a General Index of the various subjects treated in the introduction and the commentary.

Cicero, THE TUSCULAN DISPUTATIONS, Book I, and the SOMNIUM SCIPIONIS. Edited, with Introduction and Commentary, by Frank Ernest Rockwood, Professor of Latin in Bucknell University. Ginn & Company, Publishers, Boston.

The text of this edition is based, with slight changes, upon that of C. F. W. Muller (in the Teubner series). The introduction to each selection is designed to prepare the student for an intelligent appreciation of the text. The following feaures add to the convenience of this edition as a text-book; an analysis and summary of both selections, a critical appendix to the first book of the Tusculan Disputations with the most important variants, and indexes to the notes.

THE CORONA SONG BOOK. A choice collection of choruses designed for the use of schools. Selected and arranged by William C. Hoff, Director of Music in the Public Schools of Yonkers, N. Y. Cloth. 362 pages. Ginn & Company, Boston.

This comprises part songs, choruses, oratorio selections, hymns, and patriotic songs arranged with a view to making them eminently serviceable and practical for school use. In a number of particulars the Corona Song Book marks a step in advance in the making of school song books.

THE TEACHING OF SCIENTIFIC METHOD and other Papers on Education. By Henry E. Armstrong, LL. D, Ph. D., F. R. S. Cloth. Pages 476. Macmillan & Company, London.

This book contains a series of twenty-four papers, of which the following may be cited to show their importance to the general reader and to the specialist: The Place of Research in Education and of Science in Industry, Science in Education—the Need of Practical Studies, Aims and Methods of Science Teaching, The Workshop in the School, The Teaching of Scientific Method, How Science must be studied to be Useful, Juvenile Research, Domestic Science, etc. The articles deal in a thoughtful and progressive spirit with many difficult educational problems.

A NEW GEOMETRY FOR SCHOOLS. By S. Barnard, M. A., Assistant Master at Rugby School, and J. M. Child, B. A. (Cantab.) Lecturer in Mathematics, Technical College, Derby. Cloth. Pages xxvi+514. Macmillan & Company, London.

This volume is an attempt to produce a complete text-book suitable for many classes of students. It is divided into three parts—a *preliminary* section on the fundamental concepts of geometry; a *practical* section containing practical constructions and essential theorems with proofs; and a *theoretical* section, including the course of theorems recommended by the Cambridge University Pass Examination Syndicate, with additions, taking in every fundamental property of the straight line and circle.

MACAULAY'S LIFE OF JOHNSON. Edited with an Introduction and Notes by Charles Lane Hanson. Cloth. xxxiii+94 pages. Ginn & Company, Boston.

This volume appears in the convenient and attractive new binding which has just been adopted for all the volumes in the publishers' *Standard English Classics Series.*

The Questions set at the Examinations held June 15-20, 1903, by the College Entrance Examination Board, are published by Ginn & Company, Boston.

The interest in the work of this board and the fact that the examinations have been accepted as satisfactory substitutes for their own separate admission examinations by nearly every college and scientific school in the United States, render these examination questions of unusual educational significance to teachers in colleges as well as to those in secondary schools.

LOCI CRITICI (Critical Passages). Arranged and edited by George Saintsbury, Professor of Rhetoric and English Literature in the University of Edinburgh. Cloth. 440 pages. Ginn & Company, Boston.

In using this book time and labor will be greatly economized by making it possible for the professor to put into the hands of the student a chain of the most important critical passages, arranged chronologically and presented in English. The student will have before him the necessary body of authorities to accompany his own expositions, or the text-books of the subject which he may select.

WAYS OF THE SIX-FOOTED. By Anna Botsford Comstock, Lecturer in Cornell University. Cloth. 152 pages. Illustrated. Ginn & Company, Boston.

This volume points out various pathways trodden by the six-footed. In it there is the story of the little pipers and minnesingers; the history of a butterfly that found safety in a stolen uniform; a discussion of the only beings that have established a perfect socialism in this world; the revelation of the secrets of two free-masons; the history of a bee that occupied a fourteen-story apartment house; a sketch of a nomad who pitched his tent on leafy plains; the tale of a bold fisherman who spread his nets on the brinks of waterfalls; and the queer story of a hermit that turned troubadour. The book was written for all nature lovers.

A LATIN GRAMMAR, by William Gardiner Hale and Carl Darling Buck of the University of Chicago, and A NEW LATIN GRAMMAR (Allen and Greenough), carefully revised and edited by J. B. Greenough, G. L. Kitteredge, A. A. Howard (these three of Harvard University), and Benjamin L. D'Ooge of Michigan University. Ginn & Company, Boston.

The former book presents a number of original features that are certain to have a marked influence upon the teaching of Latin in our schools.

The New Allen and Greenough Latin Grammar, which first appeared in 1872, and which has been used extensively ever since in American schools and colleges, appears in an entirely new form. The arrangement of the book has been changed throughout; every new contribution to classical scholarship has been examined and incorporated, when approved by the editors. The revision was begun by Professor Greenough himself and was completed after his death by a circle of scholars who had long been most intimately associated with him. A new scheme of type display marks the highest typographical achievement in books of this character.

NOVEMBER MAGAZINES.

President Eliot, of Harvard University, opens the November *Atlantic* with an important article on The School, its characteristics, what its aims should be, and into what it should develop. There are other notable and valuable papers on many different topics, literary papers and reviews, essays and short stories, poetry, making up a brilliant number.....In the *Delineator* for November excellent reading and fine art supplement the display of winter fashions. A House Small but Artistic is pictured and described by Alice M. Kellogg, and in Carlotta and I, Miles Bradford tells the story of an old-fashioned Thanksgiving. For the children, there is a Firelight Story, by Livingstone B. Morse; entertaining Pastimes, by Lina Beard, and there are numerous articles treating of the home and household.....The *Canadian Magazine* for November is full of timely topics and discussions on Canadian subjects. The character sketch of the month deals with Geo. E. Drummond, the president of the Canadian Manufacturers' Association. Mr. E. Stewart advocates a national forestry policy which will preserve our timber, and Dr. Hannay continues his War of 1812.