

PAGES

MISSING

The Educational Review.

Devoted to Advanced Methods of Education and General Culture.

PUBLISHED MONTHLY.

ST. JOHN, N. B., APRIL, 1895.

\$1.00 PER YEAR.

G. U. HAY,
Editor for New Brunswick.

A. McKAY,
Editor for Nova Scotia.

J. D. SEAMAN,
Editor for P. E. Island.

THE EDUCATIONAL REVIEW.

Subscribers should promptly notify the REVIEW of change of address giving old as well as new address. Communications from New Brunswick should be addressed EDUCATIONAL REVIEW, St. John; from Nova Scotia and Newfoundland to W. T. Kennedy, Academy, Halifax, from Prince Edward Island to J. D. Seaman, Charlottetown.

CONTENTS:

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| EDITORIAL— | 205-207 |
| TALKS WITH TEACHERS— | 207-208 |
| CONTRIBUTED ARTICLES— | 208-214 |
| Our Four Brightest Stars—Promotion of Pupils—N. B. Schools of the Olden Time—Our Birds—School Room Chats—N. S. School Report—N. S. Normal School. | |
| SELECTED ARTICLES— | 214-219 |
| Dalhousie College Lectures for Teachers—Cut from a Criticism—Arbor Day Programme—Welcome Mothers as School Visitors—Two, Too, and To. | |
| Question Department—School and College— | 219-221 |
| Recent Papers by Atlantic Province Men—April Magazines— | 221 |
| Official Notices— | 222 |
| NEW ADVERTISEMENTS— | 222-223 |
| Summer School of Science—Lawrence Scientific School—Webster's International Dictionary—Trip to Europe— | |

THE annual meeting of the Royal Society of Canada will be held at Ottawa on the 15th of May.

WE have received a catalogue of books for public school libraries for New Brunswick, compiled by the Chief Superintendent of Education, Dr. Inch. It embraces a large and varied list of works, and it will greatly aid teachers and school trustees in choosing books suitable for their libraries. The catalogue seems to have been compiled with great care, and at considerable labor. A copy may be had by addressing Dr. Inch, Chief Superintendent Education, Fredericton.

THE official notices, on another page, will interest those teachers who have pupils preparing for the terminal examinations.

PROF. ROBERTS, of Kings College, Windsor, it is understood, is engaged in writing a history of Canada. The Halifax "Chronicle," in speaking of a lecture recently delivered in that city by Professor Roberts, says: "Seldom has the story of the early days of Canada been told so clearly, so vividly and so interestingly, as by Prof. Roberts last evening. Throughout his address rang clear and true the tones of manly patriotism. The closing portion of it dealt with two chapters of Canada's history of which Canadians are pardonably proud."

ARBOR DAY has not yet been definitely announced for New Brunswick. According to present appearances the spring will be sufficiently advanced to observe it a little earlier than usual. It is better to name an early day than a late one. How would Friday, the 10th of May, do?

On another page will be found hints and selections which will be of service to teachers in making up a programme. We hope all our teachers and scholars will make preparations to observe the day in some practical shape—by planting trees, beautifying and clearing up the school grounds, and by giving useful and inspiring lessons on plants.

ON another page will be found the notices of the meetings of the Summer School of Science for the Atlantic Provinces, and the Summer School of Harvard and the Lawrence Scientific School.

A TRIP TO EUROPE is an event in a lifetime. It is an investment that will pay a teacher in the additional mental and physical vigor, breadth of ideas, stores of information that it will bring. Consult Miss Crowe's advertisement in another column where you will find an attractive programme that can be carried out at a comparatively small cost.

THE Report of the Chief Superintendent of Education for P. E. Island has been received, but too late to make any detailed statement from it for this number. The report shows an increase in the number of schools and teachers, but a decrease in the number of pupils in attendance. Satisfactory features in the report are—the gradual increase shown in the relative number of higher class teachers engaged; the increased number of pupils under instruction in nearly all the subjects included in the common school course; increased interest and liberality on the part of rate-payers and trustees, in providing improved buildings; greater regularity in keeping schools in operation; and a largely increased attendance at the Prince of Wales College and Normal School. The total amount paid for education from all sources, was \$159,931.58; average cost per pupil, \$7.19; number of teachers employed, 553, less than one-half of whom were females,

COMPULSORY EDUCATION.

Nova Scotia now stands prominently in advance of every other American state or province in her compulsory school laws. By an act of the recent legislative session the compulsory age is from six to sixteen, and the minimum days' attendance is 120.

At the age of twelve a pupil may pass an examination in Grade VII and be exempt. At thirteen he may work the rest of the year if he attends for sixty consecutive days. From fourteen to sixteen he must attend school, unless he is at work with the approval of his parents. This law is compulsory in Halifax, and becomes compulsory in incorporated towns by a vote of the town councils. It has been adopted in Dartmouth and has worked to the satisfaction of every one. In some cases even those who were prosecuted wrote letters to the council, thanking them for the interest taken in making education universal.

ENLARGED SCHOOL SECTIONS.

In a former number of the REVIEW, we referred to the advantage of the Township system of managing schools, as it is now being introduced into the United States. A change in this direction in the Maritime provinces would do much to improve the schools in rural sections and raise the status of the teachers there to an equality with that of the city teachers. We are therefore glad to see that this subject has been introduced into the Nova Scotia Legislature by the Hon. W. H. Owen of Bridgewater, from whose speech we quote the following judicious remarks:—

“There are some two thousand school sections within the province. Many of the residents therein are in very poor circumstances, and their property of little value, and they find it almost impossible to realize the amount necessary for their schools. Under the existing law there are three trustees in each district, or about six thousand for the province. Many of these trustees are illiterate, especially in the outlying sections, and are incapable of performing the duties devolving upon them. Frequently, they have very inefficient teachers, and in other respects the requirements of the sections are not properly looked after. In the state of Maine, New Hampshire and Massachusetts of late years they have been combining many of their sections, and forming them into school districts, and placing those districts under the control of what they call “town boards” who exercise supervision over such districts in place of the trustees. The system there has been found most satisfactory, and it seems to me that some such system as that might be adopted in this province, and might prove to be much more effective than that now existing. It occurs to me for instance, it might be advisable to combine a number of existing school sections in each county

and form them into school districts, and appoint a school board which could be elected at the same time as the municipal councillors are in the different districts, so that no great additional cost would be entailed. This school board having the whole control and management of the district would be in a position to administer the system more efficiently than it could be under the present arrangement. They could find out the amount required in the various school sections and apportion the money raised in the district in accordance with the scale to be prepared by them, so that the proper districts might get the benefit of a portion of the taxes paid by the wealthier classes. If this were done, the education in many outlying districts would be more efficient than it is at present; the affairs of the proposed districts would be conducted in a more business-like way under the control of a more competent school board. It would cause equalization of school taxes; the inferior schools would become part of an efficient system; and under more efficient management, the taxes could be more equitably adjusted.”

We expect that next session, Mr. Owen will introduce a bill to carry out his ideas. In the meantime we will be glad to hear from our correspondents regarding the system.

SECURING HABITS OF INDUSTRY.

In the effort to make school life pleasant we are apt to overlook one of the most important functions of the school—the overcoming of the pupil's dislike for hard work. On the plea that the attention of young children can be held but a few minutes continuously on one subject there is a constant change of exercises. Much time is devoted to amusing them by story telling, by games and so-called kindergarten plays, in all of which the teacher is working while the pupils are more or less passive. Gradually, but not too slowly, young pupils should be trained to face hard work bravely. If at the first they acquire the idea that school life is largely play, it will be difficult afterwards to secure those industrious habits which are necessary both in their advanced studies and in the struggle of life in which nearly all must engage. When one has read light literature for some time, it is difficult, sometimes impossible, to settle down to anything more solid. It is not wise to accustom children to a butterfly life in school. Let them be as happy as possible ere the period of real toil and labor begins; but let it be a happiness mixed with the necessary modicum of effort to prepare them for the duties of life.

It has been conclusively demonstrated that crime is disappearing with the advance of education, and that the increased expenditure on the schools is more than met by the decreased expenditure on criminals.

SOME NECESSARY REFORMS AMONG GRADED SCHOOLS.

Last month the REVIEW indicated a few changes for the better that might be brought about at the hands of the N. B. Provincial Legislature. "The mills of the gods grind slowly," and there can be no doubt but that all the reforms mentioned will come to pass in time. It is just possible that the excellent suggestions which the REVIEW is about to make to city boards, may not all be adopted at once, as "great bodies move slowly," but in this case it is equally certain that the changes will be made.

There is a regulation requiring a teacher to be present in his room at least twenty minutes before the beginning of each session. No fault can be found with this, but it bears particularly hard upon those teachers who live at a distance from their schools. The present length of the noon recess in most towns is one hour and a-half. Deduct twenty minutes from this, and there remains but one hour and ten minutes for the teacher to be absent. Teaching is not an ordinary occupation—those who engage in it are prone to nervousness and dyspepsia. A hurried dinner, and a still more hurried walk after it, has a very injurious effect upon many teachers. Would it not be preferable to do in all towns as is done in a few of them? Make the noon recess two hours and dismiss at four, instead of as at present at half past three? There can be no doubt but that the parents would welcome the change, and it would be one means of diminishing tardiness. Until such a change could be brought about, would it not be well to regard ten minutes before the beginning of the afternoon session as sufficient?

On stormy days, and perhaps for other reasons, it is at times necessary to hold but one session of the schools; indeed there are some who favor one session for every day. An ordinary session consists of five hours for all pupils, save those in the first two grades, who are dismissed an hour earlier, thus making their attendance four hours. On "one session" days all pupils, including these primaries, are detained until one o'clock. A continuous session of three hours is considered too long by many who know, for very young children, but when it comes to four hours, all will agree that it is too long. Why should not the youngest people be dismissed at twelve on these days? Any primary teacher will certify that no work of any value is done between twelve and one o'clock. The pupils are hungry, nervous and restless, and should be dismissed as on other days—an hour earlier than the others.

Which town will be foremost in providing its pupils with stationery, pens and pencils? Ink is already supplied by many of them, and to furnish the articles mentioned is only another step in the same direction.

It goes without argument that such a provision would advance the educational interests of the schools along those particular lines, and would greatly cheapen those articles to the rate-payers. It may be a step toward free text books; that is only another argument in its favor, as all thinking and progressive people believe free text-books desirable.

It may be that school boards have not power within themselves to introduce these changes, but a little earnest advocacy will be all that is needed to bring them about if they are for the best. Let them be considered.

TALKS WITH TEACHERS.

I propose this month to take as the subject of my "talks," mental arithmetic. There has been a revival in the teaching of this subject during the last few years, but it is not yet dealt with in the most profitable manner. I may say in this connection that it was a mistake to do as was done in taking this subject from the requirements for license. Since that time it has languished in a great measure, and it is only recently that its importance has become generally recognized by our teachers.

Mental arithmetic is important, first, because it brings, like all other oral work, the teacher into closer touch with the pupils. It develops independence and self-reliance, because each pupil has to stand on his own feet. It produces accuracy and quickness of thought—two very important qualities. There is no better exercise in oral composition, as the "answer" is of little importance in this exercise, but the method of arriving at results is everything.

Teachers often ask: What text book shall I use for mental arithmetic? I would say that while a text is suggestive, it is not essential. No teacher should come before his class in this subject, as in all others, without having prepared his lesson beforehand. The mental work to be given should be based primarily on the principles bearing upon the arithmetic to be taken up for that day. A short time should also be devoted to general review. A judicious teacher will by means of mental arithmetic keep his pupils fresh in all review work.

Now as to the nature of the questions, I am not sure but that in many cases the practical is sacrificed for the mechanical. How common it is to hear teachers give

again and again questions of this kind: "Add 9, 8, 6, take away 12, multiply by 6, divide by 3, etc., etc., The pupils will solve them with marvellous rapidity, and they may be beneficial, but such questions give me the cold chills. Another very common sample is—48 is $\frac{2}{3}$ of how many times 9. An occasional question like either of these is not objectionable, but to follow them up day after day, is a waste of time.

Some of you may say: What kind of questions would you give? It would depend upon the subject to come before the class. Let us suppose it to be mensuration. I would first obtain the pupils' idea of an inch, foot, yard and rod, by getting them to draw them on the board or floor, and testing them by the foot rule. The next step will be to draw the square inch, square foot, and square yard. The pupils can then estimate the square inch on the surface of books, slates, desks, and black-boards. How many square inches in a pane of glass 12 x 9? How many square feet in a black-board $3\frac{1}{2}$ x 5? What would be a convenient size in rods for a school lot containing one half acre? How many square yards in the floor of the room? Carpet it with carpet $\frac{3}{4}$ yard wide? Paper the walls and plaster the ceilings! From the inside of the school room you can go to the outside and estimate on boards, shingles, clap-boards, etc. Mechanical accuracy is important, especially in the earlier grades, but the development of thought is the primary object of mental arithmetic.

For the REVIEW.]

Our Four Brightest Stars.

This is the best time of year for seeing all four of them up together in the evening.

Not *the* four brightest, because there are two of these that we cannot see at all. And *stars*, not *planets*, for this article does not condescend to notice mere solar appendages, notwithstanding the fact that some of them make a much more dazzling display of splendor with their second-hand light than do the brightest of the self-luminous stars—vastly larger than our planets, but infinitely farther off.

The twenty brightest stars in the sky are classed as being of the first magnitude, but all the twenty are not equally bright. The Dogstar is an easy first in the matter of brilliancy, and, according to photometric measurements, he is twelve times as bright as Fomalhaut, the faintest of the twenty. Second and third in order of brightness come Canopus and Alpha Centauri. Like the Dogstar, these belong to the southern celestial hemisphere, but, unlike him, they are too far south to be visible from these latitudes. Alpha Centauri is famous as being the nearest of all the stars—so far as

known—to our solar system. Canopus is 36° nearly due south of the Dogstar, and just grazes the southern horizon 6° to the south of Yarmouth. Next to these come the three great northern stars, Arcturus, Vega and Capella; and they, together with the Dogstar—which is also called Sirius, are our four brightest stars.

To all places north of latitude 44° Capella is always above the horizon. In that latitude Vega spends nineteen hours above the horizon and only five below, out of every twenty-four; Arcturus, a little under fifteen above and a little over nine below. Farther north, these two spend more time above and less below. With Sirius the case is different. Being a southern star he favors southern latitudes more than northern. If there are any astronomers living within 16° of the south pole they have this grandest of all the stars above their horizon all the time. In north latitude 44° we have him with us for only nine and three-quarter hours out of the twenty-four, and farther north his daily visits are shorter still.

Of course they are not always visible when above the horizon, for in the day-time the light of our own star—which takes only eight minutes to reach us—quenches the light of their rays, thinned out by distance and perhaps enfeebled by their years of travel. And yet this is not altogether true of *these* stars. It is not a very difficult matter to see Sirius with the naked eye in the full glare of sunlight—not at midday, as we can easily do with Venus, but while the sun is low in the east or west. And with a common field-glass I have often seen him on or near the meridian when the sun was higher in the sky than he was. This is one of the two best seasons of the year for this kind of observation, but no one need hope for success at it unless he knows exactly where to look for his star. If the observer does succeed he will be delighted with his glimpse of the tiny needle-point of light sparkling like a splinter of diamond in the sunlit blue. It is not nearly so easy to see any of the other three in daylight, but if stargazers will only take the trouble to try, they will find that they can see them without much difficulty,—if not in full daylight, at least in twilight so strong as to be scarcely distinguishable from it.

At nine o'clock on any evening there will be at least two of the four in sight; and, if only two, they will be Vega and Capella, or Sirius and Capella. Arcturus is never above our horizon except in company with at least two of the others, and when Sirius and Vega are up together, Capella at least is always there to watch them. For more than half the year there are three of them above our horizon at nine in the evening, and of course Capella is always one of the three. To see the whole

four at this hour is only possible for us during April, and the middle of the month is the best time for it. Go out on the first clear evening and have a look at them.

If it is about the middle of April, and if the hour is about nine, you will find Sirius above the south-west horizon. You can't possibly mistake him. None of the brighter planets are allowed to wander in his neighborhood, and no star near him — or anywhere else, for that matter — can at all approach him in brilliancy or in the splendor of his flashing, as he

“Alters hue
And bickers into red and emerald.”

The nearer he gets to the horizon the lovelier are the color effects which his twinkling and sparkling present to the eye, and if a glass is used they become still more lovely. Before he gets too low, note how he lies with respect to the three stars in Orion's belt, and then when you find him rising above your horizon again in the fall evenings you will readily know who he is.

Now turn round to the north-east and look at Vega. At our chosen hour she is just about as far from the horizon as Sirius is, and looks in every way much like a smaller copy of the grand southern star. Not such sparkle and play of color, but the general color is the same — white, with a dash of blue. And the spectro-scope tells us they are as much alike as they look, being the two chief members of a class of stars that differ very much from our sun. Those that resemble the sun in appearance and physical constitution are called Solar stars; the white ones like Sirius and Vega are called Sirian stars. It would spin this article out too long to enter upon the different characteristics of these two classes and to tell how the New Astronomy of the spectro-scope and the camera and the laboratory has discovered these characteristics, but the subject will keep and may be taken up some other time.

Sirius will pass from the evening sky in a few weeks, but Vega will be found there until the close of the year. Not always where you now see her, however, and so you had better learn how to distinguish her in whatever part of the sky she may happen to be. Note the two small stars near her and how they form with her an equilateral triangle. Get your eye familiarized with the group and you will ever after recognize it, whether low in the north-east or up near the zenith or curving down to the north-west horizon. Put your glass on the two small ones and see what it tells you about them. Even at the present low altitude it will easily double one of them. When higher up try if it can't double the other also.

To find Arcturus and Capella all you have to do is to look for the two brightest of the yellowish or reddish

stars. Arcturus is well up in the east, and Capella in the north-west. Just at present (9 p. m. mid-April, 1895,) there are brighter objects in the west and north-west than Capella, but they are not stars and they are not red or yellow (except when very near the horizon) and they are lower down than Capella. On the east side of the meridian there is nothing that can be mistaken for Arcturus at this hour, unless you look too low and too far south. But, to be quite sure, and to have a convenient sign-post for him at all times, note how he is situated with respect to the Bear's tail. If you don't know the Bear's tail, take the handle of the Dipper, and that will do as well.

Capella and Arcturus belong to the solar class of stars, and Capella is the one of them all, so far examined, which most closely resembles the sun. This is only one of many interesting discoveries that have been made about these stars, but there is no room here to say anything more about them at present.

A. CAMERON.

Yarmouth, N. S., April, 1895.

For the REVIEW.]

Promotion of Pupils.

In an article in the February REVIEW, on the “Promotion of Pupils,” the writer says: “The pupils not graded go on with their studies from their present standing and are not required a second time to go over work which has already been fairly well done, simply because it has not been found convenient to advance them to another grade or class.” If the work has been “fairly well done,” why should it not be found convenient to advance them? Shall the teacher in whose room these pupils remain be required to take up the work of the higher grade having thus the same work carried on in two departments? It seems to me that the above sentence requires a little further explanation, notwithstanding the assurance that “this plan has been thoroughly tested and found to be a great gain intellectually and morally.”

B. D. B.

Gloucester County, N. B.

“Truth” relates this bright little school-room story: A little girl who was just beginning to spell was asked by her teacher to spell “bee,” which she did, enunciating the letters very distinctly. Her teacher corrected her, saying: “Jane, when you come to two letters just alike, as ‘ee’ in bee, pronounce them ‘double-e,’ not separately.” A few days later she was called upon to read a line in the first reader which ran as follows: “Up, up, Mary, the sun is high.” Mistress Jane studied over it a minute and then, partly remembering the rule that her teacher had given her, read: “Double up, Mary, the sun is high.”

For the REVIEW.]

New Brunswick Schools of the Olden Time.

BY W. O. RAYMOND, M. A.

(Continued.)

THE OLD GRAMMAR SCHOOLS.

In the course of these articles on the progress of our educational institutions in the early days of New Brunswick, it has been shown that so early as the 13th December, 1785, a memorial had been presented by Dr. William Paine and others to the Governor in Council, praying that a charter of incorporation be granted for the institution of a Provincial Academy of Arts and Sciences; and that by successive steps the academy established at Fredericton was eventually incorporated by provincial charter in the year 1800 as the College of New Brunswick. The academy at Fredericton filled the place of a grammar school for the County of York until the days of Sir Howard Douglas, when the institution enlarged and extended in its scope was incorporated by Royal Charter as Kings College, and removed from its humble surroundings in the old building on King street to the new stone edifice erected for its accommodation on College Hill, at the rear of the town—the same building which (enlarged and improved) is now occupied by the University of New Brunswick. After the extension of the work carried on by the college at Fredericton, in consequence of the erection of the new building and the increased grant made towards its support under the Royal Charter, the present Collegiate School was established at Fredericton to supply the place of a grammar school for the County of York and to serve as a feeder of the college.

Col. John Coffin, on the 16th February, 1803, brought in a bill (as we learn from the Journals of the House of Assembly) for establishing a public grammar school in the city of St. John. The bill did not become law until two years after, when it passed with the rather ambitious title, "An Act for Encouraging and Extending Literature in this Province."

In the year 1816 (March 11th) the Legislature passed an act for the establishment of a grammar school at St. Andrews, in the County of Charlotte, and at the same session an act was passed to establish grammar schools in the remaining five counties, namely, Sunbury, Queens, Kings, Westmorland and Northumberland. The general provisions of this act have appeared in a previous number of the EDUCATIONAL REVIEW and need not now be recapitulated. Grammar schools were shortly established in the Counties above referred to, and some facts connected with them will be given when we come to consider, under the head of the respective counties, the schools taught in the province

down to the year 1825. (It is the intention of the writer to make a list for each county of the parish schools in existence during that period, with the names of teachers, as far as they can be determined from old records in his possession).

It may be of interest here, however, to compare the dates at which the means of promoting secondary education first became available in the several counties.

The first master of the academy at Fredericton appears to have been appointed in the year 1786. At St. John there existed about the same period some private schools in which the classics and higher mathematics were taught, but not until the founding of the grammar school in 1805 was there any public institution for promoting secondary education.

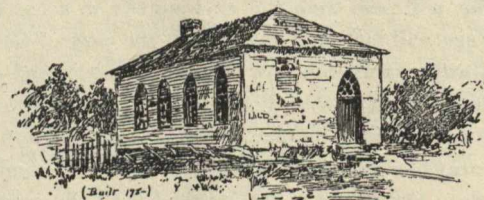
The St. Andrews grammar school was opened June 1st, 1819, the Rev. John Cassel, master. The course of instruction, terms, etc., are given in the St. John "City Gazette" of July 7th, 1819.

The Westmorland County grammar school was opened September 6th, 1820, the Rev. C. Milner, master.

The Northumberland County grammar school was opened about the year 1822; Archibald McQueen, master.

The Sunbury and Kings County grammar schools were opened in the year 1823, the former at Sheffield and the latter at Kingston. The Queens County grammar school was opened at Gagetown the following year.

The grammar school-houses were built by individual subscriptions, supplemented usually by a government grant of £100. In almost all cases they were low, homely looking buildings, with no pretensions to architectural beauty. That at Gagetown is still standing; for the use of the cut here given we are indebted to the kindness of the publishers of the "New England Magazine."



The Old Grammar School-house at Gagetown.

It was in this old building that Sir Leonard Tilley, late Minister of Finance for the dominion and ex-lieutenant governor of New Brunswick received his early education.

The first master of the St. Andrews grammar school, Rev. Mr. Cassel, appears to have been a Presbyterian minister. Several of the masters of the other grammar schools were clergymen of the Church of England. The

combining of the duties of school master and parish minister, as seen in the light of history, clearly was not beneficial to the interests of the churches to which these clergymen ministered, and on the other hand it appears to have been equally unsatisfactory from an educational standpoint.

An agitation was commenced against the continuation of the system, and in the year 1827 the House of Assembly on the 29th of February passed a resolution:

"That it is the opinion of this House that the trustees of grammar schools in the different counties shall yearly forward to the secretary of the province a specific statement of the condition of the school house, the name of the master, whether he be in Holy Orders, the number of scholars in each school, with the number of free scholars and their names, with the reason of their being admitted as such, with the rate of tuition money paid by scholars and by whom received."

At the next year's session of the legislature the committee on schools, Messrs. W. Crane, Alex. Rankine, Thomas Wyer, E. B. Chandler and John W. Weldon, reported —

"That it appears to them, from facts which have come under their own observation and from information they have received from respectable persons residing in different parts of this province, that the very liberal grants of money appropriated and paid by the legislature in support of grammar schools in this province have not produced that beneficial effect which was expected to result from those establishments."

The discussion that ensued resulted in the passing of an act which provided that —

"From and after the 1st day of January, 1830, no beneficed clergyman of the established church or minister of any sect or denomination of Christians having charge of a congregation shall be eligible as master or usher of any grammar school."

In addition to the establishment of county grammar schools, other efforts were put forth from time to time for the encouragement of secondary education; one of the earliest of these was that of the Rev. Oliver Arnold of Sussex, a gentleman who throughout his life took the greatest interest in educational matters. The particulars in the instance here referred to may be gleaned from the following advertisement in the "Royal Gazette," dated March 26th, 1793:

ACADEMICAL INSTRUCTION. The pleasing success and apparent reputation of the public school at Sussex Vale, together with the solicitations of a number of respectable gentlemen, have induced the DIRECTORS to engage accommodations for a larger number of scholars than have heretofore attended. The accommodation will be in readiness on the 1st of May next for the reception of any young gentleman who may be sent to the said school, where he will be taught **READING and WRITING, MATHEMATICS and NATURAL PHILOSOPHY, LATIN and GREEK LANGUAGES.**

Any gentlemen who may wish to send their children to said school for education may be assured that good accommodations are provided in decent families, that strict attention will be paid to their morals; and that it may reasonably be presumed their progress will equal the most sanguine expectations.

The whole expense for the English scholars, including boarding, lodging, washing and the tuition, will amount only to eighteen pounds currency per annum.

A separate agreement will be made with those who may wish to be taught navigation, surveying, the Latin or Greek languages.

N. B.— It is well known to every gentleman who has visited Sussex Vale that its local situation is central, and such as to render it very pleasant and easy of access from every part of the province.

✉ Any letters on the business of the school may be directed to the Rev. Mr. Arnold.

Doubtless the modern boarding school has made a very marked advance on the facilities provided in this pioneer boarding school established by Sussex enterprise so shortly after the settlement of the country, but it is at least questionable if the modern boarding school will ever be able to rival the old Sussex school in economy of management. Boarding, lodging, washing and tuition, with "strict attention to the morals" of the pupils can hardly be hoped for in these days at the rate of £18 currency per annum.

It may be here noted that the Rev. Oliver Arnold petitioned the House of Assembly at the session in February, 1816, for aid towards establishing a grammar school at Sussex Vale. The grammar school, however, went to Kingston, then the shiretown of Kings County.

Another project, looking to the providing of higher education for girls, was started in St. John about the year 1816. Mr. Thomas Millidge, a member for St. John County, on February 20th, 1817, presented the petition of the mayor of St. John and others, praying for aid towards establishing a Seminary at St. John for the education of young ladies, and the House of Assembly on the 15th March following voted to commissioners, to be appointed by the Governor in Council, the sum of £300, to be by them expended "in aid of individual subscriptions" to establish the proposed seminary at St. John. The seminary for young ladies does not appear to have been a success and its existence was brief.

EVERY professional and business man has felt the need of some kind of a receptacle, in which could be placed and constantly within reach, reference books such as he uses daily. Just such an article has at last been invented, and is shown and described in another column in this paper. We have tried it and found it satisfactory.

For the REVIEW.]

Our Birds.

In the June REVIEW of 1889 there is a classified list of the orders of birds found in these provinces, with a note of the number of species in each. The list enumerated all the birds which at the time were reported to be found within the said limits, including the very rare as well as the more common. The orders were given according to the scheme of the American Ornithological Union, but with suggestive English names. We give the following as a useful summary for the use of those who wish to explore the bird fauna of their respective school sections :

| ORDER. | NUMBER OF SPECIES. |
|---------------------------------|--------------------|
| 1 Diving Swimmers,..... | 14 |
| 2 Long-winged Swimmers,..... | 20 |
| 3 Tubed-nosed Swimmers,..... | 7 |
| 4 Full Web-toed Swimmers,..... | 7 |
| 5 Lamel-billed Swimmers,..... | 35 |
| 6 Knife-billed Waders,..... | 9 |
| 7 Long-toed Waders,..... | 6 |
| 8 Slender-billed Waders,..... | 36 |
| 9 Terrestrial Scratchers,..... | 2 |
| 10 Arboreal Scratchers,..... | 2 |
| 11 Birds of Prey,..... | 27 |
| 12 Kingfisher and Cuckoos,..... | 3 |
| 13 Yoke-toed Climbers,..... | 8 |
| 14 Strong-wings,..... | 4 |
| 15 The Perchers,..... | 102 |
| Total,..... | 282 |

Perhaps 200 might be the proper number to speak of as the birds more or less common to the provinces, while 100 would be a very creditable number to be catalogued as visiting one school section on an average. But some portions of the country are much more attractive to a number of species than others. The boy who masters a fair knowledge of one hundred of our native birds may be put down as an ornithologist of no mean acquirements. The perchers are the most numerous, and the spring is a good time to commence their observation. They are found everywhere, but from their small size and shyness it is not very easy for beginners to identify them without a great deal of patience. Perhaps we may give a classification of the perchers into families in our next, if our readers are not already tired of such outlines for reference. We have had lessons upon a number of the order in previous numbers of the REVIEW.

THE SONG SPARROW.

The Song Sparrow is the first sweet singer of spring. It is always here early in April, sometimes before the end of March. This year it will very likely not be seen in many places until April, as March may have been too wintry for it. It is a typical sparrow, one of the

largest family of the perchers—the largest family of birds in any order. Its length is from six inches to six and three-quarters. It is one of the grey, brownish birds, is much streaked above on the breast and sides; below whitish. An indistinct greyish line divides the crown in the middle. A greyish light curved stripe runs along the side of the head, just through or over the position of the eye, and another one concave to the eye separates the cheek from the throat. It may stay with us until the end of October. Its song resembles the beginning of a canary's song—is very short, but exceedingly sweet and frequently repeated. Its nest is built in the ground under a tuft of grass, lined with horse hair and other material. The eggs are four or five, of a bluish white, thickly sprinkled with reddish-brown spots.

For the REVIEW.]

School-room Chats.

Verbs have not only voices as pointed out last month, but they also have moods. So, too, unfortunately, have teachers. In English-speaking countries verbs have only three or at most four moods in a life-time, but there are teachers who can beat that record in half a day.

Verbs do their indicating by one mood called the indicative, and the information imparted is neither more nor less than is intended. But some teachers do their class-room indicating in a number of different moods, all of which indicate, in addition to what the words express, one and the same thing—character. A mood in teachers is a state of feeling. Encouraged, it becomes a habit of mind. Persisted in long enough, it becomes a part of character. Thoughts, states of mind, are possible but undeveloped deeds. "Action is but coarsened thought." Thinking and doing are essentially one.

"A deed knocks first at thought,
And then it knocks at will;
It then goes out in act,
Or is entombed so still
That only to the ear of God
Its doom is audible."

Have you ever allowed yourself to become the creature of a mood which ought to have had that inaudible doom?

Mood in verbs is the mode or manner, etc. So also in teachers it is the mode or manner in which the teacher thinks, speaks and acts in the class-room. Which of the verb-moods is best for the teacher's use? Certainly not the subjunctive. There must be very little of the *conditional* or *doubtful* about class-room methods. Know in every case exactly what you are going to do;

know in every case exactly how you are going to do it; and do that thing in that way. A poor method worked out with force and confidence, is better than a good one followed in a weak and doubting manner. Let your confidence in your mode of working be such as to inspire confidence.

Do not make conditional threats. In fact, do not threaten at all. If a pupil does a wrong do not say, "If you do that again I'll punish you," but if the act deserves punishment, either punish or fail to observe what occurred. Never excuse a first offence. Just as wise to let the first Russian thistle go to seed. See that the pupils have clear and correct ideas of right and wrong. Then as every possible action is either right or wrong, no rules, as such, will be needed. A code of rules often does harm. When children get into trouble they think only of having "broken a rule" instead of realizing that they did what was wrong. When a fault is spoken of at all, let it be shown to be an offence against *right*, and not merely an act which happens to be contrary to the whim of the teacher.

The great mood for the teacher is the *indicative*. When a number of persons are walking over a rough and unknown part of the country, the guide *indicates* the right road and clears away any difficulties that may be in the way. To do this the guide must be one of the party, and not like King Edward who watched the battle of Crecy from a wind-mill, or Xerxes who viewed the fight at Salamis from a promontory. Let the teacher in all the studies be one of the party of workers, trudging along with the class. Let the gentle imperative mood "come" be often used, but the sterner "go" seldom or never.

Carry no disagreeable or even peculiar moods into the school-room. I once knew a Scotch lad whose disagreeable temper, one day, caused him a severe flogging. His aunt who had been reading to him of a sect that baptized its members in a running stream so that the current might carry away their sins, said to him, "Dan, if I were you, I'd send away that bad temper with the brook." Next morning, Dan having met with some annoyance, started to school in a very ugly mood. It was in the month of April. In about half an hour he returned home cold and dripping, and told his aunt that he had "put the pouts away with the brook." If you, fellow-teacher, cannot go to the class-room in a mood that is perennially pleasant, take a cold plunge on the way. Then go home and stay there.

The next annual meeting of the Manual Training Teachers' Association of America, will be held at Armour Institute, Chicago, Ill., July 16, 17, 18, 1895.

Nova Scotia School Report.

(Continued.)

The report deals with many interesting points relating to several subjects in the course of study. They are divided into two classes: (1) The nerve exhausting, and (2) The recreative subjects. Though the recreative subjects require but little time, yet, like flavoring in food, they are very important in the proper assimilation of the rest. The Chief Superintendent points out that

"There is yet a great lack of skill on the part of most teachers in utilizing them so as to break the monotony and weariness of the school, correct bad habits of body and form good ones, and practise the expression of thought in good English in the most interesting and rational way possible—the description and explanation of what pupils see and understand in their surroundings. In the common schools the best English will be found, as a general rule, where the best object and oral lessons are given. Language can be correctly learned only as it is used for the expression of ideas which are distinctly comprehended. The recreative exercises, besides relieving the pressure, interesting the intelligence and promoting health of body and mind, will enable the pupils to do better work in the old and staple subjects than was ever generally possible without them."

The number of pupils taking Latin in Grades X and XI shows a decided increase.

The great advantages of the provincial high school examinations are made clear. They serve the purpose of testing the scholastic qualifications of would-be teachers, they are generally accredited certificates of scholarship, and they help to admit students to colleges of various standards of entrance. In defence of a thorough high school course it is said that if we should depart from the course adapted to the average, it would be better to have it suited to the abler rather than to the duller students. Otherwise the better students would be kept back and would acquire idle habits—a danger wherever pupils must be taught in large classes. Ill fares the country that does not encourage ability and genius. In the schools there may be sometimes over-pressure, just as in all departments of life there are those who from various motives press on beyond their strength. Those things, whose general tendencies are good, cannot, however, be banished because a few go to excess in them. The high school course of study is shown to be a gradual growth to which the Educational Association and various expert committees have contributed. It is the result of a general consensus of the opinions of those best qualified to frame a course of study for the province.

An analysis of some of the statistical tables would be very interesting. In the meantime we shall only refer to a part of one of these tables, viz., No. XIX. There

it is shown that Halifax has as many academic pupils as Annapolis, Digby, Yarmouth, Shelburne, Queens, Lunenburg and Hants taken together. In Colchester the cost per pupil in the academy is \$20, in Halifax \$35, in Yarmouth \$56, and in Cape Breton \$75. The educational status of each county is fairly well shown by taking the proportion of its pupils engaged in high school work. In Annapolis we find 1 : 9, Kings 1 : 10, Hants 1 : 14, Pictou 1 : 15, Colchester 1 : 19, Cape Breton 1 : 21, Queens 1 : 21, Shelburne 1 : 21, Yarmouth 1 : 22, Antigonish 1 : 24, Halifax 1 : 28, Digby 1 : 29, Guysboro 1 : 36, Cumberland 1 : 39, Lunenburg 1 : 47, Richmond 1 : 59, Victoria 1 : 61, Inverness 1 : 164.

Principal Calkin reports from the normal school 130 students enrolled, of whom 123 received diplomas. He claims that as the result of the changes, making the work mainly professional, "the students gained a more complete and thorough grasp of the principles underlying good teaching, and attained to higher skill in the application of those principles to practical work in the presentation of knowledge and in class management." The practical skill in teaching and class management attained by these 130 normal school students was obtained in the model school, which averages seventy-nine pupils, and in the model lessons given by the students to each other. The manual training department, under Professor Russell, "was very popular and excellent work was done." The kindergarten department, conducted by Mrs. Patterson, was very successful. There were three graduates, one of whom now occupies an important position in Newfoundland. Professor Smith, of the affiliated agricultural school, has classes in microscopy, botany, advanced chemistry and agriculture. By this means scientific agriculture is receiving some of the attention which it deserves. Several graduates of this school have established "local agricultural schools."

"The work of these schools is something of which our province should be proud. With so many pupils studying agriculture, with the lectures and advice of these teachers, with their success upon their own farms, with their assistance to the local agricultural societies, they are doing a work hard to appreciate at its full value."

Principal Fraser, of the Halifax School for the Blind, says that one of the chief difficulties with which he has to contend is that many of the best years for educational work are lost. The pupils of that institution enter the school at ten years of age. In some homes the blind child is the victim of ignorance and neglect—in others it suffers from something more agreeable, but oftentimes more pernicious—over indulgence. The most of the blind children of these provinces suffer physically, mentally and morally before they reach the age of ten years, so Principal Fraser's suggestion that children should be allowed to enter the school at the age of six years would seem to call for the careful attention of the governments of the Maritime provinces and Newfoundland.—["Progress."

Nova Scotia Normal School.

This institution will have for the current year a larger attendance than ever before. A very considerable number are of the higher grades—among them several college graduates. Every effort is being made to increase the amount of practice in teaching. By sub-divisions of the two or three departments of the model school, and by practice upon the junior grades of pupil teachers, the practical work has been greatly extended. Scholastic work has been almost wholly displaced by purely professional work, and the result is in the main good. Psychological and educational questions are more freely discussed than formerly. There is more original research, more mind development, and less memory work. Sloyd benches and laboratory stands afford greater opportunities for that muscular activity which develops brain power, self-reliance and a general mental alertness. These are the qualities that give success both in the little world within the school-room and in the greater world without.

In object drawing Miss Smith gives an admirable training of the faculties of observation and judgment. The powers thus gained are largely utilized by the other professors in illustrated science lessons.

The students are made familiar with apperception, concentration and Herbartian ideals in education, so that as they obtain fuller practice in schools of their own these germinal principles grow upon them and they themselves are not in danger of that arrested development which so often blights the promise of better things in those who have not studied the psychological and historical phases of education.

Dalhousie College Lectures for Teachers.

The course of lectures on educational subjects given in Dalhousie College was closed in March by Dr. MacKay, Superintendent of Education. The "Chronicle" has the following report:

A very large audience assembled to hear Dr. MacKay's address on the "Co-ordination of Studies." The object of the lecturer was to explain the principles upon which a course of study should be drawn up. He confined his attention chiefly to courses of study for secondary schools. The first subject which he considered was that of compulsory subjects, what subject should every pupil be required to study? English and mathematics should form the backbone of such a course. In addition to these some science and some history and geography should be required. He here entered into a discussion of the arguments for and against making languages, especially the classics, optional. Spencer and others were quoted in favor of shifting the centre of school work from the classics to science, and other subjects more suited to the needs of the age. He sketched the

history of the changes in the courses of study in Nova Scotia. He called attention to the fact that though Latin was an optional subject, recent reports show a decided increase in the numbers studying that language in the schools.

The next subject considered was the order of the arrangement of studies. There are two methods of arranging studies—the successive or tandem and the simultaneous or abreast. The former proceeds upon the maxim of one thing at a time and that done well. This method is open to serious objections. It does not give sufficient attention to the fact that it takes a child's mind some time to grow. If too much attention and time be given to any one subject the teacher must necessarily proceed from the easier to the more difficult parts of the subject more quickly than the child's mind has grown in strength and capacity. Again, a course of study with a small number of subjects does not appeal to a sufficient number of interests. Variety is a condition of interest. Monotony, a want of variety, is almost synonymous with the uninteresting. Equally ineffective is such a course in developing all the pupil's capacities.

In this connection the lecturer considered the objection to the study of several sciences. He contended that the method of study was one, though the objects studied were many. The result was not a smattering of knowledge, but a single kind of training; for the object in view is not knowledge, but a way of thinking. Variety of objects is necessary for broadening the pupil's interests—for opening his eyes to many things and for counteracting the tendency to faddism. He also spoke of the marked improvement made in recent years in the teaching of science in the schools. The subject of examinations was also touched upon. The written examination is not the only means of testing work in the present system. The teachers as well as the inspectors' reports enter in the determination of the grading.

These lectures have been of very considerable interest and value, not only to the profession in Halifax, but also throughout the province.

They will be continued next year, but on a larger scale. The lectures leading up to the degree of Literate in Education, were attended by twelve students, five of whom will be graduates in the arts course for this year. They have, in the meantime, gone to the normal school at Truro, to receive further light in methods by a three months' exclusive devotion to practical work.

Could the trustees be induced or compelled (if necessary) to subscribe for one good educational journal—the EDUCATIONAL REVIEW for instance—for the use of the school and the teacher, at the expense of the section, payable out of the county fund or otherwise, the desired medium (between school officers and trustees and teachers), would be established, besides securing to the teacher and the school valuable and profitable articles and exercises without any appreciable burden to anybody.—[Inspector M. J. T. Macneil, N. S.]

Cut from a Criticism—Nature Lessons.

* * * It was very sensible for Dr. McKay to urge the importance of interesting children in "buttercup and butterflies," but it is one thing to sow and quite another to secure a crop. Out of fifty school teachers "who could exhaust all the adjectives of admiration over his opinion, not ten of them could tell you how 'toad stools' are propagated, or know a moth from a butterfly. To hear them, one would think they were so in love with nature, that they were stuccoed with quadrupeds and birds all over." I know that there is but a very little teaching of natural history in any of our schools. The reason is not far nor hidden. The teachers have neither adequate knowledge of the subjects, nor the enthusiastic aptitude to impart such knowledge. Very few of them have prepared themselves to make buttercup and butterflies interesting to children. This does not arise from lack of interest and curiosity about such things in children, but for the reason that the would-be instructors lack both the enthusiasm and the knowledge to open the way to the deeper enchantments of nature. It would be an easy matter for any teacher to pluck a squash blossom and hold it up for the admiration of children, and draw their attention to its unusual size, and notched corolla; but how many will call their attention to the two kinds of blossoms on the same vine, and show them that one produces pollen and the other does not; that one has a baby squash already set below the blossom, and the other has not; that, unless this golden dust of pollen is placed on the proper place within the other blossom, no squash will ever grow? Will they capture a bumble bee and show them that this little creature as he tumbles in and out of these blossoms for sweets, carries this dust on his hairy body, and thus performs a necessary service, and but for the like of him or some other insect the race of squashes would come to a sudden end? Will they show them that these honey-pots inside the flowers are apt contrivances that secure the visit of the needful bee? and so on, carrying the children with wide-eyed wonder into the temple of nature. The teacher must not say to the children that this "onion" I place before you is a provision meant for man; but explain that this was nature's provision for another onion; the food was not for us, but for the future plant. * * *

One might as well say the highest ambition of a beech tree is to produce beech nuts for squirrels and jays; or that the highest ambition of pine trees is to produce seeds for squirrels, since our "pine squirrels" could not winter without them. To show how far this is from the truth, come with me and let us open up, scale by scale, a pine cone before it is ripe, or we will

look in vain. Here are the seeds, each one with a wing, an outgrowth of the covering. This wing has but one meaning. The intention is for the seed to drop out of the ripened cone, when the scales turn up a little to let them out, and as they are set free the wind seizes upon the wing and sows the seeds here and there, thus increasing their chances of reproduction. The pine squirrel, or "red squirrel," does not say, "Lo, here is a tree whose highest ambition is to produce food for me and mine." On the contrary, he sees that the tree has taken means whereby he is not likely to get a taste. If he waits till the seeds are ripe he will not get any of them, so he "circumvents" nature, as Mr. Weller would remark; he climbs the tree when the cones are as green as leaves, but in the nick of time when the seeds are milky, but stored with nutritious food. He does not attempt to take out a seed, but cuts off the cones by hundreds and lets them fall. If he let them remain upon the ground they would soon dry, and the scales curl up and the seed would be lost to him. So he picks them up, and carries them away to his winter nest? No, he doesn't, but he tucks them always into a damp hole beneath a root or log or rock, or even piles them layer after layer in puddles of water. In that moist or wet condition the cone never opens itself; the seeds harden and keep for years. He remembers in winter where he has stored them, and goes from one place to another to drag them out and make a meal as he needs one. Both the trees and the squirrel have done their best to look out for themselves, and the squirrels have got the best of it. How long it took them to learn, or how the knowledge is transmitted are questions of surpassing interest in a legitimate and hopeful field of enquiry. Our teachers need not look in the books for this account I have given. It was learned at first hand and will perhaps illustrate a better method of learning than to run away with the notion that anything in the vegetable world has an ambition to supply our wants. Sheep know more than onions, but who would believe that they have any "ambition" to raise wool for our benefit? or that geese console themselves at the annual agony of feather plucking, that they are furnishing pillows for us? We must go to nature divested of all notions, and prepared to learn what she has to impart, and we will find that

"She never did deceive the heart that loved her."

There are so-called naturalists, who have never learned to love nature.

"They would peep and botanize
Upon their mother's grave."

And "verily they have their reward." As children we are full of curiosity about this wonderful world.

We wish to know how and why and the wherefore of all we meet, but we are met with dull ignorance smiling at our wonder, or stiff prudishness closing our lips, or cowardly superstition to flaming cherubim guarding the gates of divine majesty, which is only another word to hide a lack of knowledge. Thus are we subdued, the light of enthusiasm is quenched and at length the

"Man perceives it die away

And fade into the light of common day."

—[R. R. McLeod, in Halifax "Herald."

Arbor Day.

Committees may be appointed as follows: To invite parents and other residents of the district to assist in planting; to procure trees, shrubs, and flowers; to procure specimens of native woods to be exhibited on a table in the school-room; to decorate the school-room with grasses, leaves, evergreens, etc.

Lines for the black-boards:

Flowers preach to us if we will hear.—*Chris. G. Rosetti.*
Go forth under the open sky and list to nature's teaching.
—*Bryant.*
Whatsoever thy hand findeth to do, do it with thy might.
—*Bible.*

PROGRAMME.

1. SONG.....By the School.
2. SCRIPTURE READINGS.....By the Teacher.
3. ESSAY.....
"On the first lines for the Blackboards."....By a Girl.
4. RECITATION.—"The Heart of the Tree" ..By a Boy.

What does he plant who plants a tree?
He plants a friend of sun and sky;
He plants the flag of breezes free;
The shaft of beauty towering high;
He plants a home to heaven nigh
For song and mother croon of bird
In hushed and happy twilight heard—
The treble of heaven's harmony—
These things he plants who plants a tree.

What does he plant who plants a tree?
He plants cool shade and tender rain,
And seed and days of bud to be,
And years that fade and flush again;
He plants the glory of the plain;
He plants the forest's heritage;
The harvest of a coming age;
The joy that unborn eyes shall see—
These things he plants who plants a tree.

What does he plant who plants a tree?
He plants, in sap and leaf and wood,
In love of home and loyalty
And far cast thought of civic good—
His blessings on the neighborhood

Who in the hollow of his hand
Holds all the growth of all our land—
A nation's growth from sea to sea
Stirs in his heart who plants a tree.

—H. C. Bunner, in the Century.

5. MOTION SONG.....
—“The Tree’s Story”..By the Primary Class.

(Tune: “Comin’ Thro’ the Rye.”)

The trees lift up their branches tall;
Their leaves dance in the breeze;
“Oh, ho!” they sing, “for what care we?
We’re living at our ease.”

But presently the woodman comes,
With axes sharp and bright,
And choosing him a tall pine tree,
He works with all his might.

“Oh, see! the tree is falling now,”
It lies upon the ground;
The ax cuts off each twig and bough,
And round it chains are bound.

Two horses pull the tree along
Until a stream they find,
On which the tree floats to the mill,
Where waits the miller kind.

He lays the log before the saw,
And back and forth that goes,
Until the mill is full of boards
That lie in long white rows.

And then the children’s father buys
Shingles and beams and planks,
To build his house, for which we must
Give tree and woodman thanks.

—Grace Butterfield, in Little Men and Women.

6. ESSAY.—“The Second Blackboard Motto,”..By a Boy.

NOTE.—Show how nature teaches from cloud and sun, sea and sky, forest and plain.

7. RECITATION.—“New Leaves.”.....By a Girl.

Mrs. Horse-Chestnut Tree said: “Oh, dear me,
I must have a new gown, and what shall it be?
On catkin trimmings the willows dote,
The staid old oak wears a gay pink coat;
Miss Birch is dressed in the prettiest taste,
With a sash of green ’round a white satin waist.
But I think I’ve guessed what pattern is best;
Besides, it will be quiet unlike all the rest.”
So a Japanese costume this morning she plans,
All made of the softest of little green fans.

—Youth’s Companion.

8. ESSAY.—“The Third Blackboard Motto,”..By a Boy.

NOTE.—Show the importance of doing the duty which is next to us, be it ever so small; the danger of delaying to do duty; the fact that the future does not belong to us, and that we must work now.

9. SONG.....
—“Work for the Night is Coming.” By the School.

10. RESPONSIVE RECITATION.....
—“Spring’s Call to the Flowers,” By seven Little Girls.

NOTE.—Each girl should have a bunch of suitable flowers in her hand.

First Girl:

“Come, come,” said Mother Nature,
“You must waken from your rest;
Don’t you hear the bluebird singing?
And the robin is building his nest.

“Jack Frost has said ‘Good-by,’ once;
But he may come back to know
Which little flowers are afraid to start,
And which will push up and grow.

Second Girl:

“Come, daffodil, you’re brave and strong,
Peep through the hard earth, my dear,
And show Jack Frost, if he comes again,
You’re one of the first to be here.

Third Girl:

“And come, my crocus and pansy sweet,
With your dresses of purple and blue.
Last year you took an early start;
I hope you will this year too.

“I must off to the woods and pastures wide,
Where the little brooks laugh and leap;
To the hedges bare and the hillside too,
Where I left many seeds asleep.

Fourth Girl:

“And violet, dear, you’re coming, I know;
Come, peep from the grass, so shy;
And the children, so glad to see you there,
Will pick you as they pass by.

Sixth Girl:

“Then, dandelion, you’re a hardy chap,
With your face so sunny and yellow,
But ere long, when the summer comes,
You’ll look quite like another fellow.

Seventh Girl:

“Dear honeysuckle, I pray you arise
And peep from your nook in the rock,
Where you bow your head when the breezes blow,
And seem so plainly to talk.

“The other flowers will come later, I know;
But the children love you best;
For you come when the trees and hills are bare,
And the robin is building his nest.”

—G. E. L., in Child-Garden.

11. DEBATE.....
—Resolved, “That the Rose is prettier than the Lily.”

Two Girls on each side.

12. SONG.....By the School.

13. ESSAY.—“What we owe to the Past.”..By a Boy.

NOTE.—Show what the past has done for us—planted orchards, built school-houses, churches, etc.

14. ESSAY.—“What we owe to the Future.” By a Girl.

NOTE.—We must do for the future what the past has done for us, and more.

15. CONCERT RECITATION.—“An Arbor-Day Tree.
By the Third-Reader Class.

Dear little tree that we plant to-day,
What will you be when we’re old and gray?
“The savings bank of the squirrel and mouse,
For robin and wren an apartment house.

The dressing room of the butterfly's ball,
The locust's and katydid's concert hall.
The school boy's ladder in pleasant June,
The school girl's tent in the July noon.
And my leaves shall whisper them merrily
A tale of the children who planted me."

—*Youth's Companion.*

16. VOTE.—"On the Most Popular Tree and Flower. . .
By all present.
17. COLLATION SERVED.
18. The school will march to the grounds, and planting will begin, under the direction of the board and teacher. Let trees and flowers be named after noted persons. Let each class volunteer to be responsible for the care of one or more trees.
19. CLOSING ADDRESS.—Subject: "Oh, the good we all might do while the days are passing by."
By the Teacher.
20. CLOSING PRAYER.—Asking God's blessing on the Work.
21. DOXOLOGY. By the School.

Welcome Mothers as School Visitors.

No one who has ever lived in the country can forget Friday afternoon in the district school. It was visitors' day, and everything in the little old school-house, from the "warping floor, the battered seats," to "the charcoal frescoes on the wall," wore an air of importance. The visitors came—fond mothers who gazed with pride at their darlings while the banner classes performed wonderful feats of learning and the star pupils "spoke pieces." It was a proud day for pupils and a proud day for parents. There may be scoffers so irreverent as to smile over the primitive custom, and some may criticise these methods. But smile and criticise as they may, there is one feature of that old-time Friday in the district school that might well be perpetuated: It is the active interest of mothers in the education of their children.

Whether from a lack of time or interest, or a feeling of timidity and fear of being unwelcome, the mothers of to-day practically ignore the public schools.

It is one of the strange anomalies of motherhood that a baby who is scarcely trusted out of his mother's arms until he is six years old, suddenly at that advanced age is pushed from the accustomed nest and taught to fly alone. He graduates from his mother's care and is utterly and confidently turned over to a teacher who never saw him before and has forty such little charges.

With all due respect to the teacher, it is rather too much to ask of her that she should at sight love and understand the little human phenomenon as well as his mother does. When before in all his guarded babyhood had he so great need of love and understanding as when the tendrils of his little mind are beginning to reach out and grasp at the outer world? His whole life hangs in the balance. Yet the ruthless mother abdicates her throne to a stranger, too often with a sigh of relief. Just here the roads of mother and child part never to approach so near again. It is the mother's fault, and gradual alienation of her child is her natural punishment.

It is not for an instant to be supposed that every mother should constitute herself a superintendent of public instruction. Neither should she be an officious wiseacre, meddling with what is out of her province and prescribing her pet remedies for every ill that may appear. Her duty in relation to the public schools is not to educate the teacher or even the wayward school board. Her principal duty is to educate herself. She should study the school that she may be in harmony with the purposes and methods of that institution, and that she may be in sympathy with her child and his work. Ideas on education have undergone a complete transformation in the last twenty years, and the woman who knows only so much about educational methods as she learned in her own school days might better know nothing at all. The class-room of to-day is the best possible training school for mothers. When a mother once understands what a teacher is trying to do and how she proposes to do it, she is a willing and valuable ally. But ignorant mothers are one of the greatest obstacles teachers have to contend with. They unwittingly frustrate the teacher's plans and retard the child's development. They work at cross purposes with the teacher, and the child suffers from it. The education of the school-room is at the best partial. The discipline and culture and development begun there should be carried on in the home, and the mother must be thoroughly acquainted with the workings of the school-room to be competent to take up the sceptre the teacher lays down. * * *

No woman who undertakes an investigation of the schools with the honest purpose of guarding the interests of her child, need fear that she will be unwelcome. The teachers are glad to have the mothers for allies. If the latter realized how much suffering they might save themselves and their children with a little oversight of their school lives, they would not begrudge the time and energy demanded by a conscientious attention to the subject.—[Exchange.

Two, Too, and To.

Nothing but most frequent and thorough drill will ever impress the distinctive meanings and uses of the words "two," "too" and "to" upon children, and unless they are understood they are certain to be constant stumbling-blocks. However it is possible to make the uses of the words so familiar as to render mistakes in writing but rare.

Before touching sentences explain the uses of the words in phrases, and obtain examples from the children :

- | | |
|-------------|-----------------|
| two books, | two slates, |
| two horses, | two pencils, |
| two girls, | two plants, |
| two boys, | two hands, etc. |

Then draw from the children the meaning of the word "too" and example :

- | | |
|------------|-----------------|
| too hot, | too sunny, |
| too early, | too sweet, |
| too late, | too heavy, |
| too short, | too thick, etc. |

Following this, exercise on "to":

- | | |
|-----------|----------------|
| to write, | to sew, |
| to read, | to study, |
| to come, | to walk, |
| to run, | to ask, |
| to go, | to carry, etc. |

After this a great number of sentences may be given in which are blanks to be filled with the right word. Beginning simply by using one of the words, the exercises should gradually increase in difficulty, until all three are necessary to the completion of the sentence :

- I have—marbles.
- Mary has—kittens.
- My tea is—sweet.
- That lemon is—sour.
- I shall have—run,
- Tom wants—read.

I went—the store and bought—oranges.

It is—cold for—little girls—go so far.

I went—far west and had—go—miles farther.

The—boys worked at their lessons until it grew—dark—see. — [Rhoda Lee in "Toronto Educational Journal."

Mr. Tyrell, of the Canadian Geological Survey, says that from the large body of water known as Wollaston lake emerge two almost equal streams, the one flowing to Lake Athabasca and thence by the Slave and Macenzie rivers to the Arctic ocean, and the other to Reindeer lake, and thence by the Reindeer and Churchill rivers to Hudson bay, the island thus formed comprising about one-third of the Canadian domain; and

directly south-east is another large island between Lake Winnipeg and Hudson bay, the result of a bifurcation in the little Sandy lake, which has an outlet to Hudson bay through the Severn river, and another to Lake Winnipeg through Family lake.

QUESTION DEPARTMENT.

W. J. M.—(1) From each of two stations, east and west of each other, the altitude of a balloon is observed to be 45° and its bearings to be respectively N. W. and N. E. If the stations be one mile apart, determine the height of the balloon.

Let BKA be a triangle with its sides nearly equal, and let BA be the base. Near the centre of the triangle take a point C and join it to the points AB and K. Now let B represent the east station, A the west station one mile away, K the balloon, and KC the height of the balloon.

BA runs east and west, CA north-west and CB north-east.

Then angle CBA = 45°, angle CAB = 45°, angle BCA = 45°.

$$\therefore \frac{AC}{AB} = \sin. 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} = .7071 \therefore \frac{AC}{1} = .7071$$

$\therefore AC = BC = .7071$ miles. But angle KAC represents the altitude = 45° $\therefore KC = CA$.

\therefore The height of the balloon is .7071 miles = 3733 ft.

(2) The angle of elevation of a balloon from a station due south of it is 60°, and from another station due west of the former and distant a mile from it is 45°. Find the height of the balloon.

Using the figure given above, K will represent the balloon, C the point vertically below it, CA the distance to the station directly south, and AB the distance from the station due south to the one due west from the southern one and distant one mile.

Then angle KAC = 60°, angle KBC = 45°, angle CAB = 90°.

Let KC = x miles, the height.

$$CA = KC \cot. KAC = x \cot. 60^\circ = \frac{x}{\sqrt{3}}$$

Because KBC = 45°, KCB = 90°, \therefore CKB = 45° and BC = CK = x miles.

$$\text{But (I 47) } BC^2 = CA^2 + BA^2. \therefore x^2 = \frac{x^2}{3} + 1$$

$$\therefore 2x^2 = 3, \therefore x = \frac{1}{2}\sqrt{6} \text{ miles} = 6468 \text{ feet.}$$

What work on mineralogy would you recommend for the use of teachers wishing to make a thorough study of Canadian minerals? I would recommend any one wishing to get a collection of Canadian minerals suitable for illustrative lessons in school to send to C. P. Willimot, Ottawa, for their catalogue.

With the proceeds of an entertainment given Xmas times, we purchased a \$12.00 cabinet of minerals—100 specimens. I am highly pleased with the collection.

G. W. W.

We know of no better work than Dr. Bailey's Elementary Text-book on natural history, where our minerals are very fully treated. This, in connection with Crosby's "Common Minerals and Rocks," published by the Boston Natural History Society, (D. C. Heath & Co.,) and Mr. Brittain's recent lessons in THE REVIEW on minerals, should enable you to make an excellent preparation for classes.

T. E. M. — On page 139, Ex. 44, of Meiklejohn Short Grammar, is found given as an example of bad grammar the following sentence: "They are the two first boys in the class." On page 4 of same book is found the sentence: "The two first letters of the Greek alphabet are alpha and beta." If the latter phrase as used by the author be correct is not the former correct, and why?

Both examples given above are incorrect. *First*, from its meaning, precedes all others in numbering, the *first two* letters as well as the *first two* boys is the correct form. How ridiculous it would be to say "the five first letters of the alphabet;" and Meiklejohn is too good a grammarian to make such a mistake. In his "English Language," (D. C. Heath & Co., Publishers, 1887), page 7, Meiklejohn says: "The word alphabet comes from the *first two* letters in the Greek language." This is the sentence that our correspondent refers to on page 4 of the Short Grammar, where, evidently, some bungling proof-reader has been the cause of the error. This is not the only school book where bad proof reading is evident. How long will Canadian publishers of school books or any other books bring disgrace on the art preservative by sending out books with bungling typographical errors?

SCHOOL AND COLLEGE.

Miss Annie M. Hayter, teacher at Latimore Lake, St. John Co., has recently, by means of a school entertainment, been able to furnish her new school-house.

Inspector Carter expects to complete his work in St. John city during April and the first part of May. He will then take up his work in St. Stephen, Milltown and St. Andrews.

By the death of T. W. Peters, Esq., St. John loses not only a progressive and useful citizen, but a valuable member of the school board.

Miss Anna MacKay, the much esteemed teacher of the intermediate grade, White School, New Glasgow, has been granted leave of absence for the remainder of

the present school year. Miss MacKay's excellent ability and her experience as a teacher, combined with superior personal qualities, have caused her to be much beloved by the pupils of her school and have won the confidence and esteem of the parents and school officials. We wish Miss MacKay a very pleasant trip and in due time a safe return. Miss Minnie MacKay, lately of the Dartmouth teaching staff, has been appointed to take charge of this department of our schools as a substitute. — [New Glasgow, N. S., "Chronicle."

A correspondent in the New Glasgow "Chronicle" refers to the department for art and music recently opened in the High School, and then adds:—

"The chemical laboratory is a busy place during part of the day. Here, a score or so of boys and girls study science experimentally, questioning nature face to face instead of pursuing the dry and worthless task of memorizing printed facts. Accommodation is provided in the laboratory for thirty pupils, each of whom has his desk, his blow-pipe, glassware, alcohol lamp, and other necessary apparatus. One could not fail to remark the fact that the building is kept much cleaner than we have been accustomed to see school-rooms in this country. The floors and wainscotings undergo constant cleaning, and the building throughout is as clean as when opened in November. Altogether, the new school is a just source of pride to the enterprising people of New Glasgow."

The New Glasgow High School is beginning to stand out prominently as one of the foremost educational institutions in Nova Scotia. The foundations of its present wonderful progress were laid by Mr. Ebenezer Mackay, now of John Hopkins University. Principal Saloan, with his able staff of assistants, has built well on these foundations. The fates are working in his favor. Within a few years, New Glasgow will have a population twice as large as any other town in the province except Halifax.

At a recent meeting of the executive committee of the St. John County Teachers' Institute a programme was drawn up which differs somewhat from those of former institutes.

A lady correspondent, under date of February 6th, from the "Wilds of British Columbia," after wishing THE REVIEW unlimited success, says: "Now it strikes me that that expression 'wilds, etc.,' might lead to misconception. Well, we are in a place from which we can reach Vancouver in two hours, where trains are constantly coming and going and stopping; where there are two churches, a Presbyterian and a Methodist, and an educational institution, including a high school and

embracing within its fostering care between one and two hundred children. The weather has been rainy up to date but this morning we opened our eyes upon Mount Baker bathed in sunshine. The robin's note has been heard and this tells us that spring is come."

On Tuesday evening, April 2nd, Mr. G. U. Hay delivered a lecture before the University of New Brunswick, on "Popular Education: wherein it has failed, wherein it has succeeded." Dr. Inch, Chief Superintendent of Education, presided. The lecturer pointed out the many advantages of our present system of education. The system is not by any means perfect. It has defects which legislators, educationists, and the people at large should unitedly endeavor to correct. The education that our common schools should seek to give, is one that should in the largest measure form the character and train the individual to think and to do. No matter how perfect the appliances in our schools, if they fail to accomplish this in the individual they fail in their function. The mere imparting of knowledge, without making fact correlate with fact, without adequate expression of this knowledge and power to use it in the manifold requirements of life, without making all school exercises help to form character, is one great cause of failure. But there are hopeful signs that more teachers are making education a study, that they are aiming to sift the important from what is less important in our courses of study, and that examining bodies are trying to find out what power the student has gained, rather than how many facts he may be ready to deliver to their inquiries.

The discussion which followed, lasted for two hours, and was taken part in by Profs. Davidson and Stockley, Dr. Bridges, Dr. Bailey, Prof. Dixon, Chancellor Harrison, Dr. Inch; by Mr. Brittain of the Normal School, and by Messrs. Allen and Hoben, students of the university. Many practical hints and suggestions were given during the discussion bearing on the material improvement in our system, especially how the system of examinations might be changed for the better. Mr. Brittain would make them tests of power by giving plenty of time to the student, and framing the questions in such a way that training would count for much. Chancellor Harrison said that students came to the University better prepared in mathematics than in former times—a strong argument for the present system, as the schools of former years gave much time to mathematics. The remarks of Messrs. Allan and Hoben were full of instruction, as showing how the rostrum and its occupant may gain the genuine and lasting respect of pupils—or otherwise.

Recent Papers by Atlantic Province Men.

The "American Geologist" for March contains an article by Dr. Geo. F. Matthew of St. John, in which the researches of M. Cayeux of Paris among the early protozoa are described. These discoveries are genuine, and it is now found that foraminifera, sponges and other protozoa occur in the pre-Cambrian rocks of St. John.

Dr. W. F. Ganong, of Smith College, Northampton, Mass., has an article in a recent number of "Science," New York, read before the American Society of Naturalists, Baltimore, December 28th, 1894, on "Laboratory Teaching of Large Classes in Botany." The necessity of individual instruction is urged, and this can be secured by appointing as assistants those who intend to be teachers.

"A Cheap Form of Self-regulating Gas Generator" is the title of a paper, with cut, published in the "Journal of the American Chemical Society," for April, 1895, by Prof. W. W. Andrews, of Mount Allison University, Sackville. "This form of generator is so cheap and easily set up that it makes it possible for every teacher and experimenter in chemistry to have, at practically no expense, a set of generators capable of yielding, whenever called upon, a supply of hydrogen, chlorine, carbon dioxide, etc." Prof. Andrews will have one at the Summer School of Science in July.

The April Magazines.

Two papers of educational interest in the "Atlantic Monthly" for the current month are The Expressive Power of English Sounds, by Professor Albert H. Tolman; and The Basis of our Educational System, by James Jay Greenough. . . . In "St. Nicholas" a cruise along Newfoundland and Labrador, and the occupations of the people in that desolate region, are described by Gustav Kobb, and Prof. Brander Matthews furnishes a genial criticism of Henry Wadsworth Longfellow for his series of sketches of great American authors. . . . In addition to the Napoleon history, the April "Century" has a variety of interesting articles, notable among which is that by Lyman Abbot on Religious Teaching in the Public Schools. . . . The "Popular Science Monthly" has several valuable educational articles, among which are Prof. Sully's Studies of Childhood, and Manual Training, by Dr. Henderson. . . . A paper of great interest to students of geography is the admirably illustrated article on Picturesque Papua in the "Cosmopolitan". . . . The March issues of "Littell's Living Age" give 315 pages of the choicest periodical literature printed in the English language. In all, these five weekly numbers contain thirty-six articles, of which, perhaps, the most valuable are The Court of Ferrara in the Fifteenth Century, Erasmus and the Reformation, The Evolution of Cities, Rural Scotland in First Half of last Century, An Unpublished Page in Madagascar History, Gen'l Boulanger: an Object Lesson in French Politics, The Crimea in 1854 and 1894. . . . The "Chautauquan" for April, is an excellent specimen of this educational magazine. There is a good article on "What the Stars are Made of," written in a very popular and untechnical way, by Garrett P. Serviss,

OFFICIAL NOTICES.

Departmental Examinations, July, 1895.

The usual Normal School Entrance, Junior leaving examinations, and Junior matriculation examinations, will be held in accordance with the provisions of Reg. 31, 3, (1) and Reg. 45 of School Manual, on the second day of July next, beginning at 9 o'clock, a. m., at the following places: Fredericton, St. John, Sussex, Moncton, Chatham, Bathurst, Campbellton, Woodstock and St. Stephen. Examinations will also be held at Andover, and Hillsboro, provided at least ten candidates apply for examination at each of these stations.

1. NORMAL SCHOOL ENTRANCE.—All candidates for admission to the Normal School in September, 1895, and all holders of second or third class licenses who propose to enter the Normal School in January, 1896, or to become eligible for examination for advance of class in June, 1896, are required to pass the preliminary examinations in July, 1895. (See School Manual, Reg. 31, 3, and Reg. 38, 6.)

Application for admission to the Normal School Entrance or preliminary examinations should be addressed to the inspector within whose inspectoral district the candidate wishes to write, not later than the 24th day of May. Forms of applications may be obtained from the inspectors, or from the education office at Fredericton. An examination fee of one dollar must be forwarded with each application.

2. JUNIOR LEAVING EXAMINATION.—This examination will be based upon the requirements of the course of study for grammar and high schools as given in the syllabus for Grades IX and X.

The pupils of any school in the province are eligible for admission to this examination upon giving notice on or before the 24th of May, to the inspector within whose inspectorate he wishes to be examined, and enclosing an examination fee of two dollars. (See Manual, Reg. 45, 14). Diplomas are granted to successful candidates.

The English literature for the closing examinations for license in June 1895, and for the junior leaving examination, will be Shakespeare's "Merchant of Venice" and Macaulay's Essay on "Warren Hastings."

3. JUNIOR MATRICULATION EXAMINATION.—This examination will be based on the requirements for matriculation in the university of New Brunswick as laid down in the university calendar; (candidates will receive a calendar upon application to the chancellor of the university, or to the education office). Any high or grammar school pupil who has completed Grade XI of the high school course, should be prepared for matriculation.

In cases in which the language studies of the high school course are different from the language studies as indicated the university calendar, candidates may take either course by giving notice at the time of making application for examination. (See Manual, Reg. 45, 14).

4. SUPERIOR SCHOOL LICENSE.—Holders of first class licenses who wish to pass the Latin examination required for superior school license, will be examined at any of the above stations, on application to the chief superintendent not later than the last day of May.

Holders of first-class license who are graduates in arts may receive superior school license without further examination.

First class teachers now in charge of superior schools may retain their present positions until June 30th, 1896, without further examination.

5. SECOND ATTENDANCE AT NORMAL SCHOOL.—Holders of third class licenses who have spent only one term at the normal school are required to spend an additional winter term at the normal school before they can be admitted to the closing examinations for advance of class.

Holders of second class licenses who have passed the preliminary examination for first class, may be exempted by attending an additional winter term at the normal school from the special conditions as to professional classification and certificates of superior scholarship, or of having taught two full years, as required by Reg. 31, 5, (a) (b).

6. SCHOOL LIBRARY CATALOGUE.—A catalogue of books recommended for Public School Libraries has been prepared and will be mailed to teachers or trustees on application.

J. R. INCH.

Chief Superintendent of Education.

Education Office, Fredericton, N. B., April 8th, 1895.

SUMMER SCHOOL OF SCIENCE.

✦ ✦ NINTH SESSION. ✦ ✦

MEETS AT AMHERST, NOVA SCOTIA, JULY 3RD TO JULY 18TH.

COURSES OF INSTRUCTION WILL BE GIVEN AS FOLLOWS:

BOTANY,
PSYCHOLOGY,
PHYSICS,
MUSIC.

ELOCUTION,
CHEMISTRY,
ZOOLOGY,
PHYSIOLOGY.

METEOROLOGY,
ENGLISH LITERATURE,
ENTOMOLOGY,

GEOLOGY,
HYGIENE,
CIVICS,

PEDAGOGICS,
MINERALOGY,
KINDERGARTEN,

For Pamphlets containing full information, apply to—

J. D. SEAMAN, Secretary,
Charlottetown, P. E. I.

Harvard University.



LAWRENCE SCIENTIFIC SCHOOL.

The Lawrence Scientific School, together with Harvard College and the Graduate School, is under control of the Faculty of Arts and Sciences. In 1895, instruction will be given in the following departments:--

Civil and Topographical Engineering,
Electrical Engineering,
Mechanical Engineering,
Mining Engineering,

Architecture,
Chemistry,
Geology,
Botany and Zoology,

General Science,
Science for Teachers,
Anatomy, Physiology, and Physical Training.

For descriptive pamphlets and for other information, address

M. CHAMBERLAIN, SECRETARY,
Harvard University, Cambridge, Mass.

HARVARD UNIVERSITY SUMMER SCHOOL.

During the summer of 1895 courses of instruction will be given as follows, beginning on July 5th:

ENGLISH,.....5 Courses.

GERMAN,.....2 Courses.

FRENCH,.....2 Courses.

HISTORY.

COMMON LAW.

EDUCATION and TEACHING.

Methods of Teaching Geometry and Algebra.

ENGINEERING.....5 Courses,
including Highway Engineering.

FREEHAND DRAWING.

MATHEMATICS,.....3 Courses.

PHYSICS,.....2 Courses.

CHEMISTRY,.....4 Courses.

BOTANY.

GEOLOGY,.....7 Courses.

PHYSIOLOGY and HYGIENE for Teachers.

PHYSICAL TRAINING,....2 Courses.

Courses at the MEDICAL SCHOOL.

Women as well as men are admitted to these courses, except those in the Medical School, those in Engineering, and the two more advanced courses in Geology.

For pamphlet describing the above courses, and other information, apply to

Harvard University, Cambridge, Mass.

M. CHAMBERLAIN, Clerk of Committee.

Webster's International Dictionary

Every Teacher and School should own it.



A College President writes: "For ease with which the eye finds the word sought, for accuracy of definition, for effective methods in indicating pronunciation, for terse yet comprehensive statements of facts, and for practical use as a working dictionary, 'Webster's International' excels any other single volume."

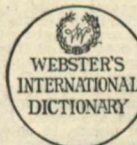
The diacritical marks for indicating the sounds of letters are so plain and intelligible as to be easily understood by old and young. Nearly all schoolbooks use them.

"It is The One Great Standard Authority

the perfection of dictionaries;" so writes Justice Brewer of the United States Supreme Court, who voices the general sentiment.

Send for free pamphlet containing specimen pages, illustrations, etc.

G. & C. Merriam Co., Publishers,
Springfield, Mass., U. S. A.



Do not buy cheap photographic reprints of old Webster dictionaries.

To Europe!

For my Vacation.
Summer of 1895.

Grand specially arranged excursion for Europe, under management of Henry Gage and Sons, Limited,

113 BROADWAY, NEW YORK.
142 STRAND, LONDON.

Organized and accompanied by

MISS ADA MARIE CROWE,
10 ELM STREET, TRURO, NOVA SCOTIA.

Sailing from BOSTON by the popular Cunard Line, SATURDAY, JULY 6, 1895.

INCLUSIVE FARES, \$230.00.

Including all necessary travelling expenses

S. S. Tickets good to return for One Year.

Address at once for detailed Programme--

MISS A. M. CROWE,
Truro, N. S.

GINN & COMPANY

— INVITE ATTENTION TO —

ALLEN & GREENOUGH'S LATIN SERIES.

Grammar; Cæsar, Cicero, Virgil, and Ovid, with full introductions, notes, vocabularies, maps and illustrations; Collar & Daniell's Beginner's Latin Book; Collar's Practical Composition, etc.

"There is no work of its size and scope which seems to me so complete" [as the A. & G. Grammar]. Professor Tyrrell, Trinity College, Dublin.

This Grammar is *facile princeps* among its rivals." Professor D. Y. Comstock, Phillips Andover Academy, Mass.

"The Beginner's Latin Book appears to me admirably suited for introducing young students to that difficult language." Oscar Browning, King's College, Cambridge.

GOODWIN & WHITE'S GREEK SERIES.

Grammar, Lessons, Beginner's Greek Book, (on the plan of Collar & Daniell's Beginner's Latin Book), Anabasis with vocabulary, and Seymour's Iliad with illustrated vocabulary.

"I know of no Greek grammar for English-speaking students that combines so many merits in so attractive a form." Professor D'Ooge, University of Michigan.

The special Canadian edition of the Beginner's Latin Book and Allen & Greenough's Latin Grammar is ready; retail prices, respectively, \$1.00 and \$1.20. T. C. Allen & Company of Halifax are agents for this and other books in the Maritime Provinces, and carry a stock constantly.

WENTWORTH'S MATHEMATICAL SERIES.

"The most popular books of the past decade." Arithmetics, Algebra, Geometry, Trigonometry, etc.

In the United States there are not less than 200 colleges and 3,000 schools which use the Algebra, Geometry, Trigonometry or all of these; and the books may be found in leading institutions in Great Britain, Turkey, India, China, Japan and the Hawaiian Islands.

GAGE & WILLIAMS' NATURAL SCIENCE.

Elements of Physics (Gage), Introduction to Physical Science (Gage), Introduction to Chemical Science (Williams), Laboratory Manual of General Chemistry (Williams).

"I have not only examined but studied the Physical Science, and consider it superior as a text book to any other I have seen." Principal DeBoer, High School, Montpelier, Vt.

"I cordially recommend the adoption of Williams' Chemical Science in secondary schools." A. Ogilvie, Gordon's College, Aberdeen, Scotland.

Also many other valuable text books described in our full Catalogue, which is sent free on application.

GINN & COMPANY, Boston, New York, Chicago and London.

RE-OPENING OF SCHOOLS.

TEACHER!

It will Pay you to have the LATEST Information about Educational Appliances.

• • • Our 1894 and '95 Catalogue • • •

— OF AND ABOUT —

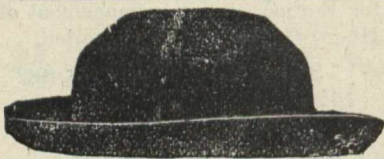
Will be sent FREE if you ask for it.

All Inquiries answered and Information given Promptly.

SCHOOL BOOKS, SCHOOL STATIONERY,
SCHOOL MAPS, SCHOOL GLOBES,
SCHOOL PENS, SCHOOL REQUISITES.

T. C. ALLAN & CO.,

HALIFAX, N. S.



THORNE BROS., Hatters and Furriers, 93 King Street, St. John, N. B.

10 Per Cent. Discount

ALLOED TO SCHOOL
TEACHERS ON

**GOLD AND
SILVER WATCHES** AT

A. & J. HAY'S, 76 KING STREET,
ST. JOHN, N. B.

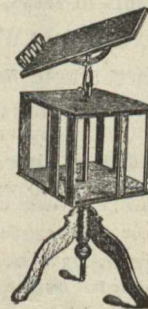


CAN I OBTAIN A PATENT? For a prompt answer and an honest opinion, write to MUNN & CO., who have had nearly fifty years' experience in the patent business. Communications strictly confidential. A Handbook of Information concerning Patents and how to obtain them sent free. Also a catalogue of mechanical and scientific books sent free.

Patents taken through Munn & Co. receive special notice in the *Scientific American*, and thus are brought widely before the public without cost to the inventor. This splendid paper, issued weekly, elegantly illustrated, has by far the largest circulation of any scientific work in the world. \$3 a year. Sample copies sent free.

Building Edition, monthly, \$2.50 a year. Single copies, 25 cents. Every number contains beautiful plates, in colors, and photographs of new houses, with plans, enabling builders to show the latest designs and secure contracts. Address
MUNN & CO., NEW YORK, 361 BROADWAY.

MARSH Reading Stand and Revolving Bookcase



32 inches high. Top can be adjusted to any angle or height. Revolving Case 15x15 x13. Holds 20 volumes size of Chamber's Encyclopaedia.

Solid oak and guaranteed first class. 100,000 now used as best Office or Library article ever patented. Expressed knocked down (20 lbs) in package, ON APPROVAL.

You need not pay for it till you see it and are satisfied with it.

Address, [naming this paper]

CASPERSON CO.

232 W. WASHINGTON ST.
CHICAGO.

The Educational Review.

Devoted to Advanced Methods of Education and General Culture.

PUBLISHED MONTHLY.

ST. JOHN, N. B., AUGUST, 1895.

\$1.00 PER YEAR.

G. U. HAY,
Editor for New Brunswick.

A. MCKAY,
Editor for Nova Scotia.

J. D. SEAMAN,
Editor for P. E. Island

THE EDUCATIONAL REVIEW.

Subscribers should promptly notify the REVIEW of change of address giving old as well as new address. Communications from New Brunswick should be addressed EDUCATIONAL REVIEW, St. John; from Nova Scotia and Newfoundland to W. T. Kennerly, Academy, Halifax; from Prince Edward Island to J. D. Seaman, Charlottetown.

HARRIS & CO., PRINTERS, ST. JOHN, N. B.

CONTENTS:

| | |
|---------------------------------------------------------------------------------------------------------|-------|
| EDITORIAL— | 41-42 |
| TALKS WITH TEACHERS— | 42 |
| CONTRIBUTED ARTICLES— | 43-52 |
| Canadian Voices—Nature Lessons—A Plant Lesson—Study of the Earthworm—An Outline of Phytobiology. | |
| SUMMER SCHOOL OF SCIENCE— | 53-54 |
| Gloucester County Institute— | 54 |
| SELECTED ARTICLES— | 54-56 |
| Put de Cookies on de Lower Shelf—A Canadian National Hymn—Hold to the Subject, etc. | |
| School and College— | 56-57 |
| Book Reviews—The August Magazines— | 57-58 |
| NEW ADVERTISEMENTS— | |
| T. C. Allen & Co., p. 60—Acadia University, p. iii.—Morrin College, p. iv.—N. S. Furnishing Co., p. iv. | |

THE Natural History Society of New Brunswick had its summer outing this year at Lepreaux, where the members availed themselves of the many opportunities that presented themselves of studying the natural sciences practically under instructors in geology, zoology, and botany. Next year, this energetic society proposes to pursue, if practicable, its investigations in the northern portions of the province—on the Restigouche and its tributaries.

THE advertisements of educational institutions and publishing houses in this number of the REVIEW will be read with more interest than usual.

TEACHERS and students are returning from their vacation, and the school-rooms are already, or will soon be, the scenes of activity. We hope that this activity may be well directed, and that the energies of both teacher and pupil may be used to the best possible advantage during the school year that is just beginning.

THE second paper of the series on plant study, by Dr. W. F. Ganong, appears in this number of the REVIEW. Dr. Ganong has had many opportunities to study the latest problems in botanical science, and our readers will be much interested in what he writes about.

THERE is a project on foot to make the Summer School of Science for these provinces permanent. Should this be adopted, a location will be chosen that will be as far as possible central for the provinces, and which will possess attractions in scenery and excellent opportunities for the study of natural science. Parrsboro, it has been thought, possesses these advantages in a marked degree, and the school will meet there next year to test them.

A FORMER superintendent of education in these provinces, and now occupying an important position in a Canadian university, writes: "Through the REVIEW I am kept *en rapport* with the educational affairs of the Maritime Provinces. It is doing a splendid work, and must have proved itself long before this a *sine qua non* to every live teacher.

THE St. John Exhibition Association are arranging for many special attractions at their fair, which opens on September 24th. Among them are included a military display, eight to ten bands of music, concerts and other hall entertainments, boys' brigade and children's days, procession of societies marching to the grounds with music and display within the ring, including horses and cattle, indoor and outdoor sports for children and adults, etc.

IT is the cause of increasing discontent that there are two matriculation examinations for entrance at the University of New Brunswick. These examinations are held at different times, and the papers are prepared and examined by different sets of examiners. It is even alleged that one of the examinations is very much less difficult than the other. If the matriculation examination is to grow in usefulness, all must be treated alike. Two examinations for the same purpose and under the conditions mentioned are unknown in any other university, and there is no apparent reason for their existence in the case quoted. The examination for county and other scholarships could be held at the same time as the matriculation examinations in July without difficulty, or such supplementary examinations as may be necessary for this purpose might be held in September and cause no complaint, but the general examination for entrance should be under the same auspices.

DR. PARKIN'S APPOINTMENT.

The many friends of Dr. Geo. R. Parkin are pleased to learn of his appointment as principal of Upper Canada College, perhaps the foremost preparatory school in Canada. That institution is to be heartily congratulated on having secured the services of such an able and enthusiastic teacher. Dr. Parkin has the power possessed by few of arousing enthusiasm in his work and inspiring boys to their utmost effort. This, combined with excellent executive ability and tact, will without doubt render his future work most successful.

The following, from the *Toronto Empire*, is an excellent account of Dr. Parkin's career, and the teachers in New Brunswick who have known and appreciated him so long in the past, look for still greater things in the future.

Dr. Geo. R. Parkin has been appointed head master of Upper Canada college. Dr. Parkin is a Canadian, a native of New Brunswick. He was educated in that province, and is an M. A. of the University of New Brunswick, which also a few years since conferred upon him the honorary degree of LL. D. For many years Dr. Parkin was head master of the Collegiate school at Fredericton, and acquired a high reputation in the Maritime Provinces as an educationist. While in that position he obtained extended leave of absence, and attended lectures at Oxford, where he acquired an insight into the educational methods of England. He was a friend of the late Dr. Thring, the celebrated head master of Uppingham school, one of the great public schools of England, and is his literary executor and biographer, his life of Dr. Thring being almost completed. Dr. Parkin resigned his position in Fredericton a few years ago in order that he might go to England in connection with the book he was then writing. Since then he has visited Australia and New Zealand, and both there and in England has been thrown in contact with the famous teachers of the empire. He has visited a great number of the public schools in England and Scotland, and addressed the pupils in many of them; and has had exceptional opportunities of studying closely the systems in use in the prominent residential schools. Dr. Parkin is an author of some repute in England, where his works have been printed. His book on the Great Dominion is recognized as one of the best books on Canada that has yet appeared, and it has been highly spoken of by the leading papers both in England and Canada. He has acted as special correspondent for the *London Times* on two occasions, the last being at the time of the Ottawa conference. A text-book of his for the use of schools, for which the Earl of Rosebery wrote the preface, has had an immense sale, and is being used in a very large number of schools in England. Dr. Parkin's life-long experience as a head master of a school, his great influence in moulding the character of boys, the fact of his being a Canadian and thoroughly understanding Canadian feelings and instincts, added to the vast experience of the last few years in the old country, would seem to fit him peculiarly for such a position as that of

principal of Upper Canada college. He is about fifty years of age, of great force of character, an eloquent and powerful speaker, a graceful writer, and one whose influence over boys would be of the highest kind. The college is to be congratulated upon its new principal.

TALKS WITH TEACHERS.

I have heard a rumor that the inspectors are going to be very particular in future regarding the teaching of temperance and natural science. I am rather glad to hear this, as much of the work done in both subjects has in the past been of a very desultory character.

Temperance teaching is no longer a matter of regulation, but of law, and any teacher failing to give instruction in the subject forfeits his government grant. I would advise all teachers to make room for temperance on their time tables at once, and not wait until the middle or end of the term. I might tender the same advice regarding the natural history subjects. It has been the practice of some, or rather many teachers, when requested to examine in these subjects, to say, "I have not yet dealt with the matter, but intend to do so at a certain time," usually before the end of the term. This excuse should no longer be a valid one, as it has too often covered neglect. Do not confine yourselves to text books in the teaching of natural history, if you do so you will no doubt fail. Go into the woods and fields. Do not be satisfied with what you have learned at school and normal schools. Seek further and add to your knowledge if you would succeed. You cannot give valuable instruction without the use of specimens. Do not be mere automatons, be live teachers.

It often surprises me to witness the indifference with which some teachers regard apparatus. It is very suspicious to find "measures" with a quantity of dust in them, and to unroll a map and be covered with it.

Object teaching has long been recognized as the most effective, and apparatus of all kinds has for its object, first to simplify and make clear, and second to save time; but it is always for the benefit of the teacher more than the pupil.

One teacher gave as a reason for not using an excellent globe, that she did not know how. She stated that there was none at the school she attended, and she had not been taught at the normal school. The first part of the statement I can well believe, because globes are not so plentiful as they should be, but I doubt the second part; but even if it were true, a live teacher will have no difficulty in working out the problems on the globe for herself.

Get together all the apparatus you can, and what is still more important, use it intelligently and take the best of care of it.

The season of county institutes approaches, and I presume that as usual we shall have in attendance the live teachers who think and read, and that the drones, who neither read nor think, will remain away and become still more old-fashioned. It is always teachers of the latter class who are seeking employment, and complaining because they do not find it. It may be added that this is the kind of teacher who always sneers at institutes and educational journals. Experience, instead of being a benefit to them, only confirms error, and for such the clock stopped when they left the normal school five, ten, or twenty years ago. Each year they are retrograding, and we find many teachers who twenty years ago were reckoned among the best seeking with difficulty situations in the most remote and least enlightened settlements. From the city to the back settlement! What a striking commentary upon sloth and unprogressiveness! What a fund of experience can be gained in twenty years if the mind be receptive and desirous to improve! There is another and brighter side to the picture in those who have improved and risen in the service, who have always attended teachers' meetings, and sought to make them profitable to others as well as themselves. They have not only encouraged educational papers, but have contributed to them, and to-day, it is needless to say, these teachers take precedence of all, old or new, in educational work. They have been moving forward while the others have moved backward.

The money expended in attendance at institutes and on educational papers is capital well invested, the returns from which will be large from the beginning, and increasingly so from year to year. But why continue a subject by remarks which will not reach their object? These teachers are so enveloped in darkness that no light from any quarter can reach them. They serve, however, as a warning to others.

For the Review.]

Canadian Voices.

In a little book of extracts from Bishop Medley's charges, lately published by Mr. de Soyres, the following passages occur.

The writer of excellent taste, great in his simplicity, is worth listening to now as he was when he wrote,—though at one or two places one might exclaim, "*Quis custodiet custodes ipsos?*" However, that is the way with even the greatest writers,—"*Humanum est,*" etc. This is what Bishop Medley said of New Brunswick:

It is extremely unfortunate that *at many of the ordinary schools in the province every fault in reading seems to be allowed, if not to be taught; wrong accentuation, incorrect emphasis, slovenly hurrying, mixing up*

of all the little words together in one imperfect sound, nasal pronunciation, and a total want of perception of the meaning of the author. It is difficult to overstate the amount of mischief that is thus done by bad reading. (p. 4).

Living where we do near the border land, where corruptions are found, and are imported among us, we must beware lest we fall unawares into commonplace vulgarity. Already *the occasional language, even of public speakers, defies all grammar* and belongs to no known tongue. (p. 17).

These statements have truth to-day. As Dr. Bright said a few years ago, at a meeting at Harvard of "The Modern Language Association," what we need is some one to go and teach those teachers whose voices are nasal, and so on. People may be quite unconscious of such defects. At that very meeting a professor got up and wanted to know if Americans really had nasal voices, as a rule. The president told him he was a living example of this horrid sound. He was a sensible man, and said he was glad to find out what he had not known before.

A Canadian writer, in the *Week* of Toronto, wrote, about three years since, that it is nonsense for us in Canada to hide these truths from ourselves. Even our educated voices, as a rule, *are nasal*, and when compared with educated English voices, are wretched. The comparison indeed is simply a contrast. But we are so sensitive we must needs be silly, and deny obvious facts.

The good Englishman said we borrowed all these bad things from our neighbors. Maybe so; but they grow and flourish on our own ground now. We might as well say, "Let us not blame ourselves for our drunkenness; we borrowed it all from the Scotch, English and Irish."

*

The "Nature Study" Teacher.

The 'nature study' teacher is an enthusiast. The monotony of school life has been dispelled. Pupils and teacher are wide awake; no more listlessness, no more perfunctory attention to routine work. These are some of the expressions used by teachers to describe the effects produced by the introduction of nature work into the schools. Begun in the town schools it has spread to the rural sections, until the American teacher, who has made no provision on his time-table for this work, soon finds himself outdistanced by his more progressive fellow-teachers. What has been done in Ontario? Here and there a few wide-awake teachers have done something and propose doing more. Other teachers would like to make a start, but they scarcely know how. The American teacher has an arbor day, a flower day, a bird day. We will catch up by and by.—*The Educational Journal* (Toronto).

We hope so. There is nothing like nature lessons, not only for breaking up the monotony of the school-

room, but also for developing the powers of observation, thus enabling the pupils often to add the whole time of going to and returning from school to the useful time of study, while it robs the mechanical travelling of its monotonous treadmill character. More than that, if these lessons are intelligently and regularly given, it lays the foundation of all technical education which lies at the basis of success in agriculture, and all the other industrial occupations, while it is the best possible preparation of the student who is to be successful in the literary professions. It also tends to illuminate the common-place notions of the country boy, who, without such education, is apt to associate with monotonous drudgery all farm life and industrial labor, because he does not see the fascinating play of nature's mysterious laws everywhere in activity. When the teacher can utilize this side of education with more skill we shall not be compelled to hear so much of the alleged effect of our schools taking our boys from the farm, and crowding the learned professions with persons who might find a vocation useful in some degree elsewhere for themselves and for others.

For the REVIEW]

Nature Lessons.

Nearly 100,000 children are daily sauntering to school in these three provinces. The majority of these walk from half a mile to two miles to school and then back again. It is the same road each day, up the same hill, down the same ravine, across the same brook, through the same wood, and within the same horizon with its weary, unchanging sky line. More than 300 times a year they repeat the monotonous journey, and continue repeating it for at least eight or ten years. And yet that road is crammed with objects of the most surpassing interest to the young people if they were only taught to see them. But they have never been taught to see; for the most of their teachers have had ten or fifteen years of such marching with *their* eyes open as to their lids, but blindfolded as to their perception. What a tremendous waste in all this blind marching! What a loss of exhilarating pleasure! What a villainous training for people who are supposed to be preparing for a few years of usefulness in *this* world!

The instruments which are making the natural world what it is, and what it is becoming every day, are on exhibition by the roadside at work. The genius which is incessantly elaborating from the dust of the earth, the wealth of the farmer, of the horticulturist, and that which is creating the beauty of the solitary flower and the glory of the landscape, is at work there. Forms of life more varied than the imagination ever painted live along the scholar's road.

What is the teacher's duty in this department? It is to see that the habit of accurate observation is developed. The teacher must start the pupil, give the hints to develop the interest which will spontaneously lead the child into the habit. Why should not every little item of geological change, showing itself on a small scale by the roadside and along the country, be reported and watched systematically? Why should not all the flowers and even weeds along the roadside be brought to the schoolroom and examined and named? Why should not the life histories of the more interesting of them be observed and occasionally reported orally and in writing. That would be making some use of speech as well. Some prefer to have essays written on highly abstract subjects before the child can really manage to string abstract conceptions logically together. But the description of an observation is always the most simple exercise for the youthful writer.

For the REVIEW]

A Plant Lesson.

MOSSES

TEACHER. For next day I would like very much if each one of you would make a collection of all the different kinds of mosses you can find in a few minutes' search. So that you may not have too much rubbish, just keep only, say three single stems each, which you can fold in a piece of paper about three or four inches square, and label.

SCHOLAR. How shall we know a moss?

T. You all know a moss bank.

CHORUS. I think we do.

T. Very well, go to such a bank and pluck up carefully three of the best looking three stems you can find. Each moss plant has a stem with green leaves, and some kinds branch very beautifully too.

LICHENS

T. I also wish you to get as many different kinds of lichens as you can while you are looking for the mosses.

S. What are they like?

T. Well, I will tell what to look for, and I shall be glad to put you right next day when you get the specimens. Lichens do not have stems bearing green leaves like the mosses.

They are not green looking like the grasses or like ordinary leaves, nor do they have any such leaves. Some of them look like mosses a little in shape and size. Some grow on the ground, some on old logs and on the bark of trees, some on rocks, and they are flat sheets with prettily curved lobes, like leaves except in color, and without any stems or ribs. Some others are only like crusts or even stains spreading on rocks and the

bark of trees. One grows like an old man's beard from the branches of trees.

S. — Oh! I know that one.

T. — And others grow on the ground sending up a stem with a scarlet, or brown or black cap or cup on the top.

S. — Oh! I've seen it! I've seen it!

FUNGI.

T. — I hope you will be able to distinguish the lichens from the fungi.

S. — What are fungi?

T. — Fungi are the toadstools, mushrooms, soft things growing on old logs and on the ground which are not like other lichens or mosses. We will collect some of them some time; but for to-morrow see if you can distinguish mosses and lichens, and see how many different kinds you can bring.

S. — Must we know the names of them?

T. — O, no! You can call them any name you like, whatever you think suits them best, until we get the proper name. But you must remember that there are so many of these little plants that very few teachers can give the proper name for them. We can give them our own name in the meantime, and examine them so as to know them and as much about them as we can see ourselves.

For the REVIEW.]

The Study of the Earthworm.

LUMBRICUS TERRESTRIS, Linn.

Earthworms are slow, ugly, slimy creatures. This is the popular verdict; yet the earthworm is by no means devoid of interest, whether we regard its structure or the part which it plays in nature. Let us first notice its structure.

The earthworm is made of not very substantial materials, as is proved by placing one in the heat of the sun, when it soon dries up, leaving only a lump of earth. Upon examination the worm is seen to consist of joints or rings, *i. e.*, it is articulated, or belongs to the branch of the animal kingdom known as the *Articulata*. This branch includes also the insects, and the crustaceans, such as lobsters and crabs, all of which have ringed or jointed bodies. While, however, the insects have a rather hard or horny body, and the crustaceans a still harder crust or shell, the body of the worm is membranous. While, again, the insects and crustaceans have numerous appendages, such as antennae, legs, etc., the earthworms have no appendages, at least none that are jointed. In this respect they differ also from the marine worms, whose bodies often bear numerous bristles, as well as external breathing organs. The number of rings

in worms is also much larger than in the other groups, and are all essentially alike. It is by means of these rings, which can be separated or brought together by muscular action, that the earthworm moves, being assisted by small rasps on the under surface of the body. The interior organs are rather numerous, including pharynx, crop, gizzard, stomach, liver and intestine. The worm eats by suction, swallowing earth, which passes through its body, only a few pebbles being retained to help grind the food in the gizzard, and retaining all the organic matter. The tail end of a worm is not very different from the head end. Eyes it has none, but it probably has a sense of light. It also has a sense of smell and taste. It will thus appear that the earthworm is comparatively low in organization. It has many organs with but few functions, and a multiplication of parts without corresponding differences in structure, a feature which marks its low rank. Worms are both inhabitants of the sea and of the land. Their distribution is cosmopolitan. The nervous system is such that one portion of the body is as equally sensitive as other parts. Earthworms form one of the foods of birds. They breathe by the air passing through the skin, and communicating with a large number of blood vessels.

I will now notice the work of worms, and whether they were made in vain. As I said above, they pass earth through their bodies, which is secreted in the form of castings. Hensen says there must exist 53,767 worms in an acre. This is calculated as the number in a garden (see Darwin's "Vegetable Mould"), but in a corn field the number of worms would be greatly lessened. Suppose all these worms to be swallowing and secreting earth, one can see that their work in nature is not small. They fertilize the ground, making a rich sediment which is so necessary to plants. They also, by their burrows, help to loosen the soil and make it permeable to air and water, which act on the bed rock and make the ground a great deal more open. Worms, we now perceive, are not useless, nor uninteresting. It is a study of endless length to fully understand their great work in nature.

GEO. W. BAILEY.

Fredericton, N. B.

The school work which has the seeds of growth in it is that which the child himself does. Art is naught, device is naught, if it does not secure the exercise of the child's observation, of his memory, his judgment, his reason, or his will, in a proper way. The function of the teacher reaches its truest fulfilment when it consists in suggestion of things to be done, and in encouragement to doing them. True teaching consists in directing, stimulating, and guiding. Who does more, does wrong. Mere telling is a long remove from teaching, and yet it passes for such in many a school-room.—*Iowa Schools.*

An Outline of Phytobiology.

With Special Reference to the Study of its Problems by Local Botanists, and Suggestions for a Biological Survey of Acadian Plants, by W. F. Ganong, M. A.

(Read before the N. B. Natural History Society, June 1, 1895.)

SECOND PAPER.

ADAPTATIONS OF PLANTS TO LOCOMOTION.

In the first paper of this series, Phytobiology* was defined, its relations to other departments of botany were explained and divisions were proposed for its treatment. In taking up these divisions it is not needful to hold to the order there given: and I have decided to treat first the one which I think will prove of the greatest use and interest to our botanists. This is the adaptations of plants to locomotion. Its relation to other topics of the series is shown in the following synopsis, which, as already emphasized, outlines a convenient rather than a logical treatment of the entire subject.

Introduction and Classification. *Published in Bulletin No. XII.*

- A. Adaptations of Plants to Inorganic Nature: *to be prepared.*
- B. Adaptations of Plants to other Organic Beings: *to be prepared.*
- C. Adaptations of Plants to Reproduction: *in preparation.*
- D. Adaptations of Plants to Locomotion: *the present paper.*
- E. The Biological Groups of Plants: *in preparation.*
- F. The Climatic Groups of Plants: *to be prepared.*
- G. A Summary of the Biological Characteristics of the Vegetation of Acadia: *to be prepared.*†

INTRODUCTORY.

There are five great primal necessities common to all living beings: nutrition, growth, protection, locomotion, reproduction. Of these, locomotion, our present subject, is not less important than the others, while it exceeds them all in the elaboration of adaptations to bring the plant into relation with its environment. Viewing loco-

*In the first paper (p. 4, footnote) I said this term had not been before used, so far as I was aware. The editors of the *Botanical Gazette* (1895) have called my attention to the fact that the word occurs in the *Century Dictionary*, and Mr. F. L. Sargent of Cambridge reminds me that it is used by Lubbock in the title of a paper of his upon Seeds and Seedlings, published in the *Trans Linn Society* for 1886. It would have been strange if so fitting a word had not before found use.

†This is the original outline proposed in the first paper, to which, however, it is not necessary closely to adhere. A more logical arrangement, and one which I shall probably adopt, is as follows: Adaptations of Plants to A. Nutrition; B. Growth; C. Protection; D. Locomotion; E. Reproduction; F. Biological Groups; G. History and Distribution; H. Philosophical Summary; I. Summary of Biological Characteristics of Acadian Flora.

I may here also emphasize such distinction as exists between Physiology and Biology, though they merge together at many points. Physiology has to do with the chemistry and physics of the operations, chiefly internal, of living beings, while Biology treats of their relations to the external world.

motion in a broad way, we find that it must be provided for in both animals and plants for the following reasons:

1. To prevent overcrowding, so as to allow each individual enough space for its development.
2. To effect the union of the sexes.

In addition it secures to them the following advantages, and these are of vast importance in the struggle for existence.

3. To give the new individuals opportunity to develop under environment somewhat different from that of the parents, thus promoting vigor and variability, the two qualities upon which progressive development in evolution depends.
4. To mix individuals derived from different environments, so that cross fertilization may occur between plants of different stock, thus promoting in the offspring the advantageous vigor and variability.
5. To allow a race to move to new localities as it exhausts certain essentials in the old.

For the animal world should be added to these, to escape from enemies, a condition which plants must otherwise work out.

Among animals, all of these advantages are secured to them by the power of independent movement which they nearly all possess; but among plants, which lack this power, the same end must be attained in a totally different way. One of the most fundamental differences between animals and plants consists in this, that plants being nourished by inorganic materials which are brought to them by the movements of the atmosphere, or of water in the soil, have not needed to move for the greatest of all necessities, that of food; their cells have accordingly built up of the firm non-contractile cellulose and its derivatives, a supporting skeleton capable of great size and strength, but not of motion; while animals, living upon other organized beings, which they must go in search or pursuit of, have formed a contractile substance, muscular fibre, and the presence of this gives a muscular system and the possibility of locomotion to even the largest animals. Yet that plants do in some way secure locomotion is very clear. One has only to recall the rapid spread and great range of weeds, or the world-wide distribution of many water-plants. Indeed, taken as a whole, it is probable that the aggregate locomotive accomplishments of plants are fully equal to those of animals, even though they are less rapid, less striking, less well-known. How then, it is now our task to inquire, does it come to pass that plants, themselves incapable of independent locomotion, yet so perfectly secure it? The answer is in essence

this: It is secured to them *by the separation of small parts of their substance capable of reproduction, and the adjustment on these of structures adapted to utilize the various locomotive forces of nature.* The end is thus as certainly attained as among animals; there is but a difference in the method. Instead of the adults moving, the small parts move; instead of by internal powers it is by utilization of those other agencies which do move.

Of the five needs for locomotion above-mentioned, the third, fourth and fifth can be secured along with the first, and indeed in the animal world all five are ensured by the power of independent movement; but among the higher plants, the first and second require distinct methods. In the first case, that of simple scattering to prevent overcrowding, the problem is simply to remove to a considerable distance, and preferably to favorable situations, reproductive parts of a plants; in the second case, that of effecting union of the sexes, *i. e.*, union of pollen and ovule, the problem is more difficult, for not only are the fertilizing elements to be removed to a distance, but they are to be deposited in a special position, *i. e.*, the male is not simply to be carried away from its producing structure, the anther, but it is to be deposited on a special part of the female organ, the stigma, and the problem is made the more difficult by the fact that cross-fertilization being absolutely more advantageous than self-fertilization in nature in the closeness of the struggle for existence, it has to be provided that the carrying of the pollen shall be to the stigma of another plant. Hence come the adaptations to cross-fertilization, resulting in the formation of the flower, with its colors, odor, nectar and varied forms, the whole affording us the most splendid example of adaptation to be found in the vegetable kingdom. This division of locomotion is, however, so large and important that although it belongs logically in the present paper it must receive separate treatment, and it will be considered in a future paper of this series along with "adaptations to reproduction;" at present we devote our attention to locomotion of plants as scattering them through space.

Let us understand clearly the mechanical problem involved. A piece of matter endowed with life, and having size and weight, must be moved through a considerable space in such a manner as not to injure it. Only a very limited movement can be effected by the plant itself, so that in the vast majority of instances the movement must be effected by outside agencies. How, then, can the plant effect movement, and what are the forces in nature outside of the organism capable of moving ponderable matter?

The former can occur through

- I. Independent animal-like movement.
- II. Extension away of parts by growth.
- III. Locomotion by movements of ripening tissues.

The latter are

- IV. Currents of air.
- V. Currents of water.
- VI. Movement of animals.
- VII. Gravitation.

Of these, gravitation is of little importance since it can only effect movement downwards and not laterally. As to the others aside from the first, which uses simply the contractile power of protoplasm, some mechanical arrangements must be provided so that the part may be brought into contact with the moving power, and be moved by it. This is in brief accomplished by the formation of new individuals at the ends of runners, etc., in the second case, by the drying or ripening of tissues under tension, and their final release in the third, by formation of wings or plumes in the fourth, and of floats in the fifth, and finally by the development of hooks or-sticky coats, or of edible fruits, enclosing seeds protected from digestion in the sixth; of course all kinds of combinations and gradations of these methods occur. The principles of these arrangements we must discuss in some detail.

We must consider next what parts of plants can best be locomoted. Excepting in the first and second, where growth and locomotion go on together, it is necessary that the part shall be capable of reproducing the organism that it can hold its life for a time in suspension, that it shall carry nourishment to give it a start in its growth, and that preferably it shall be small and light. In some cases, especially in the lowest cryptogamic water plants, these qualities reside in the entire organism, and these move as a whole, but in the higher land plants there have been developed special structures which combine these qualities; these are in some cases, buds, in others spores, and most important of all, seeds. Buds usually have the disadvantage of not being able long to retain vitality after separation from the parent plant, but seeds can retain their life for much longer periods and during long transportation, and it is in them that we find by far the most perfect arrangements for locomotion. Indeed the seed is what it is, chiefly because it is the locomotive stage of the plant.

The seed is, in origin, a fertilized ovule. The flower is itself a structure for securing locomotion, the locomotion of the male to the female and all of its parts and colors and odors, etc., are adaptations to this end. Immediately after the act of fertilization all of the accessory parts, calyx, corolla, stamens, style and stigma, become useless, and they either wither and drop off, or else they may be retained and made of use to help form the various structures, which the seed needs in order to take advantage of moving agencies; thus any of them may form wings, plumes, floats, hooks, pulps, etc. In all such cases the seed itself has no disseminating structures of its own — those of the fruit are sufficient. This occurs commonly in few or single-seeded fruits, which are independent and where the entire structure ripens or is carried off. But in fruits containing many seeds, the

fruit remains on the plant until all seeds are ripe, and each seed has some arrangement for locomotion by itself.

From a biological point of view it does not matter in the least from what part the disseminating structures are developed, but from the morphological side it is very important to trace the exact structural origin of each peculiarity. It is soon apparent that the same biological end may be attained in the most diverse morphological ways; a wing may be either bract, calyx, wall of ovary, or outgrowth of the seed coat; the pulp of a fruit may be bract, receptacle, calyx, ovary, placenta, hairs or seed-coat, and so on. Any available structure whatever may be expected to be utilized for the formation of a useful feature. What it is which determines what particular morphological part shall be employed in any given case, is usually unknown, but there can be no doubt that in general it is determined by the fundamental principle of least resistance—the most available or the most easily modified structure is led by the adaptive forces along the easiest lines, and the result is the structure as we have it.

It is of course necessary in the study of locomotion as elsewhere in phytobiology, to distinguish that which has been adapted from that which is incidental. All gradations between these occur. Without doubt in very many cases the adapted has originated in the incidental. Thus the presence of a wing on a seed is a case of gradual adaptation to wind-locomotion, and the principle of natural selection explains very well how adaptation may have been perfected. On the other hand the wide locomotion which willows secure by the floating of their brittle and wind-broken twigs is incidental, though it is easy to understand that if it were worth while this mode of locomotion could be improved and perfected. Examples of structure just on the boundaries of the adapted and incidental are found in some of the modes of vegetative locomotion presently to be mentioned.

As in the case of many of other natural phenomena, the facts of locomotion have long been known, but it is only in this century that the philosophical significance of the facts has been understood. That seeds are scattered by wind and animals is plain to observation; but to know that plants derive advantage from this, and that the advantage in the keen struggle for life to which they are exposed may explain the perfecting of the adaptations to secure the locomotion, this is knowledge which has been gained slowly and has been made possible only by the light thrown upon all organic processes by the principle of evolution.

The classical work on locomotion of plants is Friederich Hildebrand's "Die Verbreitungsmittel der Pflanzen," (The Dissemination-methods of Plants), published in Leipzig, in 1873. This work sums up the subject most admirably and is characterized by philosophical treatment, richness in facts and judicious selection in illustration. No work has yet superseded it, and all students since its appearance have based their studies upon it. I have

myself made free use of it in the preparation of this paper. Darwin has much to say on this subject in the "Origin of Species." Since then Hildebrand, Huth, MacLeod, and very many others have worked on the subject. MacLeod has published a most useful bibliography of publications on dissemination from 1873 to 1890 (in *Botanisch Jaarboek*, Ghent, 1891.) Finally, Kerner, in his "Pflanzenleben," (English translation by Oliver,) has given us a most valuable though popular discussion, richly illustrated, and Lubbock has given a good summary in his "Flowers, Fruits and Leaves." The present paper is designed not to describe the facts already so well set forth in these works, but to reduce our knowledge of the subject to definite principles which will make more easy an objective knowledge of the subject and guide our local botanists in further studies into the subject.

PRINCIPLES OF THE MODES OF LOCOMOTION OF PLANTS

I. INDEPENDENT ANIMAL-LIKE MOVEMENT.

Since plants lack altogether muscular fibre, it is only possible for independent automatic locomotion to occur where the contractile power of the protoplasm itself can be utilized. This occurs only in unicellular or very few celled organisms, *i. e.*, only in the lowest and smallest plants. Many of the lower algae produce spores, (called zoospores) which can swim freely through the water by means of cilia or flagella, precisely as animals of an equivalent grade do. The Diatoms move by use of protoplasmic filaments, and some filamentous algae, the Oscillariae, by vibrating movements of their rod-like structure. Among land plants, some of the slime-moulds, or Myxomycetes, can creep over damp surfaces precisely as the animal amoeba does, *i. e.*, by continually causing its very plastic substance to flow in a constant direction. No higher land plants whatever have the power of independent locomotion.

II. EXTENSION AWAY OF PARTS BY GROWTH.

In the higher plants, a branching root and stem system prevails, each part of which grows only at or near its tip. By sending out these growing parts laterally and allowing them at a greater or less distance to turn upward and grow into an erect plant, or to send off an erect plant by branching, an effective and rapid though not extensive locomotion can be brought about. The connecting part may subsequently die, leaving them independent. There are several ways in which lateral growing parts may act.

1. Horizontal underground roots and rhizomes, more or less long and slender, may send up new plants (called "suckers") from adventitious and axillary buds respectively. Examples of the former are Blackberry, *Asclepias Coronati*, etc., and of the latter, *Triticum repens*, *Achillea millefolium*, and many others. The same method occurs abundantly in water plants. It incidentally brings about the formation of turf, and makes some plants very difficult to exterminate when they become "weeds."

2. Offsets and runners above ground form new plants at their tips. The Houseleeks (*Sedum*), *Lobelia cardinalis*, show the former, and the Strawberry, *Potentilla anserina*, etc., the latter method.

3. Slender stems or branches bend over and take root and produce a new plant at their tips forming "stolons;" such are some species of *Rubus*.

4. Plants in which the main stem creeps horizontally either above or below ground and in which the old parts die behind as the new advance, attain locomotion by the very act of growth. Ferns and Solomon's Seal are examples. Such plants may branch and after a time by the death of the old connecting parts may give rise to several independent individuals. In the tropics there are epiphytic plants which creep along the stems of trees and have this same habit, such as *Pothos*.

5. Bulbs may be drawn away from their producing plants by the shortening of lateral roots. Many bulb plants which form small side bulbs, send out from them, horizontally, slender roots. Later, the connection of bulb with the old plant is severed, the roots shorten and draw away bulb from plant. *Ornithogalum nutans* and *Tulipa sylvestris* are examples.

6. An inclined stem may develop aerial roots called "stilt roots," by which it is nourished and supported several feet from the ground; in time the old stem and roots die behind and the plant continuing to grow and produce new roots, the plant thus secures movement from place to place. None of our plants do this but it occurs in many of those of the tropics. A modification of this habit, in that the old parts continue to grow, there is profuse branching, and the roots thicken up to stems, gives us the habit of the banyan.

In addition to the formation of new plants at the ends of laterally extended parts, many forms of separable buds, bulblets, branches, etc., are formed directly upon the plant, but these all are adapted to being scattered by some of the moving agencies, wind, water, etc., and they will be considered under these topics.

III. LOCOMOTION BY MOVEMENTS OF RIPENING TISSUES.

Although the skeleton built up by plants out of cellulose and its derivatives is not contractile, it nevertheless is capable of producing locomotive movement if ripened in special ways. By this means either slow, creeping movements or very rapid projection may result, though the resulting locomotion can never be great. It is clear that for projection, seeds, not buds, nor even very light spores are adapted, and the most efficient seeds for projection are nearly or quite spherical, smooth, hard and rather heavy. The various modes are as follows:

1. Cell walls may become strongly hygroscopic, swelling and shrinking and altering shape as moisture is absorbed and given up, just as a board warps, and in small pieces the movement may be rapid. Sometimes slender hygroscopic arms are attached to spores and move them from the capsule or even farther, as in the spores of *Equisetum*. In *Vanda teres*, a tropical orchid, hygroscopic hairs force out the seeds to be carried off by the wind. There are even a few seeds

and fruits which are pushed along the ground by the hygroscopic twistings of some of their hairs, certain hooks which point backward allowing only of a forward motion. Such are some species of *Trifolium*. In *Arena sterilis*, the "living oat," this movement is very perfect and may be somewhat sudden. Related movements assist in burying seeds as will presently be considered, and in closing fruits when weather is unfavorable, and opening them when favorable.

2. Certain bands of tissue may ripen under restraint in a state of tension so that finally, and more or less connected with drying-up or hygroscopicity, when the restraint is released or overcome, the parts spring suddenly to a new position and hurl out the seeds, sometimes to a distance of many feet. This may come about by the formation of special elastic unicellular "elaters" which force out the spores from the capsule in many mosses. Or the seeds of the carpels may come to press harder and harder upon the smooth seeds between them until these are suddenly and swiftly ejected, as one shoots a bean or nut from between the fingers, as in some stemmed violets. Or the styles may ripen on an elongated receptacle forming springs to hurl away ovary or seeds as in the genus *Geranium*. Or the carpels under spiral tension burst all apart from one another as in many Euphorbiaceae, in some cases as the castor bean, or better the West Indian "sand box," bursting with a loud report and hurling the seed many feet. Or two-valved pods may split suddenly by the independent rolling up of the two valves, as in some vetches and lupines.

3. Soft fruits may become strongly turgescient, *i. e.*, gorged with water in their inner and dry on their outer parts, until finally they explode at the weakest point and shoot out the seed. This happens in fruits with valves, in which case the latter usually suddenly curl up and throwing off the seed, as in *Impatiens*, and many Cruciferae, or the entire pulpy interior may become turgescient under a firm skin, as in some Cucurbitaceae. In the "squirting cucumber" of the Levant, pulp and seeds are shot through the opening left where the fruit drops from the stalk, while in *Cyclanthera* it bursts along the sutures.

The power of ripening tissues to produce movement is also used to assist seeds in self-planting, and to aid locomotion by the production of tumble-weeds and to form elastic stalks, all presently to be described.

IV. LOCOMOTION BY UTILIZATION OF AIR CURRENTS.

Of all of the locomotive forces of Nature, air currents are the most universally prevalent and easily utilizable. They are of all grades, from the barely perceptible up-and-down convection currents of still warm days to great gales. To effect by them a movement from place to place, it is simply necessary to develop about the seed structures which will spread as great a surface as possible in proportion to weight. This principle is worked out in various ways as follows:

1. Various more or less light vegetative parts capable of reproduction may be blown from a plant by strong winds: such as leaves in begonias and Bryophyllum, joints of stem as in some cactuses, rosette branches in some sedums, small bulblets in some lillies and ferns, even brittle twigs as in willows, though here doubtless the locomotion is rather incidental than developed.

2. Plants or their parts develop large surfaces and are rolled by the wind along the ground. Entire plants curling their branches upward assume a ball shape, loosen their hold on the soil by rotting or breaking or pulling out of the roots and are blown along, rolling over the ground as "tumble weeds," either scattering their seeds as they roll, or more commonly coming to rest and scattering them, when rain gives proper conditions for their growth. Such plants are rare or wanting in wooded regions, but are abundant on open plains especially those with a long dry season. The "Russian thistle," now doing so much damage in the west, is a good tumble weed, and *Plantago cretica* of Europe, and possibly the "Resurrection Plant," of the south-west is another. The classical case of the "Rose of Jericho," of Palestine, must be given up as it only rarely and accidentally becomes uprooted. It is frequently the case that fruit clusters become tumble weeds, as in some Umbelliferae, and in some clovers where the sterile stalks of a head become feathered and this gives a surface for the wind to roll along the fertile ones. Sometimes the fruit curls up to a helix with very flat spirals, and is thus rolled along as in some species of *Medicago*, and there is perhaps an approach to this structure in the pods of the honey locusts; or the single fruit may become very large and loose in texture, or the pod very flat and thin, and be carried far from the plant by the wind and then rolled along.

3. By extreme minuteness a relatively large surface proportional to bulk can be attained without special appendages, for as a sphere diminishes in size its bulk diminishes relatively more rapidly than its surface. Thus very minute spores can swim in the air like dust, as do these of moulds, etc., and those of mosses, ferns, etc., can easily be blown to great distances. Amongst Phanerogams the presence of a several-celled embryo makes it difficult to reduce them to so small a size, but in certain orchids they are very minute. Plenty of plants bear tiny seeds, which, thrown from their capsules by strong wind gusts, are by them carried considerable distances, as will be mentioned below. Sometimes as in orchids, the seeds are surrounded by a sort of loose sac containing air which makes them much lighter.

4. Seeds or fruits of trees develop wings which either act as sails or else as parachutes, causing the slow fall and hence wider lateral carrying by the wind. In all cases the centre of gravity of the seed is so adjusted that the fall is as slow as possible. In the simplest cases, the seed itself becomes very flat and thin, as in some species of iris; in addition they may be the development of a wing around the edge. The wings may be formed from a bract as in linden, grasses, *Carpinus*; from the ovary as in elm, maple, ash; from the corolla in rare cases; from the calyx as in *Cabiosa*; from the seed coat as in *Calappa*, pines and spruces.

As noted wings are almost confined to tree seeds, since the height of the tree gives them a good start with the winds, which would not be true in herbs or low plants.

5. Upon herbs and low growing, woody plants, where the seeds need not only to be carried laterally but also raised in the air, plumes or tufts of hairs are developed. Frequently these are such that the entire mass forms a light ball, but more often the plumes are at one end, sometimes connected with the seed by a stalk, as in the dandelion, in which case the whole structure keeps an upright position and the wind may carry it for immense distances. Indeed where the plume spreads out horizontally and the seed hangs on a stalk beneath to keep the whole balanced, even the light convection currents of a hot summer

day may raise them up to considerable heights, hence they may be widely spread. These light plumes form the most efficient of all the modes of locomotion. Most weeds owe a part at least of their success to it, and the family Composite owes its great predominance in part to the fact that the collection of the flowers into heads and their protection by the involucre has set free the calyx to form the pappus, giving to each single seed one of the most effective of known disseminating structures.

The plume or hairs may be formed of the sterile flower stalks of a cluster, as in the "smoke bush," from the fruit stalk as in *Typha*, from the calyx as in composite, from the style as in *Gum and Clematis*, from the wall of the ovary, from the seed-coats as in cotton and milkweeds, from the funiculus as in willows. In rare cases the fibrovascular forms after decay of the soft tissue a light frame easily blown away.

6. The stalks of seed pods may ripen elastically so that when gusts of wind shake the pods, the seeds are hurled out especially by the recoil. In these cases, the seeds, which are small and smooth, are early loosened in the pods and the latter open not at the bottom or along the sides but at the top, and in such a way that they form smooth grooves along which the seeds are guided as they are hurled out at such an angle that they are sent to the greatest distance. This is one of the commonest modes of locomotion among herbs, and occurs according to Hildebrand in *Scrophulariaceae*, *Campanulaceae*, *Papaveraceae*, *Primulaceae*, *Caryophyllaceae*. It may be well seen in the common poppies. This shaking of the stalks and their sudden recoil may be brought about also by passing animals, and probably the bladderly pods of some plants as *staphyllea*, etc., may assist this mode of locomotion by giving the wind a larger surface to work against.

The wind may also assist in locomotion by driving floating seeds over lakes or the ocean either by blowing directly against them, or by creating surface currents which carry them.

V. LOCOMOTION BY WATER CURRENTS.

To utilize the movement of water currents for locomotion, it is needful that the parts to be scattered shall float, and be able to resist decay for a considerable time, but finally sink to the bottom. The floating is usually effected by the development of air-holding tissue. Water currents are of three kinds: 1. Those caused by falling rain, both as it falls and as it runs along the ground; 2. Those caused by wind on non-flowing water; 3. Those of flowing water. Of these the first and second are not of much importance, and there is probably more of the incidental than of adaptation in the locomotion they effect; the third is more efficient.

The various types are as follows:

1. Seeds or fruits of wind-scattered land plants are very light, and when accidentally they fall in water, they float, and may be carried far. But they rarely reach conditions favorable to germination and hence this incidental method is of little value. It may, however, explain the reported fact that some heavy nut trees which are migrating northward, are found upon branches of the St. John which flow from the south and not on those flowing from the north.

2. Floods may tear out root-stalks, fruits and other parts of plants and carry them to situations in which they can grow when the floods subside, but here, also, we can have no adaptation—only incidental locomotion.

3. Entire plants or their vegetative parts may be carried by currents. This occurs with many algae. The plant may let go its hold on the bottom, float down stream and later take root again, as in *Nasturtium lacustre*; or it may float normally throughout its life as in *Lemna* and *Salvinia*, the water hyacinth of Brazil, which makes floats of its swollen leaf-stalks, and others. Detachable buds are common in water-plants, which are either lateral and protected by bracts as in *Potamogetons*, or condensed branches or terminal buds as in *Utricularia*. Willow twigs may be carried to grow in favorable places.

4. Spores, seeds or fruits may be carried by currents. To make seeds or fruits float air chambers develop in some parts and these are usually resistant to decay. Occasionally by waxy substances, the parts are made unwettable and hence float. The receptacle is said to provide the float in *Nelumbium*, the ovary in *Alisma*, *Sagittaria* and species of *Carex*, separate carpels in *Nuphar*, ovary and calyx combined in the cocoanut whose salt-water resisting air filled husk and unwettable outer skin, make it perfectly adapted to long ocean voyages; the arillus or third seed coat is used in *Nymphaea*.

5. Rain drops may wash spores or seeds from their capsules and carry them away in rivulets to grow in damp places. The little gemmæ are thus carried from the cups on the fronds of some liverworts, as *Marchantia*, and perhaps the bublets may be thus carried from the axils of the leaves in lilies and ferns. The pods of *Anagallis* and *Brunella vulgaris* are said to open in a rain which then washes out the seeds.

VI. LOCOMOTION BY THE UTILIZATION OF THE MOVEMENT OF ANIMALS.

There are two fundamentally distinct ways in which the locomotive power of animals is used by plants for their locomotion; first, parts are made to cling to their fur or feathers or feet; second, seeds protected from digestion by special coats are enclosed in fleshy fruits which are eaten, and the seeds are later discharged uninjured from the animals' bodies.

Looking over the groups of animals, we find that the only ones large enough to carry seeds and fruits, and at the same time of active habits and wide range, are birds and mammals. In special cases, however, insects, snails and even fish may carry seeds.

The different types of dissemination are as follows:

1. Vegetative parts provided with hooks may be carried by fur of animals, as in some cactuses, and possibly the stems with their fruits of our *Galiums* and *Polygonum sagittatum* may be carried in the same way. Winter buds and other parts of water plants may be carried in mud by the feet of birds as in *Elodea canadensis*.

2. By clinging apparatus of hooks, etc., seeds or fruits may become attached to wool or fur and be carried far, to be finally brushed off or to be shed with them, or spines may be developed which stick into the feet of animals. Mammals, because of their shaggy coats, are best adapted for this mode of

dissemination, and accordingly it is common in herbs, and rare in shrubs or trees. Hooks, more or less large and strong, are formed from bracts as in the burdock, from outgrowth of the calyx as in Agrimony, calyx teeth as in *Compositæ*, ovary or part of it as in *Desmodium*, inferior ovary as in *Umbelliferae*, *Circaea*, the style as in *Polygonum virginianum*, the seed itself as in *Villarsia nymphaeoides*. Hooked fruits are numerous but hooked seeds rare, for in the ovary where many are closely pressed together there is not room for the development of hooks. Spines which project straight from the fruit and stick into the hoof of animals occur, as in a few plants, and in other cases there are formed many projections arranged in lines so that the fruit clings in wool or hair as a comb does.

3. A sticky substance is formed which makes fruits or seeds cling to the fur, feathers or feet of animals, a peculiarity particularly common in water-plants. This may be formed either as special glands or simply over the general surface. It may be on the calyx as in *Salvia glutinosa* and *Plumbago*, in the ovary as in *Linnaea borealis*, on the seed itself as in *Collomia*, and rarer cases are known where it occurs upon other parts. In parasites the seeds are usually sticky, but doubtless this is as much to make them cling to branches as to secure locomotion.

Another very important phase of this subject is the carrying of seeds in the mud which clings to the feet of birds and hoofs of mammals, an extensively effective mode of locomotion. Birds nearly always carry some mud and seeds with them from pond to pond, and doubtless this is the explanation of the extremely wide range of most bog and water-plants.

4. The heavy nuts of trees are moved to some extent by squirrels and other small animals, which carry them off for food. Many are dropped by them *en route*, and others are stored up but never used and may come finally to the ground and germinate. Probably oaks, hickories, etc., secure a part of their locomotion in this way. Such seeds are not intended to be eaten and many of them have a bitter taste which to some extent prevents it.

5. By the development of nutritious and pleasant tasting pulp in which seeds, protected from digestion by hard coatings, etc., are imbedded, animals are made to carry seeds for long distances, discharging them finally from their bodies under conditions most favorable for germination. This is the true philosophy of edible fruits in Nature. To protect them from being eaten before the seeds are ripe, they are usually green in color and may even possess spines or stinging hairs, but have some bright color making them as conspicuous as possible when they are ripe. Thus when they ripen early in the season they are red, this color contrasting the best with the green of foliage—but when they ripen after the foliage has turned red, they are often purple, and when they grow in dark or shaded places, they are often white, as in many parasites. Birds are particularly adapted to this mode of dissemination. Their smaller size and habits make it possible for the plants to attract them more readily than the larger mammals; hence berries are particularly common on trees and shrubs, less so on low herbs, though they do occur upon the latter and are eaten by ground birds. Though many seeds become destroyed in the animal's body, many others pass through without injury, and in some cases actually germinate better than these which have not been swallowed. The seed may be made indigestible either by its coats becoming stony as in the grape, or by inner part of the ovary ripening to a stone as it does in the peach and cherry. In many cases the

seeds are enclosed in a core which is not eaten but thrown away after being carried some distance.

The pulp may be formed from bracts as in juniper, from the receptacle as in the strawberry, from the calyx as in wintergreen, from wall of the ovary as in the grape, from inferior ovary as in banana, from placenta as in watermelon, from the arillus as in mace, yew, from the funiculus as in some cactuses, from hairs on the interior wall of the ovary as in aroids and the orange, or the pulp may be formed from several of these combined.

6. In some plants, seeds or fruits, more or less protected by hard coats against danger of digestion, look so remarkably like insects that it is believed by some botanists that their resemblance is not accidental but the result of adaptation, and that they are swallowed by animals in the belief that they are insects, and are later discharged uninjured. Such are the seeds of the castor bean and of *Jatropha*, which resemble beetles, and fruits of *Scorpiurus* and *Calendula* which resemble caterpillars. But the subject is not yet settled. In other cases very brightly colored seeds may be swallowed precisely as other brightly colored objects, such as bright pebbles, etc., are.

7. Man has produced great effects upon plant locomotion. He has carried useful plants from one continent to another and through all lesser distances: along with the seeds of these, he has accidentally introduced others, which may run wild and become weeds, and finally in various accidental ways he has scattered them around the globe. All of this locomotion is, however, of the incidental, not of the adapted kind.

VII. UTILIZATION OF THE POWER OF GRAVITATION.

As already pointed out this force working in a vertical instead of a lateral direction is of little use in dissemination. It causes seeds to roll down slopes, and undoubtedly aids in the scattering of heavy nuts, which have their outer walls so built that they are elastic, and, falling with force they may strike stones or roots or lower branches and bounce away considerable distances, and this may be helped by wind, water currents, etc.

SOME SPECIAL ADAPTATIONS CONNECTED WITH THE LOCOMOTIVE PARTS.

In addition to the adaptations to locomotion proper, there are various arrangements connected with the locomotive parts which we cannot here more than mention. Such as the power of planting themselves by utilization of the movements of hygroscopic tissues which bore them into the ground as in *Erodium* and *Stipa pinnata*. In other cases the fruit stalk turns from the light and places seeds in clefts of rocks on which the plant grows as in *Linaria Cymbalaria* of Europe. Some plants place their seeds in protective positions while they are ripening, as many water plants which draw them by spirally shortened stems, under water. Some seeds have modes of protection against germinating in the fruit, others special arrangements for rapidly absorbing water and perhaps even fastening themselves to the ground, and there are others which space does not allow us to take up.

SUGGESTIONS FOR THE STUDY OF PLANT LOCOMOTION BY LOCAL BOTANISTS.

From the foregoing outline, which is intended to be suggestive rather than exhaustive, it will be perceived that in plant locomotion, local botanists have a most attractive and profitable field of study. There is opportunity for a great amount of original work in it. These questions have been much studied in Europe, but very little in this country, and it is needful that every species shall be examined here, whether studied elsewhere or not.

The student may start with the assumption that every plant has some mode of locomotion; his task is simply to discover what that is. To do so he has simply to watch closely enough the plant as it passes from flower to fruit. Then secondly, it will help him if he studies the locomotive agencies and observes what plants are moved by them. He should, for example, watch the berries to see what animals eat them, and the birds to see what berries they eat. The seeds floating on water or driven along the roads by wind, or which cling to his clothing or the fur of animals, or (if he be also an ornithologist,) which occur on the feet or in the stomachs of birds should be collected and identified. To aid in this latter work, he should make collections of seeds and fruits of our water plants; indeed our natural history societies should make such collections as a part of their museums. A collection of seeds and fruits of native plants arranged according to agencies of locomotion would be most instructive and interesting as well as valuable for comparison. The botanist who would undertake as his specialty to work out the locomotion of every plant in a given district and to make a collection of seeds and fruits to illustrate it would have a no less interesting and serviceable specialty than he who works out the occurrence of plants in a given district and collects an herbarium to illustrate it; indeed in the present state of knowledge he would have one likely to be of even more real service to science.

There is need also of experiment. How far certain seeds may be carried by winds of certain strength; how long seeds may float in water without losing their power of germination; what seeds resist digestion while passing through the bodies of animals, and many other principles still need that statistical study which is the only foundation for true knowledge.

I would propose finally to the botanists of Acadia that they should communicate their original observations upon locomotion and other biological topics to their society, and that the society publish them in brief, precisely as it has published notes on plant distribution, and that nothing should be admitted to the list which does not rest upon direct personal observation. In this way may be systematically collected a body of reliable fact as a basis for further elaboration of principle, and as well for the preparation of that true natural history of our native plants which is the real goal of all our endeavors.

Smith College, Northampton, Mass., June 1, 1895.

Summer School of Science.

The ninth session of the Summer School of Science for the Atlantic Provinces of Canada was opened by a public meeting at Amherst, N. S., on the evening of Wednesday, July 3rd, Mayor Curry presiding. Interesting and enthusiastic addresses were given by Councilor Chapman, of Amherst, Inspector Craig, of Cumberland County, N. S., Dr. MacKay, Superintendent of Education for N. S., Dr. Inch, Superintendent of Education for N. B., Prof. Coldwell, of Acadia College, and Prof. Andrews, of Mt. Allison.

The numbers attending the school were not so great as on the two preceding years, but those attending were diligent students and good work was done. Much regret was expressed at the absence of Prof. Brittain, who was unavoidably absent, also at the departure of the president early in the session to attend the Christian Endeavor Convention at Boston.

A marked feature of this year's school was the *field work*, which was carried on during the afternoons of each fine day. For the first few days this work was under the direction of Dr. A. H. MacKay, to whom the members of the school are under a debt of gratitude for the encouragement given by him in their work.

Mr. Hickman, of Pictou, was a welcome visitor to the school, his early morning tramps with the members who accompanied him to hear the birds sing, and to learn to distinguish them by their notes, were truly enjoyable. One of the most interesting evenings was the one spent listening to Mr. Hickman's talk on ornithology.

The subject of a permanent location for the school engaged the attention of the members. Steps were taken to thoroughly canvass the project during the year.

The fine, large, airy, thoroughly ventilated rooms of the Amherst Academy had not a little to do with the comfort of the students and with the success attending their efforts.

Thanks of the school were given to school commissioners of Amherst for use of academy building; citizens of Amherst for courtesies extended; Principal E. J. Lay, and A. D. Ross, Esq., local secretary, were especially entitled to thanks, for their untiring efforts on behalf of the school; to the Amherst band and male quartette for excellent music in connection with public entertainments; to Dr. Allison and Mr. Milner of Sackville for excursion courtesies; to Mr. Dick of the Joggins Coal Mine Company for kindness during visit to the Joggins; to Col. Blair and Mrs. Blair, of the experimental farm at Nappan, for the kind reception given the school on its visit to the farm; to railway and steamboat authorities for reduced rates.

The following received certificates of proficiency on the subjects indicated:

In Botany—Annie L. Darling, Jennie McManus, Minnie Weir.

In Mineralogy—Willard T. Carter, Winnie Freeman, Maretta Angus, Ida Crowe, Daniel A. Matheson.

In Music—Jennie S. Johnston, Junior Certificate; Sarah Harris, Junior Certificate; Clara M. Coats, Junior and Elementary Certificates; Charles E. Reid, Junior Certificate; Bella Henderson, Junior Certificate; Fred. A. Dixon, Junior Certificate; Ella J. McKay, Junior Certificate; Lizzie R. Kirkpatrick, Junior Certificate; Bessie L. Gregor, Junior Certificate; Sarah J. Paterson, Elementary Certificate; Flora Embree, Junior and Elementary Certificates; Mabel Acorn, Junior and Elementary Certificates; Minnie A. Weir, Junior Certificate; Sarah C. Ross, Elementary Certificate.

In Zoology.—Sarah J. Patterson, Minnie A. Weir.

Officers for the ensuing year:

Patron, Lieut.-General Montgomery-Moore, Halifax, N. S.; Hon. Sir S. L. Tilley, K. C. M. G., C. B., St. John, N. B.; Hon. T. Heath Haviland, Charlottetown, P. E. I.

President—A. Cameron, County Academy, Yarmouth. Vice-Presidents—G. J. Oulton, B. A., High School, Moncton, N. B.; W. R. Campbell, County Academy, Truro, N. S.; Ewen Stewart, Supervisor of Schools, Charlottetown, P. E. I.

Secretary-Treasurer—J. D. Seaman, Prince Street School, Charlottetown, P. E. I.

Executive Committee—Inspector Craig, Amherst, N. S.; Mr. S. B. Patterson, Truro, N. S.; Prof. J. Brittain, Fredericton, N. B.; Miss B. G. Gregor, Charlottetown, P. E. I.

List of Members—Susie Archibald, Truro, N. S.; Maretta Angus, Shinimicas, Cumberland County, N. S.; Mabel Acorn, Amherst, N. S.; Clara Archibald, Amherst, N. S.; Bessie M. Bell, Newcastle, N. B.; Maud L. Betts, St. John, N. B.; Florence Black, Amherst, N. S.; Willard T. Carter, Mt. Whatley, Westmorland County, N. B.; Amelia Carter, Amherst, N. S.; Clara Coates, Amherst, N. S.; Ida Crowe, Diligent River, Cumberland Co., N. S.; Ida Carter, Amherst, N. S.; N. Chapman, Amherst, N. S.; Edith Copp, Amherst, N. S.; Mrs. W. A. Chubbuck, Amherst, N. S.; Frederick A. Dixon, Sackville, N. B.; Gladys Dixon, Sackville, N. B.; Annie L. Darling, Nauwigewauk, Kings Co., N. B.; Alice Downey, Amherst, N. S.; Frederick L. Daye, St. John, N. B.; Flora Embree, Amherst, N. S.; Minnie Freeman, Pleasant River, Queens Co., N. S.; Bessie L. Gregor, Charlottetown, P. E. I.; Margaret Graham, Collingwood, Cumberland Co., N. S.; Rena Gillis, East Leicester, Cumberland Co., N. S.; Hattie Howard, St. John, N. B.; Bella Henderson, Northport, Cumberland Co., N. S.; Sarah Harris, Charlottetown, P. E. I.; Bertha B. Hebb, Bridgewater, N. S.; Julia M. Jordan, Simonds, St. John Co., N. B.; Jennie S. Johnson, Joggins Mines, Cumberland Co., N. S.; Geo. M. Johnston, St. George, N. B.; Adela Jackson, Wolfville, N. S.; Mary Kaulback, Conquerall, Cumberland Co., N. S.; Lily McKay, St. John, N. B.; Ella J.

McKay, Moncton, N. B.; Lizzie R. Kirkpatrick, Parrsboro, Cumberland Co., N. S.; Oressa McKinlay, Southampton, Cumberland Co., N. S.; Christina McLeod, Little Narrows, Victoria Co., C. B.; Estella Lyons, Ouslow, Colchester, Co., N. S.; Emma Lodge, Port Howe, Cumberland Co., N. S.; Grace Murphy, St. John, N. B.; Daniel A. Matheson, Upton, Dundas, P. E. I.; Jennie McManus, Hampton, N. B.; Mary Moseley, Halifax, N. S.; Annie B. McPhee, Hampton, N. B.; Augusta Pipes, Nappan, Cumberland Co., N. S.; Ada Pipes, Nappan, Cumberland Co., N. S.; Sarah J. Patterson, Linden, Cumberland Co., N. S.; Chas. E. Reid, Somerset, Kings Co., N. S.; Sarah C. Ross, North Earlton, Colchester Co., N. S.; Ellen L. Read, Amherst, N. S.; Mrs. R. W. Rogers, Amherst, N. S.; Ella Seely, Lower Horton, Kings Co., N. S.; Edith S. Stewart, St. John, N. B.; M. J. Sproule, Parrsboro, Cumberland Co., N. S.; Julia Sayre, Fredericton, N. B.; Maud Terrie, East Leicester, Cumberland Co., N. S.; Ethel Tuttle, Amherst, N. S.; Louise Wetmore, Clifton, Kings Co., N. B.; Minnie Weir, Amherst, N. S.; Lillian Wotten, Parrsboro, N. S.; Mrs. Willis, Halifax, N. S.

The next session of the school will be held at Parrsboro, N. S., July 9th to 24th, 1896.

Teachers' Institute.

GLOUCESTER COUNTY.

The annual session of the Gloucester County, N. B., Teacher's Institute was held at Caraquet, June 27th and 28th. There were forty-eight teachers enrolled. Dr. Inch was present. He spoke at the public meeting Thursday evening and took part in the discussions on the papers read at the sessions Friday.

In the first session, after routine business, the Institute took into consideration the subject of writing. The discussion was opened by Fred. L. Legere, and participated in by a great number of the teachers. This was carried on in both English and French, and was animated and interesting. In fact this characterized all the discussions.

At the second session model lessons on botany were given by Mr. Branscombe, L. R. Hetherington, Miss Sish and Miss Mullins. These lessons were criticised by J. E. Lanteigne and J. F. Doucet.

The public meeting Thursday evening was an unqualified success. Standing room was at a premium. The meeting was addressed by M. Turgeon, in French, Dr. Inch, P. J. Veniot, M. P. P., and Father O'Zanne. The Caraquet brass band furnished music.

At the fourth session J. F. Doucet read in French a paper on "The Difficulties of Teaching English to Acadian Pupils." The discussion was opened by J. E. Lanteigne. A paper on "The Best Methods of Observing Arbor Day" was read by Miss Minnie Miller, A. A. Gionet leading in the discussion. Afterwards there was a discussion on "Temperance," started by the reading

of letters, written by the pupils of Miss Eddy's school.

At the fifth session a paper written by C. F. Brisson, "L'Autorité parentale et l'Autorité de l'Instituteur," was read by W. J. Allain. This paper was highly spoken of by Dr. Inch, P. J. Veniot, Turgeon and others. The Question Box was then opened and the questions answered by Dr. Inch and the President.

The following officers were elected: President, W. J. Allain, Tracadie; Vice-President, Miss E. C. A. Stout, Dumfries; Secretary-Treasurer, L. R. Hetherington, Bathurst; additional members of the Committee of Management, J. F. Doucet and Margaret Sozier. The institute meets next at Bathurst.

This was one of the most successful institutes ever held in the county. Great credit is due Mr. B. D. Branscombe, the retiring president, for the arrangement and successful execution of the programme.

Put de Cookies on de Lower Shelf.

A minister from the North one time attempted to preach a learned discourse to the colored people of the South. He began using large words and long sentences, but he soon noticed that he was not getting the attention of his hearers, and changed to more simple language. At this one brother said, "Now we can understand the gospel." Taking this as a key, he changed to very simple language, giving them the pure word of God, when a good sister shouted, "Bress de Lawd! he's goin' ter put de cookies on de lower shelf, where de chillun can all reach 'em."

When we listened to the discussions at Denver, and heard so much about Correlation, Concentration, Interrelation, Coordination, etc., and saw how little the average teacher seemed to care for such things, we thought, "Gentlemen, you had better put the cookies on the lower shelf, so we can all get some."

At some of the institutes we have visited we find Dr. Wordy pouring forth his discourse on Psychology and Psychological principles, ringing the changes on Apperception, Concept, etc., the teachers sitting very quietly, looking wise, but not getting more than a crumb to take home with them, because all the cookies are away upon the top shelf. It is all right to get the teachers to look up and reach up, but we do not want them to strain their eyes and arms reaching for things that are clear out of reach. Let us be practical. *American Journal of Education.*

THE work of the teacher must in these days be both progressive and elastic. His pupils grow mentally and morally, as well as physically. Events should more frequently be his text books. The living law of growth extends and projects his teaching so as to shape and control all the future of his pupils. *American Journal of Education.*

A Canadian National Hymn.

Land of my love and praise,
 Land of my happy days,
 Land of my birth,
 Where'er my steps may roam,
 Toward thee with joy I come,
 Thou art my chosen home
 'Mid the wide earth.

Land of the rapid stream,
 Of the broad river's gleam,
 Land of fresh seas,
 Of forests vast and old,
 Of winters bright and cold,
 Fling thy red banner's fold
 Free to the breeze.

Land where the red rose tree,
 Thistle and fleur-de-lis,
 With shamrock gay,
 Twine leaf, and spine and crown
 From rugged Blomidon,
 To where the rivers run,
 The sunset way.

Land of the Sabbath calm,
 Church-bell, and prayer and psalm,
 Blest of the Lord,
 Still in thy homes secure,
 Thronged marts and temples pure,
 Be the great God of power,
 Owned and adored.

Goal of that loyal band,
 Who bravely sought a land
 Ruled by their king,
 Spurned for it homes of cost,
 Rich heritages lost,
 We in our father's boast,
 Loud let us sing.

"God save our gracious Queen,
 Long live our noble Queen,
 God save the Queen;
 Send her victorious,
 Happy and glorious,
 Long to reign over us,
 God save the Queen."

—Margaret G. Currie.

"To build high, make the foundation sure." Mothers and teachers are largely responsible for the formation of character of the children under their care; but how often is the responsibility shirked entirely and the little ones discouraged by continual fault-finding, embittered by harsh words and hardened by unjust punishment, too often inflicted in anger. The world, to-day, is full of wasted, aimless lives, whose childhood promised so much. —Miss Fannie E. Miller, North Dakota.

Hold to the Subject.

It is one of the easiest things in teaching to have plenty of talk during the recitation period, and yet not have a recitation. It is an easy matter for the teacher to fill time and to make a show of animation and work by asking three or four questions where one would not only do, but be better; by the senseless and monotonous repetition by the teacher of whole recitations exactly as made by the pupils; by stories told by the pupils that are faintly suggested by the lesson, or by another pupil's story. All this makes noise, keeps up an appearance of work when the real recitation may be wholly absent. The average teacher should have burned into his being, *hold to your subject*. If the teacher wishes to draw the pupils into conversation (purposeless or otherwise), he should set apart a certain time for doing it. When he has a lesson on interest, the Rocky Mountains, the relative pronoun, or a simple little lesson in reading or numbers, he should teach the child that the particular thing for recitation to-day should be held to until mastered, or the recitation period is ended. Teach the pupils, big and little, to stick to a thing until it is finished.

The class was reading "The Harvest Mouse" in the Second Reader. During nearly all of the recitation the book was not looked into at all, when a true reading lesson consists in getting the thought the language conveys, and it is necessary to consult the language to determine what this is. The following is a part of the recitation:

Teacher—What do you mean by grain?

Pupil—Wheat, rye, oats, and corn.

Teacher—What color are they when ripe?

Pupil—They are yellow when ripe.

(Hands were raised, and the words "Miss J." distinctly heard from several children.)

Teacher—What is it, Alice?

Pupil—Oh, Miss J., I saw a very large field of wheat, almost as large as this room, and it looked white.

Teacher—I think you are mistaken, for it is always yellow when ripe.

Pupil—Miss J., is the wheat stalk yellow to the bottom?

Teacher—Yes, it is. Now, who can tell how the harvest mouse is different from the common mouse?

Pupil—It isn't as large, and is brown instead of grey.

1st Pupil—Miss J., I am going to the country this summer, and I can see some then.

2nd Pupil—Miss J., I was out to my cousin's in the country last summer, and we found a nest with four little mice.

3rd Pupil Miss J., we had so many mice, and papa got a mouse trap and we caught three.

4th Pupil Last summer I was out to grandpa's, and when they hauled the wheat in we found four little mice, and gave them to the kittens.

Teacher Well, we'll have to leave the lesson now, and talk about the harvest mouse again to-morrow.

Instead of a reading lesson, it was turned into a desultory conversation on color of grains when ripe, and stories the mouse part of the lesson and the harvest suggested to the children. I certainly think talks on grain and harvest and the children's experiences with each are very helpful, but they were foreign to this reading lesson; nothing in the lesson justifies it. This is an illustration of a great deal of the reading work, and, I might say, of the number work as well. Don't forget that one great thing to remember in teaching is to know exactly what *should* be gotten out of each lesson, and then persistently work toward getting it.

Indiana School Journal.

Many a child first conceives the idea of the beautiful from his school surroundings and obtains his first idea of the requirements of life from his observations of his teacher's conduct and his association with his school fellows who have been more fortunate in their home surroundings and training; and it is in the school that he begins to reach toward the higher life which is the result of true education. *Sel.*

The Teachers' Round Table is an unorganized collection of teachers, informal in its nature, composed of men and women who desire to discuss vital topics connected with their profession. Such gatherings are exceedingly useful in making teachers better acquainted with each other's plans and in promoting professional pride in good work.—*Henry Sabin, Iowa.*

SCHOOL AND COLLEGE.

There has been a re-arrangement among the St. John principals. Mr. W. H. Parlee has been transferred to Leinster street, Mr. Thos. Stothart to Winter street, and Mr. John Thompson to Charlotte street.

Miss Emma McInnis has been appointed to one of the high school rooms in the Victoria.

The calendar of Morrin College, Quebec, has been received. This institution was founded in 1860, has a large endowment, and is affiliated with McGill University, Montreal.

The calendar of Acadia University, for 1895-96, is at hand, filled with interesting information regarding its departments and courses of study.

Mr. Geo. J. Trueman, of Point de Bute, has taken charge of the superior school of St. Martins, N. B.

The usual half yearly conference of the chief superintendent with the inspectors of N. B. took place in July in Fredericton.

It is understood that all preliminary arrangements have been completed for holding the combined session of the St. John and Charlotte County Institutes in September.

Inspector Carter will be engaged during the latter part of August in St. John County, and at the beginning of September will begin his work in Charlotte County.

The results of the July Normal School Entrance Examinations in N. B. have been made known: 529 entered and 265 failed. The following shows the number at each station with the class gained:

| | Class I | Class II | Class III | Failed |
|--------------|---------|----------|-----------|--------|
| Fredericton, | 9 | 22 | 17 | 46 |
| St. John, | 15 | 30 | 31 | 41 |
| Moncton, | 14 | 20 | 14 | 16 |
| St. Stephen, | 5 | 9 | 5 | 15 |
| Woodstock, | 9 | 23 | 9 | 31 |
| Chatham, | 1 | 9 | 12 | 18 |
| Sussex, | 4 | 22 | 10 | 22 |
| Campbellton, | 4 | 2 | 3 | 4 |
| Bathurst, | 0 | 3 | 2 | 7 |
| Hillsboro, | 3 | 4 | 3 | 5 |
| | 64 | 153 | 106 | 265 |

St. Andrews, N. B., has a town improvement association, in which are enrolled old and young. The schools are taking an active part in the work of improvement, and on arbor day the citizens and school children joined forces. A prize offered by the association for the best essay on town improvement was won by Miss Lillian Gunn. The essay was read at the closing of the schools, and published in the *Beacon*. It contains many excellent suggestions on how to advance the material interests of a town, and how to make it clean, beautiful and attractive. Active co-operation between old and young in this work of improvement could be introduced with beneficial effect in all our towns and villages.

The supply of teachers in N. B. for the present term is more than equal to the demand.

Mr. Chas. H. Murray, lately of the St. Stephen staff, has been appointed principal of the North Head, Grand Manan, superior school.

Mr. C. H. Acheson has been appointed principal of the Moore's Mills superior school. Mr. Acheson spent last year at the university.

Miss Lilla M. Dick has been appointed to succeed Miss Lucy McKenzie on the St. Stephen staff.

Prof. Ingres, formerly one of the professors of the Berlitz School of Languages in the Atlantic Provinces, has been appointed Professor of French at McGill University, Montreal.

Mr. W. J. Wilson, formerly of the Leinster Street school, St. John, now of the Canadian Geological Survey, has successfully completed the course of scientific study leading up to the degree of bachelor of philosophy in Wesleyan University, Illinois. Mr. Wilson has been engaged for over six years on this course, and we congratulate him heartily on its successful completion.

The new school building in St. John, on Erin street, will not be occupied before the first of the next year.

In the N. B. Matriculation Examination, forty-six applied, and only fifteen passed unconditionally, twenty-two passed conditionally, and nine failed absolutely. None passed in the first division. The following passed in second division:

Passed in Division II, 50 to 75 per cent.—Jessie L. Lawson, Victoria High School; Mary E. Clark, Victoria High School; Ida P. Hanington, Victoria High School; John Hales Sweet, Harkin's Academy, Newcastle; Harriet S. Comben, St. Andrews; Frank O. Erb, Grammar School, St. John; Charles C. Blanche, Sussex; Jessie B. Henry, St. Stephen; Edward Elliot, St. Andrews; Ethel Brittain, Fredericton; Dio H. Frzeze, Campbellton; Alice M. Crilley, St. Stephen; Sadie Laffin, St. Stephen.

At the closing examination of the Collegiate School, Fredericton, Miss Ethel Brittain won the Douglas Silver Medal for general proficiency and excellence in classics.

The academy of science in Paris, France, has elected Professor Simon Newcomb, the distinguished astronomer, a native of Wallace, N. S., its foreign associate in place of the late Professor Helmholtz. Professor Newcomb is a son of the late John Newcomb, who taught school at Wallace for many years.

BOOK REVIEWS.

HOW CANADA IS GOVERNED, by J. G. Bourinot, C. M. G., LL. D., etc., cloth, pp. 344. Published by the Copp, Clark Company, Limited, Toronto. This is a valuable book to all students of Canadian history. It aims to present in a small compass an account of the executive, legislative, judicial and municipal institutions of Canada, with an historical outline of their origin and development. There are numerous illustrations, chiefly of legislative buildings, with a map of the Dominion. The book traces our constitutional history from the days of Champlain to the present year. It is quite safe to say that no man in Canada could write such a work as well as Dr. Bourinot has done it. He is recognized as our highest constitutional authority. Added to this, his clear, vigorous and polished style gives an interest to what, in other hands, might have been dry and formal. No library, public or private, will be complete without this book.

THE NEW GRADATIM, by Wm. C. Collar, cloth, pp. 180; price 55 cents, for introduction. Publishers, Ginn & Co., Boston. This is an excellent book for the teacher to supply supplementary work in the first and second year's course in Latin. Important principles of grammar and the elements of syntax are illustrated in the graded passages given.

COUNSELS TO PREACHERS.—This is the title of a little brochure containing extracts from the charges of the late Bishop Medley. It has a preface by the Rev. J. de-Soyres, and is printed by E. G. Nelson & Co., St. John. It might have had for its title, counsels to teachers as well as preachers, as the extract by a correspondent in another column may show. No one can read the earnest words of this eminent preacher without catching some of his earnest spirit.

BOOKS AND WRITERS OF NEW BRUNSWICK, by W. G. McFarlane, A. B., 165 Princess Street, St. John, N. B. Paper; price 50 cents, postage free. Mr. McFarlane has done excellent service in collecting and presenting to the public in such a convenient form what is known of New Brunswick writers. The book has cost much labor and research on the part of the author, and Mr. McFarlane is to be congratulated on the completeness of his work.

FOUR YEARS OF NOVEL READING, by Richard G. Moulton, M. A., Ph. D., Professor of English literature in the University of Chicago. Price 50 cents. Publishers, D. C. Heath & Co., Boston. This is an account of an experiment made by the Backworth Classical Novel-Reading Union, and the results that are summed up are of a most interesting character.

PLATO'S CRITO, and part of the PHÆDO, with introduction and notes by Chas. Haines Keene, M. A. Pp. 127; price 2s. 6d. Publishers, Macmillan & Co., London and New York. The special features of this little book of the "Elementary Classics" series are the fulness of the notes and the excellence of the print and binding.

HOMER'S ODYSSEY, Book VI. Edited for the use of schools by Chas. W. Bain, University School, Petersburg, Pa. Publishers, Ginn & Co., Boston. This is a convenient edition for students in the "School Classics" series, with introduction, vocabulary and notes. The notes are especially excellent, full of parallel passages and historical allusions.

THE HAMILTON DECLAMATION QUARTERLY, Vol. I, No. 1. April, 1895. Published by C. W. Bardeen, Syracuse, N. Y. This is made up of a series of passages for declamation, preceded by an introduction, which gives some valuable hints for readers.

LAMB'S ESSAYS OF ELIA, edited, with introduction and notes, by N. L. Hallward, M. A. (Cantab.), and S. C. Hill, B. A., B. Sc. (Lond.), pages 370; Price 3s. Publishers, Macmillan & Co., London and New York. The essays of Elia are delicious bits of wit, humor and fun combined. They will never grow old with those who can intelligently appreciate the real article, as distinguished from the many spurious imitations that too often pass for wit and humor in these days. The editors, in their admirable introduction, give us an insight to Lamb's inner life, with its joys and sorrows, which he bore with philosophic indifference. The "Essays," in their new dress, with what the editors have done to illustrate their quaintness and interest, will be none the less welcome than the well-worn pages that have grown more and more dear the oftener they have been read.

OVID'S TRISTIA, Book III. Edited with introduction, vocabulary and notes by E. S. Schuckburgh, M. A., late Fellow of Emmanuel College, Cambridge. Price 1s. 6d. Publishers, Macmillan & Co., London and New York. This little work, published in the "Elementary Classics" series, is well printed, excellent in detail, and convenient for students.

TENNYSON'S LANCELOT AND ELAINE, by F. J. Rowe, M. A., professor of English Literature, Presidency College, Calcutta; price 2s. 6d. Publishers, Macmillan & Co., London and N. Y. In the introduction to these poems there is a fine analysis of Tennyson's poetry, with a sympathetic estimate of him as a writer and man.

HAND BOOK OF BIRDS OF EASTERN NORTH AMERICA, by Frank M. Chapman, cloth, pp. 421; Price \$3.00. (Pocket edition in flexible covers, 83.50.) Publishers, D. Appleton & Co., New York. The bird lessons which have from time to time appeared in the REVIEW have awakened a great interest among teachers in this subject, and there have been numerous enquiries as to the best text on birds. Suitable works have been so expensive that they were within the reach of comparatively few. The new hand book by Mr. Chapman will supply a long-felt want. It is furnished with keys to the species, and descriptions of their plumage, nests, and eggs, their distribution and migrations, and a brief account of their haunts and habits, with introductory chapters on the study of ornithology, how to identify birds, and how to collect and preserve birds, their nests and eggs. The book is illustrated with twenty full page plates in colors, and upwards of one hundred and fifty cuts in the text. It is brightened throughout with pleasant description, invaluable for the amateur, since all needless technicalities are avoided, and the problem of identification is reduced to its simplest terms. The book treats of all the birds, some five hundred and forty in number, found east of the Mississippi river, and from the Gulf of Mexico to the Arctic Ocean. It cannot fail to prove a great boon to the student of birds, and an incentive to others to begin this attractive branch of science.

BOOKS RECEIVED.

WENTWORTH'S MENTAL ARITHMETIC. Ginn & Co., Publishers.

THE EDUCATIONAL IDEAL, by J. P. Munro. Published by D. C. Heath & Co., Boston.

MILTON'S TRACTATE ON EDUCATION. Published by Macmillan & Co., London.

ALGEBRA FOR BEGINNERS, by H. S. Hall and S. R. Knight. Revised and adapted to American schools by Frank L. Sevenoak, A. M., M. D. Published by Macmillan & Co., New York and London.

The August Magazines.

The remarkable series of papers on Mars, by Percival Lowell, in the *Atlantic Monthly*, have won deserved attention, not only on account of their astronomical interest, but also because of their literary excellence. No. IV., for August, is on the "Oases," and tries to answer the question: Is Mars inhabited, and if so, by what kind

of people? The August number of *Popular Science Monthly* is an excellent educational number. Prof. E. L. Richards sets forth the importance of the physical element of education, and Dr. John Ferguson writes on the nervous system and education. The element Argon—the new constituent of the air—is also treated by Prof. Stoddard. Dr. J. M. Rice has written for the August number of *The Forum* a notable article entitled, "Do our Teachers Teach?" Dr. Rice contends that the greatest fault of our schools lies in the professional weakness of our teachers, who are not properly trained, and he recommends, among other remedies, the substitution of the teacher for the text book. In the *Deliberator* for August (Price \$1.00 a year, 15 cents for single numbers), is an interesting description of the Ontario Ladies' College, Whitby, and the popular Kindergarten series is continued. Published at Toronto. The mid summer number of the *Cosmopolitan* magazine continues the life of Napoleon, and has an excellent table of contents besides. The *Cosmopolitan* has been reduced to the very low price of ten cents a number. The idea that ten cents for the *Cosmopolitan* means inferiority from a literary point of view is dispelled by the appearance in this number of such writers as Sir Lewis Morris, Sir Edwin Arnold, Edgar Fawcett, Tabb, W. Clark Russell, Lang, Sargey, Zangwill, Agnes Repplier, and others.

St. John County Teachers' Institute.

The seventeenth meeting of the St. John County Teachers' Institute will be held in the Assembly Hall of the Centennial School, St. John, N. B., on Thursday and Friday, September 26 and 27, 1895.

PROGRAMME.

FIRST SESSION—THURSDAY, 10 A. M.

Enrolment and Address by the President. Report of the Secretary-Treasurer. Short Papers on "Moral Teaching," by Mr. John McKinnon, and the Misses Iva Yerna, Annie Hea and Louise D'Orsay. Discussion.

SECOND SESSION—THURSDAY, 2 P. M.

Practical Lessons. "Reading," Grade II, by Miss Elizabeth Beatty. "Word Building," Grade I, by Miss Kate Lawlor. "Geography," Grade VI, by M. D. Brown. Discussion.

THIRD SESSION—FRIDAY, 9 A. M.

Institute to divide into Sections. "Short Papers and Practical Lessons in Writing." Section A, Grades VI, VII, VIII, by the Misses Emma Colwell and Amy Iddles. Section B, Grades III, IV, V, by the Misses Ottie L. Stewart, and E. Enslow. Section C, Grades I and II, by Miss Harriett D. Gregg. Discussion. Practical Lesson on "Plant Life," Grade IV, by Mr. John Brittain. Discussion.

FOURTH SESSION—FRIDAY, 2 P. M.

Practical Lesson on "Minerals," Grade VI, by Mr. John Brittain. Discussion. Election of Officers. Miscellaneous Work. Adjourn.

MALCOLM D. BROWN,
JOSEPH HARRINGTON, *President*,
Sec. Treas.