

# The Educational Review.

Devoted to Advanced Methods of Education and General Culture.

PUBLISHED MONTHLY.

ST. JOHN, N. B., JANUARY, 1888.

VOL. I. No. 8.

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**SUBSCRIPTION PRICE:**  
Twelve Numbers, . . . . . \$1.00  
Single Copies, . . . . . 10 cents

Subscriptions payable in advance. Send money by money order, or by bank bill in a registered letter. All remittances acknowledged by postal card. Address all business communications and send subscriptions to EDUCATIONAL REVIEW, St. John, N. B.  
The REVIEW is issued from the office of Barnes & Co., St. John, to whom subscriptions may be paid if convenient.

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## EDITORIAL NOTES.

IN HIS hints to the teachers of his district, Inspector Lay of Amherst, says: Resolve to subscribe for the "EDUCATIONAL REVIEW" for 1888.

THE Cleveland (Ohio) Board of Education is considering the question of pensioning teachers who have been in the schools for twenty consecutive years.

WE have received late circulars from Professor Ward's "Natural Science Establishment" at Rochester, New York. Pictou Academy has procured a very finely mounted human skeleton from this mammoth establishment.

THE Teachers' Association of District No. 10, Nova Scotia, endorsed the EDUCATIONAL REVIEW by a most hearty, unanimous vote: At the present rate every teacher in the counties of Cumberland and Colchester will soon be supporters of the REVIEW. We hope to be able to make it still more useful and satisfactory to our patrons.

THERE is an excellent prospect for the New Brunswick Summer School of Science for this year. The executive committee of the Educational Institute extended a cordial support to the proposal at its recent meeting, and appointed a committee to make the necessary arrangements for carrying on the school. The names of the committee are: G. U. Hay, W. J. Wilson, H. C. Creed, Philip Cox, John Britain. Notice will be given in an early number of the REVIEW of the time and place of meeting, the programme, and names of instructors.

TEACHERS of Grammar and Superior Schools throughout New Brunswick, will be interested in knowing that the Board of Education has authorized the adoption of the courses of study published in the October and November numbers of the REVIEW, until the close of the present term, or until such time as a course of instruction shall be prescribed. The Executive Committee of the Educational Institute appointed Inspector Oakes, G. R. Parkin, M. A., Philip Cox, M. A., W. B. Jonah and S. D. Alexander a committee to revise these courses for final adoption by the Board of Education.

THE desire for more systematic instruction in Natural Science in New Brunswick is becoming daily more and more marked. The Summer School will soon become a permanent organization; Dr. Bailey's book on Natural Science is stimulating teachers to read and observe the book of nature; and the band of teachers in St. John who are devoting their time this winter to the special study of natural history, are evidences of this desire. But if a wider and more lasting stimulus is to be given to this study, the Normal School must foster it. To begin: Our Normal School is not provided with a museum worthy of the name. In geology there is no adequate collection; in mineralogy there is a small but good collection; in botany the collection is in sad need of arrangement; in zoology there is nothing. Now a little united effort among the teachers of the Province, and especially among the students of our Summer School, would soon change this state of things.

A TEACHER has found the following plan in teaching chemistry to work well: In conducting the experiment (no teaching is effective in chemistry without careful experiment) let the class prepare the apparatus and assist as far as possible; let them write out for the following week an account of the experiment, the tests, results, etc., being careful to exact from the pupils only what came under their own observation. By this plan chemistry may be taught thoroughly, and a stimulus is thereby given to composition by providing a subject on which pupils will be eager to express themselves, and they will do it with a little practice in excellent language. If the plan here outlined were made more general, and other studies made to do duty as subjects for composition, writing and spelling exercises, we would have fewer complaints of "too many studies."

M. INSPECTOR BOUDREAU, acting under the direction of Chief Superintendent Crocket, has addressed a circular letter to his French co-laborers, calling upon them to avail themselves to a greater extent of the advantages prescribed by the New Brunswick Normal School. The call is an opportune one. The advantages presented to the French student in the department so efficiently presided over by M. Belliveau at Fredericton, should be used to a greater extent than they are at present. The example presented by a people, who, under great difficulties, are aiming to preserve and encourage the study of their mother tongue, is worthy of admiration. Such journals as the *Moniteur Acadien*, *Le Courrier des Provinces Maritimes*, *L'Evangeline*, are worthy exponents of the spirit that seeks to preserve the French language and advance education throughout these Provinces.

"How do you like 'Among the Constellations?'" we asked a reader the other day. "I haven't read the articles, I don't know anything about astronomy. But I must. What book would you recommend?" Now, reader, if you don't know anything about the stars or astronomy, read the articles. They are written just for those people. If you *do* know anything about the subject, *don't* read them. Save your time. You can begin with any of them. It is not astronomy; it is more elementary—simply uranography, the geography of the heavens, and only elementary at that. Even when there is a mathematical disquisition, we never intend to wander beyond the elementary mathematics of grade B or C. It will take but a few minutes each month to compare our notes with the sky. In the course of a year or two, without any text-book, the leading features of the

starry firmament may in this way become as familiar as the outlines of terrestrial geography. And you will have your reward in a new and ever present source of interest opened up for enjoyment.

It is proposed to wind up the affairs of the St. John Mechanics' Institute, and sell the building with library and museum. It is hinted that the Board of School Trustees may become owners of the property, the price being a nominal one. If so, there would be available for school purposes—an assembly hall capable of seating over a thousand persons, offices for the Board of Trustees, several school-rooms, a library that has in it works that would form the nucleus of a valuable educational library, a museum which might be used for school purposes or be handed over to the N. B. Natural History Society to form a provincial museum.

The Institute has been in existence fifty years. The design of its founders was to encourage technical and industrial education. That was lost sight of long ago. To use the property for educational purposes at the beginning of the second half of the century seems to be reverting to the original design; and if education of a technical and scientific character could receive encouragement within its walls, so much the better.

WE have had the pleasure of looking at a note book, of one of the readers of the REVIEW, in which ink sketches of the insects figured in the lessons of Ferndale School were made, accompanied with short descriptive notes. This young lady had never received instruction in drawing, but the simple and direct attempt to copy these forms developed a remarkable degree of accuracy in the sketches, while it also left so vivid a picture in the mind as to enable her to identify the natural objects without hesitation. We have also observed the barest outlines of some of these figures on the blackboard create a wonderful interest in the subject of drawing. Only a few lines of chalk, and from the black surface there rises in apparent relief, a winged butterfly. We strongly recommend every teacher, whether he has received instruction in drawing or not, to follow this course. Sketch in outline every figure in the REVIEW as it comes out. At the end of a year or two, you will then be surprised to find that you can, with no greater difficulty, make a fair outline sketch of a new object from nature. And in the meantime a great many facts of form will be pleasantly assimilated with but little consciousness of effort. Never mind the shading lines. Reproduce outlines, and outlines only. When this can be done truly, you are an artist.

**SUBJECTS OF STUDY.**

The letter of "X." in the December REVIEW has, we hope, been carefully read. It was the plea of a practical teacher who sees, in the multitude of subjects required to be taught in our schools, a source of educational weakness.

Our school courses, it is claimed, are weighted down with subjects, and others are knocking at the door for admission. While some few pupils in each school may be able to acquire a pretty complete knowledge of the subjects of these courses, the great majority of pupils fail in the attempt, give up the contest, and relapse into carelessness and indifference, while the worry and discouragement incident to the attempt to "get up everything in the course," paralyze the energies of both teacher and pupil. It is of paramount importance to education to enquire how far the complaints of our correspondent "X." and others are true.

Have we too many subjects on our school courses? or do examiners and teachers make the mistake of expecting every subject laid down in a course to be taught with too great fulness, instead of having its principles and salient features carefully discriminated and intelligently taught? In answer to the first,—there is no doubt that the tendency is to crowd too many subjects in a course of study. Over zealous persons, estimating too often the importance of a subject from their own standpoint, think that the intellectual pyramid would be complete if only that particular subject should be introduced into the curriculum, and forthwith they devote their energies to that object, too often with success. There are many such subjects that might be taught incidentally, or in connection with other lessons.

In regard to the second point. The State pays for and has a right to expect a sound and thorough training, in the elementary schools, in the three R's. No smattering of a dozen or a score of subjects can make up for the want of this training, either as a mental equipment for everyday life or as a preliminary step to higher intellectual flights. The wise teacher will discriminate, not only in an overloaded curriculum, but in each subject of it, and teach its leading features thoroughly, and incidentally what is of less importance. But how, we hear some asking, can teachers do this when the examiner requires the course, the whole course, and nothing but the course, with all the bearings of each subject thereof? With the possession of good sense and a nice judgment an examiner will not fall into such an error. But for fear that every examiner who reads this may complacently suppose that these qualities belong, in an

especial degree to him, it may be said that quite another species of examiner is "abroad;" and a strong protest should be entered against the absurd and meaningless questions that are too often put forth as tests (?) of pupils' efficiency both in the elementary and higher grades, by examiners who appear to think that it is their special function to puzzle and confuse the pupil, and who appear to have forgotten that they themselves once climbed the difficult path of knowledge. Our correspondent "X." very properly placed a great deal of the responsibility of the superficial work done in our schools upon the shoulders of these examiners.

There are other points in the letter of our correspondent (whom we would be glad to hear from again, and designate by a "known quantity") which we would like to touch upon, and which we may refer to in a future issue.

**CANADIAN TEA.**

The *Halifax Chronicle*, last month, editorially referred to the interest manifested at present in the Labrador tea plant. Mr. James Taylor, of Winnipeg, brought the matter before the Schultz Committee at Ottawa, and not only the committee, but the public, appear to be impressed with the idea that the subject may possibly be of industrial importance. The editorial remarks drew out correspondence which showed that the plant is common in Nova Scotia and New Brunswick. Mr. J. J. Fox, of Halifax, who has seen it used in the Magdalen Islands, and has tried it himself, describes it as "astringent and possessing a narcotic, soothing and exhilarating quality. The infusion has an agreeable aromatic and somewhat astringent taste, its flavor being improved by boiling in milk, and after a few days' use is found to be quite palatable. Formerly these plants were secretly used by fraudulent brewers in the north of Europe, to give headiness to beer. Having used the Labrador tea as a beverage for some months, I can recommend it to those desirous of testing its qualities, and am confident that after using it for a short time its flavor will be found very agreeable and more conducive to health than the common and often adulterated Chinese tea imported for sale."

A writer from Baddeck says: "Cape Breton alone grows enough of this tea to supply the whole Dominion with a delightful beverage at a very moderate figure." It was generally used by the Micmac Indians and the earlier settlers in this island.

The *Colchester Sun* says: "This plant is found almost everywhere in our forests, and when the leaves

are properly steeped it makes a liquid, which, with sugar and milk in proper proportions, has a flavor that cannot be described, and which, when once tasted, will never be sought for again."

This latter is a valuable remark, as it emphasizes the danger of coming to a conclusion from simply "once tasting." Imagine the gustatory properties of half a pound of China tea cooked like a vegetable in a sauce-pan, a real historical experience in Nova Scotia on its first introduction in at least one settlement—and the soundness of the verdict on its desirability as a beverage from such a crude experiment!

An intelligent series of experiments should be made with the infusions. And more than that. Experiments should be made on the best time for collecting the leaves, and on their manipulation and treatment to develop desirable qualities.

There are three species of this plant—*Ledum*—in Canada. There is the "glandular *Ledum*" (*Ledum glandulosum*, Nutt.) of the Rocky Mountains and Southern British Columbia. The "marsh *Ledum*," (*Ledum palustre*, Linn.) which is the narrow leaved and arctic form, common also to the north of Europe and Asia. And the "broad leaved *Ledum*," (*Ledum latifolium*, Ait.) the Labrador tea proper. It belongs to the Heath Family, the *Ericaceæ*, and is a low shrub, with oblong leaves, their edges rolled back, and their lower surface covered with a fine, dense, rusty colored wool. The flowers are white, in terminal umbel like clusters. The foliage, when bruised, has a fragrant odor. The surest distinction between *L. latifolium* and the narrow leaved *L. palustre*, is that the latter has uniformly ten stamens and oval pods, while the former has commonly five stamens (never ten) and oblong pods.

Infusions of *L. palustre* are stated in the United States dispensatory to be considered as efficacious in a number of cutaneous affections. *L. latifolium* is considered to be pectoral and tonic. The indications are that Labrador tea may tend to beautify the skin, strengthen the lungs, and invigorate the assimilative functions. It is said that during the American war of independence, Labrador tea was used to some extent in the United States. If they continued emptying all the foreign teas into their harbors as the Bostonians commenced, the Americans to-day might be a better looking and stronger people. Perhaps so, perhaps not.

However, when the probability of securing a more healthy general beverage, and at the same time, developing a new industry within our country, is indicated, both science and patriotism suggest a

patient and complete investigation of the facts. Our teachers can do their share by giving an *object lesson* of fifteen or twenty minutes on the plant in every locality in which it may be found. We have had good specimens of it from various quarters of the country for identification during the past two or three weeks. A hunt for the Labrador tea plant in January will be as good an athletic exercise for the boys as "Hare and Hounds," and probably just as interesting for the first occasion. The scientific editor will always be glad to get and store up well authenticated facts and experiments in this connection.

#### A WORK ON ECHINODERMS.

We are glad to announce that W. F. Ganong, A. B., has in course of preparation a work on the Echinoderms (star-fishes) of our coast. Mr. Ganong, in addition to a practical study and observation of these forms along our coast, extending over several years, has made a special study of them in connection with his zoological course at Cambridge. The work is especially designed for students and teachers. The subject will be treated under the following heads:

1st, An analytical key which will enable any one to identify an Echinoderm of our coast; 2nd, A brief description of each, together with an account of its habits of life, habitat, etc.; 3rd, A cut to illustrate each of the genera; 4th, A brief account of its life history so far as known; 5th, A list of known localities, (a) showing its distribution on the surface of the globe, (b) of places in New Brunswick where it is found, in order that students may have their interest aroused by adding new localities. These are some of the prominent points which Mr. Ganong will take up. In addition to these there will be found in the work simple experiments to interest classes, which will be illustrated; how and where to collect, and how to prepare specimens for class work, with interesting particulars of their habits and surroundings.

Our teachers and students, especially those of our summer schools, will be glad to know that Mr. Ganong has this work in view. It will be published in a cheap and neat form, and may serve as a manual to zoologists, not only of New Brunswick, but also of the other Maritime Provinces, and Maine. Mr. Ganong's growing reputation as a naturalist, and the happy faculty he has of making every subject clear and interesting to those who come within range of his teaching, will cause this little book to be looked forward to with interest.

This, we understand, is to be the first number of a series of monographs on New Brunswick zoology, which will be looked forward to with interest by students.

**SCHOOL SAVINGS' BANKS.**

This old-world institution has been introduced into the public schools of Dartmouth, Nova Scotia. The Town Council has authorized a neat little "pass book" for each depositor, containing the "Rules of the Dartmouth School Bank," and the history of and reasons for the trial of the system. Principal Congdon, who, we presume, is more than any other man responsible for the experiment, says: "So far it has worked admirably. We have about 450 depositors. Took in \$50.22 first week; and last Monday (12th Dec.,) although our schools were very thin on account of the wet weather, we took in \$43.78. I think the whole scheme good. Our teachers do the work, which is not heavy, after hours, and are very much interested in it. We find it has produced good results so far." Our readers, will, no doubt, be interested in the result of this trial; and we think we can do nothing better than publish the admirable statement of the Dartmouth school committee, and the rules of the bank in our next number. We shall then be ready to learn the measure of success attending the enterprising experiment, and to estimate its value for other sections.

**INTER-PROVINCIAL CONVENTION.**

The educational associations of Nova Scotia, New Brunswick and P. E. Island have all declared for an Inter-provincial conference of educationists, to be held in St. John, in the third week of July next. In New Brunswick no Provincial educational institute will be held this year. We have not heard what action has been taken, if any, in regard to a meeting of the associations of Nova Scotia and P. E. Island for the present year, but it is probable that the general convention will take the place of a provincial association.

A convention of the teachers of these Provinces will be looked forward to with the greatest interest. If nothing more be accomplished than to make those engaged in educational work better acquainted with each other—the REVIEW has already broken the ice—the results will be important. But there are questions that are common to the educationists of these Provinces—problems pertaining to the future of our schools—that should be discussed by the best minds engaged in the work.

The committee engaged in making the final arrangements will, it is hoped, leave nothing undone to make the meeting successful. At a meeting of the Nova Scotian Association executive committee, on the 4th inst., Prof. F. H. Eaton of the Normal School was appointed, on behalf of that body, to make full and

final arrangements. Principal Mullin, G. U. Hay, and Inspector Oakes were appointed by the executive committee of the New Brunswick Institute, while Supt. Montgomery and Principal Anderson are the committee of the P. E. Island Association. A meeting of the joint committee will take place at an early day.

**SPELLING REFORM.**

The Dalhousie College *Gazette* is leading in the spelling reform movement by reporting the proceedings of the "Sodales" Society according to the twenty-four rules of the American and English Philological Associations. They have the highest authority of scholarship in the English world in their favor. But then we must remember that the greatest English and American philologists couldn't take a Grade B diploma in Nova Scotia if they followed their own recommendations. Keep on, however, *Gazette*. The water must rise before the dam gives way. The stream of progress never runs free.

The *Academy*, Vol. III., No. 1 (December), takes ground in favor of phonetic reform in spelling and phonographic reform in writing.

The *University Monthly*, of the University of New Brunswick, looks approvingly in the direction of reform.

The author of the "Hand-book of Volapuk," just published in New York, London and Chicago, says in his preface: "Upon the recommendation of the American Philological Association and of the London Philological Society, I have dropped the final *e*, misleading and unhistorical, from such words as 'infinitiv,' 'feminin,' etc.'

**TEACHERS' ASSOCIATION.**

The district association of teachers in Mr. Lay's inspectorate, Nova Scotia, held their annual meeting at Amherst on the 22nd and 23rd December. About seventy teachers, representing every part of the district, were present.

The work of the first day commenced at 10 A. M., by an address from Inspector Lay. Then followed a paper by Mr. J. W. H. King, on the "Utility of Science;" by Principal Freeman, of the Amherst Academy, on the "Responsibility of the Teacher;" a primary school lesson, by Miss McGregor, of the Amherst Academy; a lesson on division, by Miss Byers, of New Annan; and an instructive paper by Principal Calkin, of the Normal School, advancing several practical suggestions on school work.

In the evening Mr. and Mrs. Lay entertained the Association.

The second day's work consisted of some routine business and the following exercises: A lesson on "Dew," by Miss Travis; on the "Tonic-Sol-Fa" system, by Mr. Byers, of Tatamagouche; and a paper, "Progress, the Teacher's Watchword," by Mr. Ruggles, of Acadia Mines. Mr. Tuttle, of Wallace; Mr. McKenna and Miss Bell also took part in the exercises. The Association was one of the most profitable ever held, and the teachers are quite enthusiastic over the tact and energy exhibited by their new inspector in stimulating educational activity. K.

#### SCHOOLS OF SCIENCE.

A number of the teachers of St. John, Portland and vicinity, have availed themselves of the course of elementary lectures in natural science—which are being given this winter under the auspices of the New Brunswick Natural History Society. The plan of these lectures is essentially the same as that adopted by the Summer School of Science in July last. Mr. W. F. Best, chemist, has given a course of five elementary lectures in chemistry, the principal object being to show how teachers may conduct experiments cheaply and successfully before their classes. Mr. G. F. Matthew, M. A., has charge of the class at present, and has undertaken a course in mineralogy, with the tests for identifying the common minerals of the Province. A course of five lectures, each in zoology and botany will carry the work on until the middle of April.

The Halifax Teachers' Association has entered upon a professional course this winter, as they did last winter. Supervisor McKay occupied the chair at the opening meeting, and laid great stress in his address on free-hand drawing, physical training, and singing. The association has formed a class for instruction in drawing by Mr. Harvey of the Victoria School of Art. In addition, a class in natural science will be conducted on the lines of study laid down by the Summer School of Science for 1888. This class meets every Wednesday afternoon for practical work. Chemistry, physics and mineralogy are the first subjects taken up.

The Victoria School of Art and Design, Halifax, has been a grand success. The following letter from the Secretary, Supervisor McKay, was read before the city council December 27th:

I have been asked by the directors of the Victoria School of Art and Design to inform you that they have established an art school, which was opened on the 31st of last October, that they are working under the constitution which recently received your approval, and that they are carrying out the published programme. They, therefore, request the pay-

ment to their treasurer of the amount voted by your honorable body, for the establishment of an art school as a jubilee memorial. In doing so they have much pleasure in being able to report the success which has attended their efforts, as evidenced by the following facts: (1) There are one hundred and eighty-five pupils enrolled, not including a juvenile class now in operation, and a teachers' class to be opened immediately. (2) Of these so enrolled 105 are evening pupils, of whom 50 are free. (3) The class in mechanical drawing numbers 35, in architectural drawing, 25, in free-hand drawing 57, in model drawing 50. (4) The fees already paid in (mostly from the day classes) amount to \$700. It is estimated that the amount for the year will not fall short of \$1,500. (5) The sum of \$5,000 has been invested in good securities. Over another thousand has been subscribed. (6) The teaching staff consists of a head master and three assistants. (7) The school has fairly good rooms over the Union Bank and in Stairs' buildings at a total rental of \$387 per year. No other art school in the Dominion has met with such gratifying success so far.

#### BUBBLES AFLOAT.

The Duke of Argyle's great "conspiracy of silence."

The Star of Bethlehem in the east on fine December mornings. We hope our religious exchanges will not be found before the shrine of Venus under the impression that they are paying attention to the Star of Bethlehem. Read the REVIEW and there is no fear of it.

A valiant Prince Edward Island doctor skilfully cut into the stomach of a fellow countryman, to capture a reptile which was suspected to have taken possession. Elaborate precautions were taken against its possible retreat into the lower intestines. The plucky doctor was completely foiled, however, in the attempted capture. By an unexpected strategic movement to the rear, on the first admission of light, the lively reptile eluded the nip of the surgical forceps, and after a series of maddening plunges, which were evidently feints, it dashed up the œsophagus and made good its escape through the mouth. We have often heard of medical men seeing snakes; and we extremely regret that on an occasion when the capture of one appeared to be all but certain, the hopes of the scientific world for ages should again be doomed to disappointment.

We have received from Geo. S. Milligan, Esq., LL. D., the report of the public schools of Newfoundland, under the Methodist Board, for the year ending Dec. 31st, 1886. We shall refer to some of its contents in detail in a future issue.

FERNDALE SCHOOL.

No. VIII.—THE OX GAD-FLY, (*Oestrus bovis*—Latr.)

“ Est lucos Silari circa ilicibusque virentem  
Plurimus Alburnum volitans, cui nomen *asilo*  
Romanum est, *astrum* Graii vertere vocantes;  
Asper, acerba sonans; quo tota exterrita silvis  
Diffugiunt armenta, furit mugitibus æther  
Concussus, silvæque et sicci ripa Tanagri.  
Hoc quondam monstro horribiles exercuit iras  
Inachis Juno pestem meditata juvenca.”

*Georgicon, Lib. iii., 146-153.*

T. This was written at least thirty years before Christ was born, by the Latin poet Virgil. The grand old poet seems to have had his eyes wider open than many of our little dreaming poets of to-day. Jack, did your brother, who is attending the Academy, translate for us what Virgil said? He told me he would send it with you to-day.

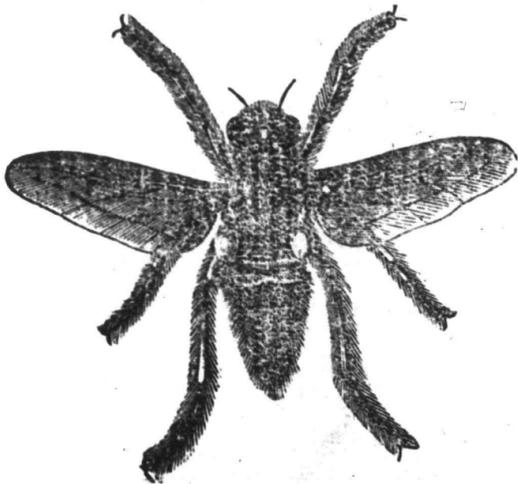
JACK. Yes, here it is. He said he thought he could make English poetry as good as Virgil, any way.

T. Well, if you please, let us hear it.

JACK. (Reading):

“ By the grove of Silarus, Italian stream,  
And Alburnus the mountain with oaks evergreen,  
There fly in the noonday like beams of the sun  
Fierce insects with stings and an angry hum.  
With Romans *Asilus* it bears for a name,  
With Greeks it is *Oestrus*, but stings all the same.  
When Jupiter changed fair Io to a cow,  
Mad Juno with these carried on the old row.  
When the angry hiss of their arrowlike flight  
Announces their presence, the cattle take fright;  
They dash through the thickets and bellow in pain  
Till they shake dry Tanagrus, the wood, mount and plain.”

T. Well Jack, you can tell your brother that as to the *English* he has the advantage of Virgil, but as to the *poetry*, it is *vice versa* I am afraid. You know



(Magnified.)

THE OX BOT-FLY (OR GAD-FLY.)

that much Latin. Now, here is this fly enlarged.

For over 2,000 years it has been tormenting cattle and has followed them to every part of the world. Have any of you seen it?

JACK. Yes. All at once on a hot summer day, as soon as the cattle hear the buzz of the fly, they shake their heads, toss their horns, stiffen their tails out straight in the air, and gallop about bellowing like mad.

T. Why, Jack, your description puts Virgil's in the shade. But we have a specimen in our collection, caught by some deft wielder of the net. Let us compare it with our enlarged drawing. How long is it?

CHORUS. Nearly half an inch.

T. Its body is—

CHORUS. Very hairy.

T. It belongs to the order—

CHORUS. Diptera, because it has only two wings.

T. Color of the wings?

CHORUS. Nearly transparent, smoky brown.

T. The hair about its face?

CHORUS. Yellowish.

T. The color of the tips of the abdomen?

CHORUS. Orange.

T. Of the middle of the abdomen?

CHORUS. Black.

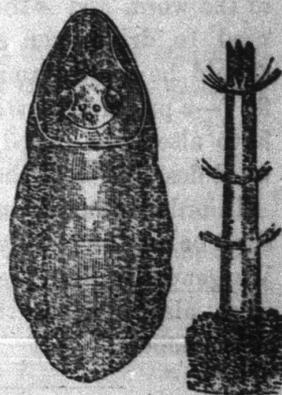
T. Of the portion of the abdomen next the thorax or middle division of the insect?

CHORUS. Greyish white.

T. The thorax is not hairy, but is black—

CHORUS. With white and yellow bands.

T. This fly is found from June to September, endeavoring to place its eggs on the back of cattle. At the end of its abdomen is something looking like a sting; but it is really an ovipositor, that is, an egg placer. If it were magnified under the microscope, it would appear to be a very tiny tube of four joints which close into one another like the tubes of a telescope. Here it is pictured at the right. At the end of each joint is a minute circle of fine hairs. The end joint makes a very small puncture in the skin of the ox and leaves a very minute egg in it. This egg is soon hatched and the small maggot—the larva of the fly—makes its way beneath the skin where it scoops out a little dwelling place for itself during the winter. Here it is sure to be warm enough, and to have abundant nourishment.



Imago issuing from cocoon and ovipositor (magnified.)

TOM. There are lots of lumps on the backs of our cows; they call them *warbles*. They will be bigger in the spring; and sometimes they can squeeze big, ugly, soft grubs out of them. Are they caused by this gad-fly?

T. They are the larval stage of the gad-fly.

JIM. And there are holes in some of the hides coming to the tannery caused by the warbles.

T. Yes. And it is provoking to think that these flies specially hanker after and torment the most vigorous of the herd.

SCHOLAR. How can the larvæ get out of the warbles?

T. By June or July, when they are full grown, they enlarge the opening through the hide of the animal by constant gentle pressure, until at last they come out backwards and roll down to the ground. The skin of the larva then hardens, turns black, and changes into a kind of cocoon. This is the pupa stage in which it remains for about one month. The imago or perfect fly then breaks forth from out of its cocoon, as is shown in our cut to the left of the ovipositor.

SCHOLAR. Why is it called a bot-fly?

T. The word "bot" was probably the same as the original of our word "bite." There is one kind of these larvæ found clinging to the stomach of the horse, appearing as if *biting* its coat. There is one also which is destructive to sheep. The larvæ *bites* its way into the brain. In some parts of England there are people who yet say, "*they botte*" for "they bit." The bots, then, were grubs which appeared to live by *biting* living animals.

SCHOLAR. And why are they called gad-flies?

T. "Gad" is the old Anglo-Saxon word which meant a sharp point. For instance, an arrow point, a lance point, a sting, used to be called by the earliest Englishmen a "gad." "Goad" is the modern form of the word, and is the name of a sharp pointed stick used to drive oxen even yet by some people who should be more humane. A gad-fly was a "goad-fly"—a pricking or stinging fly. Some of these flies have also been called *Breeze* flies, from a very old word descriptive of the buzzing sound made by them.

In order to make our lessons connected, our next shall be on the gad-fly of the horse and of the sheep. We generally find the greatest scientific interest in what also involves the most important industrial consequences.

THE Maritime Province Experimental Farm has been located at Nappan, near Amherst, and will consist of 360 acres of fine land.

## AMONG THE CONSTELLATIONS.

No. V.—ORION.

"Seek him that maketh the seven stars and Orion, and turneth the shadow of death into the morning, and maketh the day dark with night; that calleth for the waters of the sea, and poureth them out upon the face of the earth; the Lord is his name."—AMOS v. viii.

"Which maketh the Bear, Orion and the Pleiades."—JON ix. 9.

"Canst thou bind the cluster of the Pleiades or loose the bands of Orion?"—JOB xxxviii. 31.

Well up in the southern sky during January nights is this most picturesque and most anciently named of all the constellations. As it swings slowly from the eastern to the western horizon, its position is also one of the most conspicuous. It reigns over our snow clad nights. Pope in his *Winter*, lines 85-87, does it too scant justice for our Canadian sky when he sings:

"But see, Orion sheds unwholesome dews;  
Arise, the Pines a noxious shade diffuse;  
Sharp Boreas blows, and Nature feels decay."

Four stars, forming a large, slightly oblique X with a belt of three stars across its centre, distinctly outline the constellation. The eastern upper star is Alpha, or *Betelgeuse* of the first magnitude; the western, Gamma or *Bellatrix* of the second magnitude. The western lower star is Beta or *Rigel* of the first magnitude; the eastern, Kappa of the second magnitude. *Betelgeuse* and *Bellatrix* are respectively near the right and left shoulders of Orion, and Kappa and *Rigel* mark approximately the position of the right and left foot.

The three stars in the centre indicating Orion's belt, are of the second magnitude and are named, beginning with the highest, as follows: Delta, Epsilon and Zeta. They are often called the "yard stick" in Canada. They have also received the names of Jacob's Staff, the Golden Yard of the Seaman, and the Three Kings of the Soothsayers.

Orion can be seen all over the world. Mythology speaks of him as a mighty hunter, and some go so far as to say that he represents Nimrod. Modern hero worship has more than once attempted to change this name. In England it was proposed to change it to Nelson. In 1807 the University of Leipsic actually resolved that all the stars forming the belt and sword of Orion should henceforth be known only by the name of Napoleon.

The sword of Orion is represented by three faint stars, of the fourth magnitude; hanging down below the middle of the belt. The central one of these, Theta, is in one of the finest nebulae of the heavens,

and is distinctly visible through an ordinary telescope or good opera glass.

There are two stars of the first magnitude in the constellation, four of the second magnitude, and five of the third magnitude. The naked eye can distinguish between 120 and 150; an average binocular over 2,000; while with a large telescope they become practically innumerable.

When Orion is in the south—near midnight—the constellation directly above it, or north and north-west of it is Taurus; northeast of it, Gemini; east of it, Monoceros; southeast of it, Canis Major; south of it, Lepus; west of it, Eridanus. The line through the three stars of its belt when produced upwards will pass a little below the red star Aldebaran, and into the Pleiades in Taurus; produced downwards, it will pass a little above Sirius in Canis Major, the brightest fixed star in the heavens.

“ Orion's belt from Taurus' eye  
Leads down to Sirius bright;  
His spreading shoulders guide you east,  
'Bove Procyon's pleasing light.”

#### THE PLANETS FOR JANUARY.

The morning sky will be resplendent this month with two of the most brilliant planets—Venus and Jupiter—and ruddy Mars. On the 2nd, Venus and Jupiter were in conjunction, Jupiter being south of the former only about four moon-breadths, and relatively moving westwardly. About the beginning of the month these two planets rise about three hours before the sun. At the end Venus rises a little later and Jupiter about an hour and a half earlier than at the beginning of the month; Mars will rise from six to seven hours earlier than the sun. He is in the constellation Virgo. Jupiter moves from Libra into Scorpio, being in close conjunction with Beta of Scorpio on the 24th on the south. Saturn will be morning star in Cancer until this date, when it is nearly opposite the sun, and is therefore seen at midnight south of the zenith. It then becomes an evening star.

The moon rises eclipsed on the 28th. The total phase ends at 8h. 9m. P. M. (60th meridian time). Last contact with shadow 9h. 9m. Last contact with penumbra 10h. 11m.

Eclipse of the sun, invisible in Atlantic provinces, February 11th.

There are several errors in the planetary phenomena of Belcher's Almanac for the month of January. They are probably due to careless proof-reading; but the number and importance of them are more than ordinary.

#### THE KINDERGARTEN AND THE PUBLIC SCHOOL.

E. J. James, Ph. D., Professor of Public Finance and Administrations, Wharton School of Finance and Economy, University of Pennsylvania, sums an address on the subject as follows:

1. That the three years preceding the school age are, for certain educational purposes, the most valuable years of the child's life.
2. That under our present system of public and private education, these years are, relatively speaking, wasted.
3. That this waste is just as general among the rich as among the poor, and is little less ruinous to the former than to the latter.
4. That it may be largely saved by the general introduction of some such institution as the kindergarten.
5. That such general introduction is only possible in the form of free kindergartens, established in connection with our public schools, in sufficient numbers to accommodate all children sent to them.
6. That the necessary outlay for such kindergartens would be amply repaid to society by the increased productiveness of the generation educated within them.
7. That owing to the economic condition of our society, which prevents the majority of our children from going to school beyond the tenth year, the only means of securing the minimum of education absolutely necessary to the welfare of our society lies in utilizing for educational purposes the three years preceding the school age, and the only institution which promises to do this is the kindergarten.
8. That the essential condition of success in this movement is a supply of properly trained teachers, which can be insured only by the establishment of an adequately equipped training school for kindergarten teachers.
9. That the first step towards this is the establishment of a kindergarten class in connection with the city normal school.

OUR public school education should not tend to wean our youth from labor and industrial avocations. On the other hand, it should aim at dignifying labor and stimulating thought for the improvement of industrial processes. This will not prevent the literary development of those with a literary genius, and it will also give them a sound substratum of intelligence—stimulating knowledge, which will add very greatly to the power of their special endowment.

For the REVIEW].

**LANGUAGE LESSONS.**

Some years ago it was taken for granted by many teachers that children knew nothing when they first entered the school-room, had no power of acquiring facts, and that the first and for some time the only thing they should learn was to read. Now we regard these small folk as interesting possibilities, endowed with a complete mind (though in a rudimentary state), and know that they have already begun the storing up of facts and ideas to which it is our business to add, while constantly seeking to develop two things—*thought* and its *expression*.

In order to furnish material for the former, and also to train the senses (that they may make discoveries for themselves) we give our primary scholars lessons upon all kinds of objects; likewise upon number, size, direction, form, color, etc. All of which, as well as every reading lesson implies, of course, training in language. But, since the aim of all our teaching is the development of thought—and language is, perhaps, as needful to thought as to its expression—it follows that children require a closer and more persistent training in language than these lessons afford.

This we endeavor to accomplish by means of language lessons on pictures, plants, animals and rocks; natural phenomena as hail, snow, rain; and physical features such as hills, valleys, rivers, etc.; while at the same time a small beginning is made in scientific study. Doubtless, many will smile at the idea of science in connection with a child of six or seven years; yet, experience has taught that at no later period of school-life will they enter into the study of nature (presented after a child-like fashion) with a keener zest, for they love animals, birds, and growing things, and delight in learning about them.

Nevertheless, while laying the foundation upon which geography, botany and zoology may in due time be reared, we must not lose ourselves in these; but, bearing in mind that the controlling subject at this period is the impression of thought, teach *language* from beginning to end of every lesson.

Though it is a difficult matter to lead young children to express their ideas clearly in the school-room, yet under the stimulus of some thought they desire to convey they will talk as freely as if at home, thus proving that it is not so much their limited *vocabularies* as self-consciousness that embarrasses them and hinders expression.

Hence, the first part of language work takes up what may, perhaps, be termed the *unconscious* side, where the child is so under the control of the thought that he is, in a measure, unaware of the means by which he expresses it.

The exercises at this stage are necessarily simple, and may be conducted in various ways. For example: Ask the class to tell the names of different kinds of birds; from the array of hands select the dullest pupil to give the first answer, which is quickly printed on the board, the next, and the next, until all the hands are down. Question until their small stock of knowledge concerning birds and their habits is exhausted, continuing to print the best answers. Next morning the children find the words and sentences neatly reprinted on the board, and copy them as *busy* work, while at a later period in the day they construct oral sentences, each containing one of the words.

After a similar plan, one may give lessons on animals, fishes and flowers. Still another form of language work calling for at least one original sentence from the children, is illustrated by the following:—Ask what day of the week it is, print the answer, then what kind of a day, what season of the year, and so on, printing the various descriptive words under the date as fast as given. (I find even the youngest child quite ready to talk about the weather). Have them read by the pupils. Next morning they copy the list, and in the afternoon print short stories containing the words, some of which are interesting weather reports.

When we have succeeded in getting the children to talk freely, we take up the second part of language work, during which they are trained in the use of new words, introduced to new idioms, led to make new combinations of sentences, and to describe accurately what they see. Action lessons are good training in the latter, while a *picture* may be used very successfully to familiarize them with new idioms such as, "this is," "here is," "he has," "is going," etc. When, by a few skilful questions, they have been led to use these words in describing the picture, the best sentences are printed on the board, to be utilized next day as busy work.

Again:—A story lesson may be given—its purpose being to arouse thought, and lead to its expression, as well as to *give* and teach the children to *use* new words. It should be made graphic by sketching the objects introduced, whenever practicable, while the new words are printed on the board instead of spoken. To illustrate: The teacher standing in front of the blackboard says, "I am going to tell you about an—" turning quickly to the board, she 'prints'; "animal," read the children; "that wears—" she prints; "horns," pronounce the children; "like that," she continues, rapidly sketching the horn of a moose, "called—" she says; then prints antlers; but not a hand is raised, not a voice is heard; no one knows the word.

Slowly she reprints the first syllable, the scholars

giving each letter its sound, then the last, and so the new word is pronounced.

She says, "I will print this word—what is it?" "antlers," reply the children; "at the top of the board, help the crayon to say it." They pronounce slowly as she prints. "Now, I will print it just at the—which side?" "Left, west;" they reply, "If you know what this word is you may tell me," and before the first syllable is printed they pronounce it. "Why," she says, "you got that word away from me."

Then she goes on. "These—" "antlers," chorus the little people, "are—" "solid;" they read; ("What does solid mean?" is the unexpected question, which, however, they are pretty certain to answer correctly), "and fall off late in the—" "winter," they say. "What is winter?" she asks. Having received the correct reply, she continues: "He is about the size of a—" prints. "Horse," declare the watchful children; "he" proceeds the teacher, "has—," prints; "slender legs and split hoofs!" interpolates the chorus. "He does not wear—a" "coat," they read, "like yours," facing about, and pointing to some little fellow, "nor is it like mine." "It is made of—" "clean short hair," they read; "and sometimes it is—" "red, and sometimes greyish," call out the class. "It is—" "a moose," they triumphantly declare.

Drawing rapidly as she talks, she questions them about the cow's horns, and soon completes her sketch, and a moose stands displayed upon the board. "This—" "moose," they read, "lived in a—" "forest," chorus the scholars. ("What is a forest!" she questions), "through which flowed a—" printing, "beautiful"—again no response, so this word must be taught after the fashion of the previous unknown word. Then comes the question, "What could it have been that flowed through a forest?" and the word river is added to the list.

"One—" she resumes, "pleasant day," they read, "two—" prints travellers,—no responsive voice this time; so another word is taught, and yet another, for "decided," the next word printed is also unknown; "to shorten their"—"journey," they read; "by following a—" "path through this forest," they announce.

And thus the story continues, during which they are led to fancy a herd of moose by the river side—some drinking, others ruminating, while the description of their rapid flight at the sound of a breaking branch shows their acute hearing and habit of getting up on the hind feet first.

At its close she says, "Who can tell me a nice story now about this animal?"

Every one seems eager to do so. "Well, you may think it over, perhaps you will dream about it to-night, and to-morrow I hope you will be ready to tell me all

about it. Who wants to do something else for me?" "Then you can ask your fathers and mothers what other animals have antlers."

(This request is made with the hope of interesting the parents in the school, and so stretching a thread of interest, however slender, between the school and home).

In the morning, the class carefully copies (with pencil, in exercise-book) the words gained from the lesson of the previous day.

In the afternoon they repeat the story, each trying how many words from the blackboard he can weave into his narrative.

Then each child is requested to give an original sentence (sometimes in the form of a question) containing at least one new word, which is thus added to his vocabulary.

The following day they will be invited to express in written language the ideas obtained from the story.

This second form of language work, viz., "talking with the pencil," should not follow *immediately* after a lesson, for fear that the children remember their phrases, and so fail to gain the greatest possible amount of language training.

CLARA A. ATKINSON.

Newcastle, N. B.

For the REVIEW.]

#### A YEAR'S EDUCATIONAL PROGRESS IN NEW BRUNSWICK.

Another year has gone, and, no doubt, has left its scars, but it has also scored its triumphs; and, we believe, not a few in the cause of education in this Province. The amount of good accomplished in this world is far in excess of the evil—each day, week and year, has its trials for the teacher, and also the satisfaction of some new thing begun, or real progress attained. Much good work is performed that never appears on the surface, and therefore appears unappreciated, but the painstaking and conscientious teacher has, as such, his own reward in the pleasure experienced in the faithful performance of his various duties, even if he is not rewarded in a more tangible way. But let us pause here. Have the salaries of teachers in this Province increased during the year? Perhaps not, on the whole. But it can be truthfully said that the most deserving teachers have obtained the highest salaries—that a first-class teacher has been better rewarded than a second-class teacher, and a second-class teacher than a third. Again, putting a teacher of one class against another of the same, it may confidently be asserted that the teacher who had the best reputation as such, was first engaged. Surely this argues the necessity of constant self-improvement, to enable us to climb the ladder of success. During

the past year, first-class teachers seldom failed to secure employment. Second-class teachers were always in demand. What shall I say of third-class teachers? There are too many of them, and their field of labor is rapidly narrowing in New Brunswick. Many third-class teachers are doing excellent work, but a teacher of this class who is content to stand still here, has not the requisite amount of ambition to properly qualify for an instructor. The excessive number of third-class teachers was produced, no doubt, by the short term system at the Normal school, and we have to note the lengthening of the term at that institution as one of the most progressive steps in the educational history for the year. We may express the hope that many will pass before any retrogression will take place in this particular. This is a guarantee for fewer low-class and unskilled teachers, and less competition and underbidding.

It cannot be denied that enthusiasm in educational matters has somewhat waned since the inception of the school law. This, perhaps, was to be expected, as novelty always excites attention; but the people of this Province are not by any means dead as to the advantages afforded by free schools, nor do they lack appreciation for well directed effort. A little revival in these matters is necessary, and none are so well situated to effect it as the teachers themselves. Instead of constantly bewailing the severity of our lot, and bringing on ourselves contempt by—as one newspaper styles it,—our constant “wail for cash,” let us set to work as in other professions to achieve success, and we cannot fail to claim its reward.

A very successful Institute has been held during the year in St. John, and no doubt these annual gatherings possess many advantages, not the least among which is the social intercourse afforded by them to teachers. The papers read, too, and the discussions participated in, have their value. But are we practical enough? Do we not have too many papers and not enough discussion? Everything seems too hurried, and by the time those who always speak two or three times, no matter what comes up, in order to explain their particular position, have spoken, the time has expired and the benefits are greatly curtailed thereby. Many favour the idea next year of an Inter-provincial Institute embracing the Maritime Provinces. It is understood to be favoured by Nova Scotia and Prince Edward Island. Many teachers who attended the Provincial Institute remained to attend the Summer School of Science, which may be considered another step in advance, as it was convened, for the first time, last year, and the benefits resulting from it must have been very great.

Some new text-books were introduced during the year, and as their recommendation was prompted by experience and practical knowledge, they no doubt will confer the advantages expected of them. The new arithmetic is well conceived from an educational standpoint, but has been nearly spoiled typographically. The text on the science subjects by Dr. Bailey is all that was expected, and will no doubt be a valuable aid to both teachers and pupils. Such a book has long been needed. The new copy-books have not as yet received a very warm welcome, but perhaps time and use may tend to reconcile them to the profession. They are perhaps useful rather than ornamental, and this may be as it should be.

Another decided step in advance was the inauguration of an Arbor Day throughout the Province. If we are to judge from the number of trees planted, and the amount of ornamentation to the school grounds, the action of the Board of Education in allowing and appointing the day was a very popular one.

The position taken by our schools in the Colonial Exhibition showed that they were second to none in the excellence of their work, and demonstrated the strength of our free school system.

It was confidently hoped by the friends of education that before this time a compulsory clause would have been introduced into our school law, as it should have been long ago. When we consider that of the total enrolment of the Province but little over fifty per cent. of the pupils attend school every day, and that nearly one-fourth of the children of schoolable age do not attend school at all, it is surely high time that such a clause was enacted. Many thought that a permissive compulsory clause would be carried last winter. The bill passed the lower house but was not introduced into the upper, and so we will have to wait to chronicle even this much until some other year, it may be hoped this.

Another change that was anxiously looked for—and this concerns trustees more than teachers—was a change in the present assessment law to make property pay taxes in the district in which it is situated. Much hardship and consequent complaint arises from the working of the law as it now is. Villages and thickly settled places which are well able to support schools of their own resources, are deriving no small amount of support each year from remote and poor districts, often in consequence rendered too poor to support schools but for a portion of the year.

While we are speaking of trustees, we may refer to a very bad and growing habit of extending the summer holidays at will, disregarding entirely the teachers'

inclinations in the matter, and even terminating agreements to effect a small saving.

But these are some of our failures, and do not smack at all of progress. Perhaps it would be well to conclude here.

St. John.

### HOW TO TEACH OUR PUPILS THE MEANING OF GOVERNMENT.

[The substance of an address before the Carleton Co., N. B., Teachers' Institute, by Inspector I. B. Oakes, A. M.]

"What is the capital of New Brunswick?" is a common question in our schools. The answer is nearly always "Fredericton." When we ask why it is called the capital, the pupils generally reply, "Because the laws are made there, and the Governor resides there;" though they sometimes say, "Because it is the largest city." But when we attempt to go further to ascertain what conception they have of laws, and governor, and government, we often find a comparative blank. What is a law? Who makes the laws? How many law-makers are there? Who are they in this country? How are they selected? When do they meet at Fredericton? When do they generally separate? To these and other similar questions, satisfactory answers are seldom given.

It would not, however, be difficult to awaken these ideas by a series of familiar conversations.

1st. Call attention to some of the rules of the school: Pupils must not whisper during study hours; recess comes at 10.30 o'clock, etc. These are laws made by the teacher, or by teacher and pupils conjointly. These laws or rules, carried into effect, constitute government; the teacher being governor, the pupils the subjects, the school-room and premises the territory.

2nd. The school shall open at nine o'clock and close at four o'clock. These are laws made by trustees. They are the government, the ratepayers form the constituency, the school district their territory. How are these law-makers elected? At the annual election in October. Who are the trustees? Let them be named, and other laws they make be pointed out.

3rd. Call attention to the parish election; the councillors' names; their jurisdiction; their territory; the people they represent; the necessity of their election, and the results if they were not at the Council Board.

4th. Direct the thought of the school to the Municipal Council at the county town, the number of councillors from each parish, the laws they make, the territory they govern. The place of meeting is the capital of the county, the court house is their parliament building. Let the pupils know when

they meet and how often, and some of the laws they have made.

5th. Call attention to the last provincial election, the names of the county representatives, the place of meeting (Fredericton), the Parliament building in which they assemble (hence House of Assembly), how many from each county? How many in all? The speaker their chairman. Some of the laws they make, for example: The school shall be taught by a licensed teacher. It shall be in session six hours a day. The annual school meeting shall be on the second Thursday in October, etc.

6th. Explain the functions of the Governor; give his name. Show that he stands for the Queen, and for her sanctions the laws when made in the House of Assembly and approved of by the Legislative Council, thus showing the three branches of the Legislature; and, if deemed necessary, the men who carry into effect the laws, could be named, viz., the Executive Council. The whole province is the territory.

7th. Reference might next be made to the Dominion election and the representative of the county named. He goes, not to Fredericton, but to Ottawa. He meets not only the others from the different counties of New Brunswick, but from each county of each province all over the Dominion. Describe Ottawa; the Parliament buildings. Point out the time of meeting, some of the laws made there, the Governor General, the Senate, the House of Commons, similar to the corresponding provincial branches, but called by other names, etc., etc. You thus show that each governing body is a circle, one within the others until you reach the outer circle, the Dominion, and each governing within its own prescribed limits of jurisdiction. Each male pupil, will, by and by, help elect the law-makers in all the circles of power. How important that he prepare at school to vote wisely, to understand that the one elected is rather the servant than the master of the people, that in reality the people are the government, only lending their power to another to exercise for them. Thus, the boys, and the girls as well, should be enabled to understand the privileges and the responsibilities of citizenship, and take a warm interest in every measure that affects the commonwealth. This condition ensures a strong national as well as individual life.

It might be well to point out that within each person—each pupil—there is or should be a government. The heart is the territory or empire. The passions, affections, will, etc., should be subservient to law. Christ should be Governor and King. His law the rule of life. Thus is His Kingdom established in the hearts of men, and thus His "Kingdom will come."

## SCIENTIFIC NOTES.

At the December meeting of the Nova Scotian Institute of Science, a paper on the Diurnal Lepidoptera of the Province was read by A. P. Silver, Esq. His collection is said to be the most complete in this section of the Dominion. He treated in a very graphic manner the transformations of some species, their variations and migrations, and sketched a few brilliant blackboard illustrations, the effect of the whole being to fascinate his audience with the study of entomology. In the midst of a busy mercantile life, Mr. Silver has utilized his holidays as people of good means generally do, but with the addition of noting his observations and capturing new specimens wherever found. The result is that Mr. Silver's recreations eventually benefit others as well as himself, and permanently advance the knowledge of our environment. Our readers can do likewise in some branch of science. We are glad to learn that the Institute is likely to have papers from Mr. Silver on the Nocturnal Lepidoptera and on the Coleoptera, at some future date.

Fluorine has at length been isolated in considerable quantities by M. Henri Moissau. He had been at work for three years on the problem at great expense, as platinum was the only material which could stand the corrosion at all, and that only for a short time. Fluorine has the most intense chemical activity of any of the elements.

## EDUCATIONAL OPINION.

*Religious Intelligencer*: "The salaries of teachers generally are too small. Better work would be had for better pay. There is no economy in keeping the teachers' pay down. There may be a seeming saving of a few dollars, but the pupils suffer a loss that cannot be estimated in dollars. But low as salaries are in the Maritime Provinces, Quebec goes lower. In the eastern townships of that Province \$150 is about the average yearly pay. The consequence is that few men and women of ability enter the profession. There are about 700 teachers in the province who have no professional certificates. The state of education is deplorable indeed."

*Woodstock Press*: "Nothing will encourage teachers more than the sympathy of the parents of those placed under their care. Parents do not generally take much interest in the exercises of the school room, nor are they apt to enquire as closely into the progress of their children's education as they are into their ordinary concerns of life; and yet they undoubt-

edly feel an interest in the relations of children and teacher much greater than they are apt to express. The children who make the greatest advance in their studies, and who are most attached to their school, are those whose parents devote at least a short time each day or evening to their lessons. We venture a step further—the families where the most mutual happiness is found are those where a common interest exists between parents and children in the lessons and duties at school as well as those at home."

*John MacDonald in the "Topeka Capital"*: Will our beloved and good-looking brother, the reporter, be kind and Christian enough to refrain from calling teachers pedagogues? The word may have been fitting enough in the eighteenth century, and in the dark ages, but it in no way applies to the teachers of these latter days. For what is a pedagogue? A dogmatical, ostentatious creature; a Nathaniel Holofernes; a fossil; an abstraction; a human being who does not assimilate knowledge, but who holds it on shelves in his mind; a being mainly of parchment, and not of flesh and blood; in the world, but not of it, "a hide-bound pedant." The teacher of our day is a genial, broad, many-sided, sympathetic human being, and a lover of his kind. But are there not exceptions? Oh, yes, "the poor ye have always with you." Just a few specimens—chiefly in the mummy condition to remind us of what once we were.

## SCHOOL AND COLLEGE.

St. Francis Xavier College is building a large gymnasium.

Dalhousie College has advertised new "Munro Exhibitions and Bursaries" for junior matriculation. Five exhibitions of the annual value of \$150 for two years, and ten bursaries of the annual value of \$100 for two years.

From the *Acadia Athenæum* we learn that the students holding scholarships in Acadia are likely to surrender them to the college. In 1886 there was a deficit in the college finances of \$330.22; in 1887, \$1,045.78. The loyalty of the friends of Acadia will not long admit of a deficit in the funds of this popular institution.

The closing exercises of the University of Mount Allison were held in Lingley Hall, Sackville, Dec. 20th, and were, as usual, of a deeply interesting nature. Recitations, essays, a French dialogue, and a debate formed the chief features of the exercises,

while the musical programme testified to the thorough character of the instruction in this branch. We rejoice to hear that the opening term of the academical year has been unusually prosperous, both at the Male Academy and at the Ladies' College, Principal Borden stating that the number of pupils in attendance at the latter, 107, is greater than ever before. The institutions composing Mt. Allison University were never more completely equipped and prepared to give a liberal and thorough education, and as evidence of this it is safe to say they were never more popular.

The examinations at the College of St. Joseph, Memramcook, took place prior to the close for the Christmas vacation. The number of students in attendance this year is greater than ever before.

#### BANQUET TO PRINCIPAL ANDERSON.

[The Daily Sun, St. John, December 22nd].

The other day in Charlottetown a public banquet was given to a teacher. The dinner was given by former students of Prince of Wales College, and the guest of the evening was Principal Anderson of that institution. Professor Anderson has delivered a few lectures outside his Province, has done some literary work, and is now one of the editors of the EDUCATIONAL REVIEW. But his life work has been given to the cause of education in Prince Edward Island. He has completed a quarter of a century of service as Principal of the college at Charlottetown, and it is not wrong to speak of that college as his workmanship. Many men who have made for themselves a wider reputation than Mr. Anderson is likely to gain, gratefully acknowledge their indebtedness to him. Dr. Schurman, the young professor of philosophy at Cornell, whom enthusiastic students of metaphysics place in the first rank of American schoolmen, and who has sat at the feet of the great lecturers in two continents, says that his old Charlottetown professor, rather than any of these, is his ideal teacher. Like sentiments were expressed in the speeches of several eminent public men who attended the banquet. It is not remarkable that a man of whom such things can be said, and who has done his Province so much service, should be thus honored. When one comes to think of it, the wonder is, that such things do not oftener occur. Here is a man whose services to the Province exceed that of any half dozen statesmen that ever lived in it, who has labored on a small salary while his pupils have gone out into the world, some to become famous, some to become rich, many to attain positions of honor and trust. Until now it has not occurred to any person to look upon this teacher as a fit subject for the honorable notice so

freely bestowed upon politicians who talk. It may be that we are coming upon a time when the true benefactors in the land will be sought out and given assurance of public approval.

#### PERSONAL NOTES.

Mr. W. S. Carter, A. M., the youngest of the New Brunswick corps of school inspectors, has been for some weeks the recipient of many congratulations. The REVIEW most heartily joins in wishing Mr. and Mrs. Carter many years of happiness and prosperity. At a recent meeting of inspectors the welcome extended to Mr. Carter—the last of their number to leave the ranks of bachelordom—was, we believe, of a very genial nature.

Mr. James Vroom, of St. Stephen, has been elected a corresponding member of the Torrey Botanical Club of New York.

Dr. Asa Gray, the leading botanist of America, is lying at Cambridge very ill. He had an attack of hemiplegia on Monday, 28th November. Dr. Lawson, President of the Royal Society of Canada, is having regular bulletins of the state of his health. From him our latest intelligence is that there is no improvement; but there is no indication of severe suffering.

Professor Roberts, of Kings College, is said to be writing a history of "Joseph Howe and his Times." The work is in good hands.

A. J. Pineo, Esq., A. B., Instructor in the Nova Scotian School of Science, and late of the *New Star*, Kentville, has purchased the *Pictou News*. We wish him success.

We have received a catalogue of the College of Physicians and Surgeons, Baltimore, U. S. A., from R. M. Smith, a Pictovian and late principal of the Maitland schools, N. S., who is now in attendance.

Professor Balfour Stewart, Owen's College, Manchester, died on Sunday, December 18th. He left the college on Friday, apparently in his usual health and in good spirits, intending to spend his holidays in his Irish home.

Mr. Edward Manning, M. A., has been appointed mathematical master of the St. John Grammar School in place of Mr. A. W. Macrae, B. A., resigned. Mr. Manning's long experience as a teacher makes the appointment an excellent one.

The death of Mr. Frank H. Osburn, son of Henry Osburn, Esq., of St. Andrews, N. B., at New York in

December, is a deep affliction to his parents, who have received the heartfelt sympathy of the young man's former classmates at the New York College of Dentistry.

Mr. Arthur L. Calhoun, of the Boston *Traveller*, will please accept our thanks for the handsome and convenient calendar which he has sent us.

Mr. Geo. F. Fenwick, formerly of the Collegiate School, Fredericton, N. B., and now of Montana, is visiting New Brunswick.

Miss Charlotte G. Montgomery and Miss Annie Montgomery, cousins of the Chief Superintendent of Schools for Prince Edward Island, have been for some time at Hamadan, Persia, where they have been laboring under the direction of the American Board of Foreign Missions.

Geo. F. Smith, a pupil of Mr. Brittain's Superior School, Petitediac, N. B., who entered as a second year student at the McGill University, Montreal, lead his class in mathematics at the recent examination. This speaks well for his preliminary training.

#### QUESTION DEPARTMENT.

Questions on scientific subjects may be addressed to EDUCATIONAL REVIEW, Pictou, N. S., to whom also all natural history specimens may be submitted for identification; those on ancient classics and mathematics to EDUCATIONAL REVIEW, Charlottetown, P. E. Island, and all questions on general subjects—English, school management, methods, etc.—to EDUCATIONAL REVIEW, St. John, N. B. On technical questions the editors will seek the views of teachers of experience, in order that this page may be of the greatest possible advantage to our teachers.

#### Questions and Answers.

STUDENT gives the following answers to questions asked:

1. In REVIEW No. 4, the question was asked, "Why did 4 pounds 6 ounces of ice in the morning weigh 4 pounds 8 ounces in the evening?" ANS.—The ice condensed 2 ounces of moisture from the air which was very warm and no doubt nearly saturated with moisture.

2. To F. H. E.'s problem in No. 7. ANS.—When a tumbler with a considerable amount of air is depressed mouth downward in water, before applying the glass plate to it, the pressure of the water compresses the air. When the tumbler is suddenly raised, with the glass plate against its mouth, this pressure is taken off, and the air slightly expanding presses out some water and thus presses off the plate. This tendency is exaggerated by the warmth of the hand also causing the air to expand beyond its original volume. But if the tumbler with the plate to its mouth be kept slightly inclined for a short time, so as to allow the enclosed air expanding to its maximum

volume, to press out the surplus water without admitting any more air, then I have seen a tumbler nearly full of air, with no more than a quarter of an inch of water over the glass plate, keep it supported in position. The success of the experiment is surer if the tumbler be warmed by the hand while the water is draining away.

SUBSCRIBER.—"Whether is wood ashes a mineral or vegetable substance?"

It is mineral in the scientific sense of the term, although it is of vegetable origin.

J. S. M.—"Two plants found some time ago by a friend on Tracadie Sandhills."

No. 1 is the "Alpine Juniper" (*Juniperus Communis*, L., var. *Alpina*, L.) No. 2 is the "Ground Cedar," (*Juniperus Sabina*, L., var. *procumbens*, Pursh).

J. S.—"Is this Labrador tea?"

It is. Scientific name, *Ledum latifolium*.

H. V.—"Is the velocity of light 160,000 miles per second as stated in the last article 'Among the Constellations?'"

160,000 was a misprint for 180,000. Errors in correcting proof often occur in spite of the greatest care. The context shows that the correct figures were used for the computation.

SC. ST., in answer to problem of F. H. E., says: "Let us take the case of the inverted tumbler partly filled with air and closed with paper. Supposing the pressure of the air inside the tumbler to be the same as that outside the tumbler, say 15 pounds to the square inch, and the weight of the water above the paper to be .1 pound on the square inch, and the weight of the paper to be .01 pound to the square inch. The upward pressure of the air on the paper would be 15 pounds on the square inch, the downward pressure 15.11 pounds. If the paper were inflexible like a plate of glass it would fall. But the paper bulges down in the centre slightly, the air within expands and therefore its pressure becomes less, say 14.8 pounds on the square inch. Add to that the weight of the water and paper and we have a downward pressure of 14.91 pounds, against an upward pressure of 15 pounds on the square inch. Therefore the paper is kept in position by an upward pressure of .09 pounds on the square inch.

When glass is used, it is in the first place heavier than paper, and therefore more difficult to support. In the second place it does not bulge down in the centre to allow of a sufficient expansion of air within the tumbler to reduce its pressure so much on each

square inch as would be equal to the weight of water and glass supported per square inch. But if the glass plate should be kept inclined for some time so as to allow all the water possible to drain away without admitting any more air, then an equilibrium of upward and downward pressure on the glass results. The surface (capillary) attraction between the glass plate and the water and the rim of the tumbler, assists the upward pressure of the air (the same occurs in the case of the paper), and therefore determines the stability of the plate when the upward and downward pressures are about equal."

Other questions received will be answered in the next number.

#### BOOK REVIEWS.

**HAND-BOOK OF VOLAPUK**, by Charles E. Sprague, member of the Academy of Volapuk, President of the Institute of Accounts. \$1.00. There have been many attempts at the formation of an international language, and such attempts are even yet being made. But in the struggle for existence, they have all disappeared except Johann Martin Schleyer's scheme. We believe, and so do the most of English philologists, so far as they have indicated their opinions, that English with a simplified orthography, might nearly as conveniently be adopted by other nations as the International language, while it has the advantage of already being the most extensively spoken language in the world. We have no sympathy, however, with those who ignorantly say Volapuk is no language. It is the best language in existence, and has the greatest potentiality involved in its principles. It fails only in one essential point, and that is, that it is not at present the spoken language of a dominant race or civilization. But it has done already what no other language has been able to accomplish. In five or six years from the date of its creation, it has been studied by over 200,000 individuals, and has a bibliography of ninety-six books in thirteen different languages, and can boast of no less than eleven periodicals. The English roots of the language we also find to be nearly equal to the roots from all other languages put together, namely forty per cent.

We have examined a number of Volapuk text-books for English people, and have no hesitation in saying that while Mr. Sprague's is the latest, it is also the most systematically and simply arranged. It has a graduated series of exercises with a key at the end of the book, which will enable a person who has studied no language except English, to master the subject without difficulty. It also contains appended a vocabulary which admits of a considerably extended range of Volapuk composition. As an exercise on comparative philology and the principles of language structure, the subject is interesting and worthy of attention. The grammar is so simple and symmetrical, that most of our readers, especially those who have studied the ancient classics, can master it at one reading. All that remains is to use the forms in connection with thought until they become associated with their meaning, then pick up the vocabulary and talk or write in Volapuk. We presume the work can

be had from the author, 1271 Broadway, New York, or from the publishers, "The Office Company, New York; Trubner & Co., London, England, or S. R. Winchell & Co., Chicago.

AN ELEMENTARY CLASS-BOOK of the geography and history of the Turk's and Caicos Islands, for the use of schools, by J. Henry Pusey, late theological student of Calabar College, Kingston. *Elliot Stock, 62 Paternoster Row, E. C., 1887.* The writer of this book is a negro, the Baptist missionary of the place. Hugh H. Hutchings, Esq., of Turk's Island, West Indies, an old Pictovian, has our thanks for the same.

MEIKLEJOHN'S GRAMMAR.—In the November issue of the REVIEW, reference was made to the admirable work on the English grammar and language by Prof. Meiklejohn of St. Andrew's University, Scotland. We are glad to learn that the American publishers of this work—Messrs. D. C. Heath & Co., of Boston—are about to bring out a re-print of the grammar in a separate form, with the addition of sixty-four pages of exercises and examination papers. This abridgment will prove a great convenience to those who wish the grammar and composition in a separate volume. What we have before said of the scope and value of this work, especially the complete volume, need not be repeated here. It is a course in English which teachers and students will find so admirably adapted to their needs, that it is safe to say the English language has been invested with a new and greater interest by the work of this distinguished English scholar.

SIXTY remaining copies out of 500 of that great work, "*The Survey of Western Palestine*," in seven quarto volumes, are offered for sale at *twenty guineas each*, by Alexander P. Watt, 2 Paternoster Square, London, E. C.

COMMERCIAL LAW published by Williams & Rogers, Rochester, N. Y., U. S. A, from specimen pages which we have seen, appears to be a very complete and valuable work. Price \$2.00. To schools \$1.00. For introduction 75 cents.

#### GOSSIP WITH EXCHANGES.

The *Illustrated London News* (American edition published at New York) is not only noted for its admirable illustrations of men and events, but its literary matter, especially its notes and reviews, are terse and excellent. In its issue of Dec. 31st, the "notes of the week" are flavored with a wit and raciness that are charming. Let us appropriate a *multum in parvo* scrap from a running comment on the "art of conversation," which the writer discusses so charmingly: "To apply on the instant the treasure of the mind, with wit, to the passing topic is, indeed, the very perfection of the 'art of conversation.'"...The *Popular Science Monthly* (published by the Appletons, New York,) for January discusses "Governmental Interference with Production and Distribution," "Evolution and Religious Thought," "Race and Language," "Climate and the Lake Region," and other timely and valuable topics. Just as we close the volume, after a delightful hour spent on its pages, the following quotation in its "Miscellany" arrests attention: "Teaching and learning have been reduced to a mathematical system

and work, with the regulation of machinery. Given so much room, so many pupils, so many hours, so many studies, so many pages of each, so many months in one department, so many in another; one class goes into the hopper at one end and goes out at the other." \* \* All, strong or weak, bright or dull, are "ground with the same burrs." \* \* "The average intelligence (of the pupils) is higher, no doubt, than when boys and girls, not classes, were taught; but are they individually as well equipped for the battles of life?"... *The Century* (published by the Century Company, New York,) for January has a portrait and sketch of Ruskin, a valuable article to students on the "Catacombs of Rome," the "War Series," with other valuable contents. Mark Twain's "Meisterschaft, in Three Acts," is a clever burlesque on certain popular methods of acquiring a foreign language. In "Topics of the Times" there is a valuable article on industrial education... *St. Nicholas* (published by the Century Company, New York,) for January opens with a beautifully illustrated poem, "The Brown Dwarf of Rügen," by Whittier. Lieut. W. R. Hamilton describes how a girl's military company was formed in one of the western universities, the perfection of drill to which they attained, and the beneficial results as an exercise. "The girls," says the Lieutenant, "seemed to show a better natural capacity for drill than the boys. \* \* But to me the greatest pleasure was the thanks I received from the fathers and mothers, and from the girls themselves, for bringing the healthy color to their cheeks and the clear look to their eyes. And how those girls would walk! straight, and dignified, and graceful as young queens—it was a pleasure to see them move."... In *Science* (Science Company, Publishers, New York,) of Dec. 30 is an account of the formation of the New Jersey Council of Education, which is somewhat of a novelty in educational organizations. It aims to "advance the educational interests of the State, chiefly by considering the means by which the policy of the State may be modified, in view of the progress of educational thought." It claims to be a working, not a talking body, and that is a very commendable feature in teachers' organizations... The holiday number of *Wide-Awake* (D. Lothrop & Company, Publishers, Boston,) is a beautifully illustrated magazine for little folk, and its reading matter not only bright and interesting, but wholesome... *Vick's Floral Guide* (published at Rochester, N. Y.,) for January, is at hand. Its illustrations are on a magnificent scale, and the information it contains makes it invaluable to the horticulturist and gardener... The *Academy* (published monthly by the students of Pictou Academy, N. S.,) is a bright little magazine of 16 pages... The October number of *Spelling* (published by the Library Bureau, Boston,) has come to hand. It contains an outline history of the spelling reform up to date. Also a list of over 3,000 amended spellings recommended by the Ph. Society of London and the American Ph. Association, 1886. The magazine is 44 paged, and contains much information on the subject... The *Pictou Standard* published a very superior Christmas number, which contained, among other illustrations, a cut of Sir Wm. Dawson of McGill, and of Principal Forrest of Dalhousie... The scientific editor also acknowledges the receipt of the "*Naturalists' Bulletin*," Vol. I., No. 1, and the "*O logist*," Vol. III., No. 4, both

from Albion, State of New York. The latter is bi-monthly, 50 cents a year... The "*Journal of American Orthoepy*," Ringos, N. J., U. S. A., although printed in type strange to the most of us, is doing very important and valuable work in the art and science of English pronunciation.

### N. S. COUNTY ACADEMY.

ENTRANCE EXAMINATION—OCTOBER 27th and 28th, 1887.

ARITHMETIC AND ALGEBRA. 10 a. m. to 12 m.

- Express in Roman numerals 1589 and 1838, and write in words MDCCCLXXIX and 2043009.
- Find the total cost of the following:
 

12 lbs of Butter @ 23 cts. per lb.	
18 " Sugar 7½ "	Y "
11 " Tea 35 "	" "
25 " Coffee 27 "	" "
29 " Rice 6 "	" "
- Define prime number, prime factors, composite number. Resolve 3366000 and 1155 into their prime factors.
- A wheel 154 inches in circumference made 8459 revolutions in rolling a certain distance. How many miles did it roll?
- Add together ¼ yd., ½ ft., and ⅓ in.
- If a grocer were to sell at a profit of 15%, tea which cost him 48 cts. per lb., how much would he receive for 85 lbs., and how much of this would be profit?
- What is Commission? Brokerage? Sent my agent \$3.654 with instructions to deduct his commission at 1½%, and invest the balance in tea, how much did he invest and what was his commission?
- A man sold ¼ of his farm and then 3-5 of the remainder. How much of his farm did he sell? If he received \$1,210 from both sales, at that rate what was the value of his farm?
- If  $a=2$ ,  $b=3$ ,  $c=4$ ,  $d=5$  and  $e=6$ , find the numerical value of the following expression:
 
$$\frac{a^2+b^2+c^2+d}{ab+c} + \frac{de}{b} - \frac{abc}{e}$$
- Multiply  $x^2+xy+y^2$  by  $x^2-xy-y^2$ .
- Divide  $x^5-y^5$  by  $x-y$ .

GRAMMAR, ANALYSIS AND COMPOSITION. 2—3.30 p. m.

- Write in a plain hand, with due attention to punctuation and proper use of capitals, the passage dictated by the examiner.
- Define *number* (in both nouns and verbs) and write the plural of the following nouns; *loaf*, *life*, *strife*, *wife*, *colloquy*, *goose*, *tooth*, *echo*, *grotto*.
- Compare as many irregularly compared adjectives as you can.
- Write the future perfect indicative passive of the verb *wind*.
- Correct, where you think necessary, the following sentences: (1) There the mighty hero laid down to rest. (2) To you, as well as I, it was a great surprise. (3) Seldom has her friends received a warmer welcome. (4) "Not me, not me, but you," cried the sailor, "are guilty of this deed,"

6. Arrange the following verbs in two columns as *strong*, or *weak*, giving at the same time the principal parts of each: *Wear, gnaw, shape, grind, glide, weep, buy, sell, stick, lay, lie, (recline), lie (tell a lie).*

7. Analyze:

When the noble Cæsar saw him stab,  
Ingratitude, more strong than traitors' arms,  
Quite vanquished him.

8. Parse words in italics.

GEOGRAPHY. 9 a. m.—10.30 a. m.

1. Name the zones and give their situation.
2. Write a note on the rivers of New Brunswick.
3. Give the location of the following places in the Dominion of Canada:—St. John, Winnipeg, New Westminster, Toronto, Three Rivers, London, Moncton, Hamilton, St. Catherines, Hull, Summerside, and Nanaimo.
4. Name the chief rivers of the United States, their direction, and the waters into which they flow.
5. Name the principal cities of Great Britain, and state for what each is noted.
6. On a voyage from London to Odessa, through what waters and near what headlands and islands would you pass?
7. Write a short description of the Chinese Empire.
8. State as fully as you can what you understand by the term Oceania.
9. Draw an outline map of Europe.

USEFUL KNOWLEDGE. 10.45 a. m.—12 m.  
(Ten questions will be considered a perfect paper).

1. Explain fully why we should pay particular attention to the ventilation of our houses.
2. Explain the formation of dew.
3. Name the principal fruits grown in Nova Scotia, and also give the chief spice plants and the countries in which they grow.
4. What are glaciers, icebergs, avalanches?
5. Explain what you understand by the term *gas*.
6. What is coal? lava? chalk?
7. What is the difference between gravel and sand, and what is their origin?
8. What are the following, and for what purposes are they used: Opium, quassia, strychnine, sumach, jute, vanilla, macaroni, and sago?
9. Name the principal birds of prey (order *Raptores*) peculiar to this Province. With what order of mammalia are they compared?
10. Give a general description of an insect.
11. In what respects do the following pairs of animals differ: The camel and the horse; the lion and the buffalo; the dog and the sheep.
12. What is the difference between a plant and an animal?
13. Name the primary colors; what combinations of these produce the secondary colors?
14. Name the chief parts of a flower.
15. Mention the chief properties of the following: Oxygen, hydrogen, carbonic acid gas, nitrogen.

BRITISH AND CANADIAN HISTORY. 2—3.30 p. m.

1. Describe the character of any *two* of the following

sovereigns:—William I., Edward IV., Richard II., William III., George I., Victoria.

2. In whose reign did each of the following events occur:—(1) Defeat of the Invincible Armada; (2) Battle of Bannockburn; (3) Field of the Cloth of Gold; (4) Signing of *Magna Charta*; (5) Catholic Emancipation; (6) The South Sea Bubble; (7) Trial of Queen Caroline.

3. Name the chief events of the reign of Queen Victoria, with dates for the most important.

4. State what you know regarding the history of Louisburg.

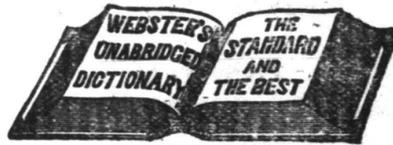
5. Give dates for the following events in Nova Scotian history:—(1) Founding of the Provincial Normal School; (2) Brandy Dispute; (3) Joseph Howe's Governorship; (4) Passage of the Free Schools Act; (5) Establishment of Responsible Government in Nova Scotia.

6. Describe briefly:—(1) The Ashburton Treaty, (2) The Reciprocity Treaty; (3) The Washington Treaty.

[For admission to the Nova Scotian Academies, candidates are required to "pass" on five papers sent from the Education office. These are (1) arithmetic and algebra, (2) English grammar and analysis, (3) geography, (4) Canadian and British history, and (5) useful knowledge. At a late examination, a candidate after vainly struggling with a few of these elementary questions which every intelligent youth should know, finally closed up the paper with the endorsement, "I don't know any useful knowledge."]

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