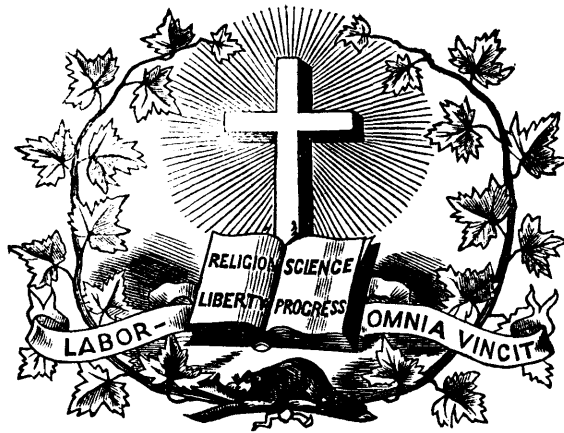


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or, which is quite as useful, they learn, from their inability to expand the metaphor, that they have not fully entered into the meaning of it. Thus a good many boys, in analysing the lines of Allegro—

" Right against the Eastern gate,
Where the great sun begins his state,
Robed in flames and amber bright,
The clouds in thousand liveries dight,"

would fail to see that the morning sun surrounded by the clouds that reflect his rays, is compared to a great king or lord, issuing from his palace gate, and attended by his servants, clothed in the liveries which he has given them. The case with which boys can slide, or—something stronger—can skate over a metaphor without thinking for a moment that there is anything down below, is quite astounding. I remember questioning a class about a passage in Pope, in which the poet is asking where the plant of happiness is to be found, whether

" Fair op'ning to some court's propitious shine,
Or deep with diamonds in the flaming mine;
Twin'd with the wreaths Parnassian laurels yield
Or reap'd in iron harvests of the field."

Now I thought an average boy of average ability might be expected to see that *iron* was a very unusual epithet for *harvest*, and that "iron harvest" must be a metaphorical expression. The context might seem to show that happiness, after being sought in court favour, wealth, and literary distinction, is now sought in military glory. From these two helps it did not seem difficult to infer, at all events, that the field meant the field of battle, and further to expand the metaphor by saying that, as the reaper cuts down the corn, so war reaps his harvest of iron-clad warriors who are struck down in death. But out of twenty boys of fair ability, averaging fourteen or fifteen years of age, not one could either expand the metaphor, or even give the meaning correctly. I dare say many of them could have answered correctly, if they had had notice beforehand that the expansion of this metaphor would be required; but, as it was, few or none seemed to have perceived that there was any difficulty at all. Perhaps it is undesirable in all cases to point out to the class the difficulties that will present themselves in the next lesson. Useful as it is to show boys that there is

ON TEACHING THE ENGLISH LANGUAGE.

LECTURE II.

By THE REV. EDWIN A. ABBOTT, M. A.
Head Master of the City of London School.

(Continued.)

It may be that I exaggerate the importance of the expansion of metaphors as an exercise for boys, because I have given a good deal of attention to it. But I must confess, the more I teach English the more valuable does this exercise seem. In the first place, it is very simple and practicable. As soon as boys have reached Proportion in Arithmetic, the proportion of a simile and the expansion of a metaphor into the form of a proportion become not only intelligible but interesting. There is an arithmetical regularity about the process of expansion which takes their fancy at once. Besides, they soon find that they learn a great deal that they did not know before;

plenty to do, and to prepare, in an English study, it is also useful to make them feel that they must always be on their guard against supposing that they understand what they do not. An occasional failure on the part of the whole class, has sometimes a very beneficial and bracing effect on their future exertions;

One danger of boys in this exercise is, that they may sometimes press the analysis too far, and include under the head of metaphor what deserves a different name. The process of expansion is so regular, and seems to explain so much, that they want to expand every expression that is not literally true. Thus they would like to expand "pale death" and "dark dishonour," or "gaunt famine." It is necessary, therefore, to explain to them that these expressions are not metaphors, not even personal metaphors like "a frowning fountain," or "a sighing oak." In the personal metaphor, "a frowning mountain," the overhanging and threatening brow of a mountain is compared to the projecting brow of a frowning person; but, in "pale death," death is not compared to a person, but is represented as a person. A painter would not represent a mountain, while he would death, as a human being. Between personal metaphor and what may be called personification, there lies a kind of debateable province. I will give one instance of what I mean. "The earth drank up his blood." Now here there may or may not be a strong personification. If the context told us of Gessler dying on the soil of the land of Switzerland, the earth would be represented as vindictively draining the life-blood of her oppressor, and this might be called a distinct personification; but in most cases the personification would be weak, and the expression would merely be a way of saying that the blood oozed almost as rapidly into the earth, as water disappears when drunk by a man or beast, and there would be little more personification than in saying "a sponge imbibes water." Such expressions are already so simple that they do not require explanation, and the process of expansion applied to them would be misplaced. There can be no possible advantage in a boy's expanding the expression in Gray's "Bard," and telling out that, as a man sighs, so an oak makes a noise that reminds one of sighing. It is a good exercise for a boy to distinguish between metaphors that are good and bad. We may point out to him that a metaphor, like a word, must be suited to the context. For instance, since a tree inhales and exhales certain gases through the medium of its foliage, "the leaves are the lungs of a tree" may be a very suitable metaphor in a treatise on natural science; but you would not like to say that "spring comes clothing the trees with their green lungs." Again, for the introspective Hamlet, the "mind's eye" is a very appropriate and beautiful metaphor; and Menenius Agrippa, wrangling with a cobbler, may appropriately call him.

"You, the great toe of this assembly."

And even Hamlet, in his lighter mood, may say that his friends are neither the soles of fortune's feet, nor the button on her cap; but scarcely any context could justify such metaphor as the "mind's hand or toe." We might briefly lay down the laws of metaphor thus.

(1) A metaphor must not be used unless it is needed to throw light upon the thought of the speaker.

(2) A metaphor must not enter too much into detail; for every additional detail increases the improbability that the correspondence of the whole comparison can be sustained without exaggeration. As an instance of excessive detail and consequent exaggeration, take

"For now hath time made me his numbering clock,
My thoughts are minutes, and with sighs they jar
Their watches on unto mine eyes, the outward watch,
Whereto my finger, like a dial's point,
Is pointing still, in cleansing them from tears."

(3) A metaphor must not be far-fetched. We may instance

"Here lay Duncan,
His silver skin laced with his golden blood."

(4) Two metaphors must not be confused. We must not speak of "the thunderbolt overflowing its banks." An instance may be found in—

"Was the hope drunk
Wherein you dressed yourself? Hath it slept since?"

(5) A metaphor, when taken liberally, must be wholly false. In other words, the two first terms of the simile must be wholly distinct from the third and fourth terms. Thus, the "venom'd spear of slander hath wounded mine honour," is a good metaphor, because slander and slander's spear are invisible, and cannot really wound mine honour, is decidedly objectionable; because, though the tongue cannot wound, it can touch. On the same principle you might say of a virulent and unprincipled critic, that "he assailed the best established reputation with his pen," but you could not venture to say, except with a touch of humorous irony, that "he blackened the most spotless reputations with his ink." Ink is literally black, and the least touch of literal truth destroys the falsehood, which is the foundation of a good metaphor. In accordance with these rules, pupils may be taught not only to analyse and expand, but also to criticise and draw out the appropriateness and inappropriateness of a metaphor, referring to the canons laid down.

I had hoped, when I began this Lecture, to include in it some remarks on Prosody, and its place in the higher English teaching, as well as upon Logic; but the want of time compels me to omit all reference whatever to these subjects. I may, perhaps, have another opportunity for repairing this omission. I could not do justice to these subjects in the brief space that remains, and I therefore prefer to pass over them entirely, and to conclude with one or two observations which are the result of some very recent experience.

I lately met a friend of mine, who is an Assistant-master in one of the leading public schools of the kingdom. During the last term he had been teaching English with zeal and assiduity. But upon my enquiring how he was satisfied with the results of his work, he replied that he was quite dissatisfied. "He could not get the fellows to work at it." Somewhat surprised at this, I enquired his method of teaching. "What did you set the boys to do?" "Oh! I told them to read over the lesson well, and then I asked them questions about it. They did not know much about it; so I told them what I thought they ought to know, and then, next time, I examined them in what I had told them; but they did not seem to take it in quite, or to feel much interest in it." "Did you give them anything definite to do?" I once more asked. "Did you tell them to expand any metaphors?" "No." "Well, did you give them any derivations, or point out any difficulties? I suppose they had an Etymological Dictionary at all events?" "No; they had not."

This conversation was very gratifying to me. If my intelligent friend—and he is very intelligent—had been able to make boys work at English without previously giving them notice of some questions, without any paper work, without any definite laws of etymology, diction, and metaphor, I should have felt that he was far more successful than he had a right to be, and certainly far more successful than I have ever been. I have myself passed through my friend's depressing experience; I have known what it is to have a class come up with a scene from Shakespeare, at which they had worked very hard, and which they fondly thought they had mastered. Oh, the singular, and apparently unaccountable, perverseness

of boyish minds! They had looked out all the useless derivations that could be looked out. They knew that rage came from the Latin *rabies*, and was connected with the Sanscrit *rabh*; they knew that *treason* came from the French *trahison* and the Latin *tradere*; they knew that *deaf* came from the Anglo-Saxon *deaf*. In a word, they knew everything that it was no use to know. But the inferences that might be drawn from these pieces of knowledge, useless in themselves, had never for a moment occurred to them; and how to distinguish between what was useful and what was useless seemed a task that they had never thought of attempting. For a time I was utterly unable to account for the curious sagacity with which they seemed to scent out and investigate just those pieces of useless information that could give them the least possible profit and the greatest possible labour. At last it flashed across my mind that they were merely endeavouring to study English, in all honesty and simplicity, as they had been accustomed to study Latin. Their Latin training had taught them to consider the inflections and derivations of words, and construing, the great objects of a lesson. Construing there was none, and inflections very few; so they were forced to make the most of the derivations. As to analysing a metaphor, or explaining the force of an epithet, they shrank from such novelties with horror. Their business was with the words, not with their meaning.

There was needed nothing but a little tact and method to change all this. A few simple laws of derivation, diction, prosody, and logic, were laid down; passages were paraphrased on paper; questions were given in each lesson to be answered on paper at home; English verses were learned instead of Latin verses: the English lesson, like any other, had its competition and rewards. Thus, by degrees, a new tradition soon sprang up: boys began to see for themselves what were the points worth study of an English lesson, and how they were to be studied; and then it became possible to discontinue some of the paper work, and to diminish the number of questions of which notice was given. That similar, and, I hope, even more satisfactory results, may be attained in any school where English is systematically taught, I am confidently persuaded. We only want, as I said above, a little tact, a little method, and perhaps a little patience.

Hints on Composition.

[From the *Irish Teachers' Journal*.]

We have for some time past received communications from different sources, requesting us to devote a portion of our space to the above subject, with a particular reference to the wants of those preparing for Civil Service and other examinations. We have not been insensible of the importance of composition and essay writing, and we felt that it should be dealt with at some time or other in our pages. But we must confess that the difficulty of dealing with it in a satisfactory manner has caused us much misgiving. We must confess, likewise, that we have no hope of treating it as satisfactorily as most of the other subjects in our programme. In order to understand fully our views upon this point, it is necessary to consider the question a little in detail. In the first place, we must recollect that in composition there are two things to be considered, namely, the ideas themselves and the mode of expressing them. The ideas themselves are of the first importance; and as they are intimately connected with the mode in which they are to be expressed, the rules relative to the latter must deal more or less with the

subject matter. But composition refers to every possible variety of topics; hence the impossibility of treating it satisfactorily by the only means at our disposal, that is, briefly. Again, it has been often said that there is no single test so decisive of any man's capacity as to ask him to set down his thoughts upon any topic. Let us suppose that the person to whom this test is applied is allowed full liberty to select his materials; still his task is a very difficult one. He has in the first instance to select, compare, and combine these materials; and in the next place he has to express them in a suitable manner. Either of these labours is sufficiently arduous; but combined they are still more difficult. How much is the difficulty increased when no opportunity is allowed for consultation or for reference? At a competitive examination, the subject is given without any previous notice, and the candidate must find in his own mind his materials, and the skill to arrange and express them properly. To prepare our readers for these difficulties is anything but an easy task; and for this reason, that we cannot possibly make the conditions similar. We can give a question in grammar or algebra not unlike those likely to be afterwards given, and we can show afterwards how these questions should be answered; but we cannot take our readers unprepared by giving them a subject to write about, and see that they cannot consult books or friends while so engaged.

We make these observations because we wish to warn our readers beforehand that they must be prepared for shortcomings in our Lessons on Composition, and that they must bear with us accordingly; with the understanding, we will endeavour to do our best to aid and encourage those who wish to attain a correct and graceful style of expressing their thoughts.

Our preliminary remarks will have shown that the ideas to be expressed are the most essential in importance. In this, composition differs from other arts. A man may be a skilful cook without either meat or vegetables; he may be a good carpenter though destitute of a particle of wood; but he cannot possibly write a good composition or have any skill in the art if he has no subject matter at his disposal. It is a standing joke that French cooks can dress an exquisite dinner out of a pair of old boots or a few nettles; and in any case they can display their skill even with these unpromising materials.

But in composition the graces of style will not conceal poverty of matter; on the contrary, the latter makes the former repulsive. Sometimes a wealth of ideas may be conveyed in a homely or uncouth garb; but for this defect a remedy can be applied. "When the style is fully formed in other respects, pregnant fulness of meaning is seldom superadded; but when there is a basis of energetic condensation of thought, the faults of harshness, baldness, or even obscurity are much more likely to be remedied. Solid gold may be new-moulded and polished; but when give solidity to gilding?"

The first quality of style is perspicuity, that is the expression of our thoughts clearly and plainly. It is evident that the first step towards the attainment of this quality is to think clearly. A person may have full and clear ideas which he cannot express except obscurely; but no one can put before his readers or hearers, in a perspicuous manner, ideas which are to himself hazy and undefined. But a difficulty will be felt in this respect by the beginner, since his endeavours to *think* clearly will often be unsuccessful. Here the practice of composition must go hand in hand with the theory. A person often deceives himself with regard to the clearness of his notions respecting something which he has read; he may think himself fully master of the subject, until his endeavours to reproduce it upon paper show him the

contrary. Then the want of coherence in his ideas, and of a comprehensive notion of the subject becomes apparent; hence the great utility of practice even though the results be disappointing. We teach ourselves in this way to think more clearly regarding what we have read; and likewise we acquire the habit of reading much more carefully. Given two persons of equal ability, one of whom practices note taking or making otherwise abstracts of what he reads, and the other does not; then if both will sit down to study the same work, the former will read to much more advantage than the latter. Few of the author's thoughts escape him; and he is not deceived by the notion that he has acquired all the information conveyed, when perhaps many of the ideas have escaped him, and those which he has retained are crude and undefined. "Writing makes an exact man."

In our introductory observations upon Composition, we attempted to show the difficulties which are connected with its attainment and exercise. We there endeavoured to point out that the first requisites in Composition were ideas or thoughts. Composition is the art of expressing ideas or thought by means of words; without the ideas there can be no field or opportunity for the exercise of the art. We must have something to say before we try to say something. It is in this preparatory stage that the smallest portion of aid or instruction can be given; the materials must be had before the builder can commence the construction of the edifice. But when we have ideas, we can express them; and there is no one, not an absolute idiot who has not ideas of some sort or another. Therefore to every one of our readers more or less skill in Composition is attainable. This skill is serviceable in two ways, directly and indirectly. Directly, because we are thus enabled to communicate our ideas to others; indirectly, because we are likewise led to utilize these ideas in a greater degree than would otherwise be the case. Notions or thoughts are of various degrees of complexity; and sum are the result of others. We often have ideas floating through our minds in a vague sort of way; they have neither definiteness nor exactness. When we endeavour to give these ideas expression in words, we reduce them to shape and form; we see them more clearly and appreciate them more exactly. Then the deductions to which they lead stand out apparent; other ideas occur naturally and easily to our minds, and an increase of knowledge is the consequence.

A discourse, written or oral, upon any subject, may be compared to a building. We see a structure complete of the latter kind, and its sight may excite in us various feelings. We may consider it handsome or the reverse, large or small, capacious or incommensurable, suitable or unsuitable. But whatever character it deserves in these respects, we shall find that it is made up of parts, each intended to be subordinate to the whole; we find rooms, halls, staircases, passages, &c. Each of these parts, again, we find composed of certain materials and portions of materials; bricks, stones, mortar, &c. Every one of these latter must be considered in two aspects, first in itself, and second in relation to the whole of which it is a part. A room or hall may be good enough as regards size or height, and yet be quite unsuitable to the house to which it belongs. So also with the bricks or stones; a piece of marble will be out of place in the wall of a dilapidated hovel.

A piece of finished composition, a book, a pamphlet, or an elaborate essay resembles a house in this respect. It is like the latter, a whole which is made up of parts. It has chapters, sections, paragraphs, sentences. The analogy holds still further, as the chapters may be good in themselves, and yet unsuited to the work; and sparkling and striking thought embodied in a sonorous sentence

may present a sorry contrast to the mass of verbose rubbish with which it is surrounded. In planing or building either house or essay, we have to consider the materials at our command; and in using the latter, we must carefully keep in view the main design. To carry the illustration another step; when we have decided upon the design of our structure, and collected our materials, we employ the latter in detail; so in our Composition. Calling the entire work a theme, we must build it of paragraphs and sentences, and we put down the latter one by one.

We are thus led to the first element in our subject, a sentence. We have said that ideas or thoughts are the first essentials in Composition; a sentence is a complete thought expressed in words. In treating of sentences, and of other parts of our subject, we shall be compelled to repeat some of what is in every ordinary work on grammar; but this is unavoidable. The relation between grammar and Composition is so close, that repetition of one when dealing with the other is necessary. The essential parts of a sentence—essential as regards the expression of the thought—a. the *subject* and the *predicate*. When we give expression to an idea, there is always something of which we are speaking, and something which we say of it. The former is the subject; the latter is the predicate. In older works on the subject, sentences were divided into simple and complex, a simple sentence being defined as consisting of one member only, as "In the beginning, God created the heaven and the earth," and a complex sentence as one consisting of two or more members linked together by conjunctions, as "Doubtless thou art our father, though Abraham be ignorant of us, and Israel acknowledge us not." In modern works, however, sentences have been divided into simple, complex, and compound; and different definitions of each have been given. For the purpose of Composition, the number and the relation of the predicates form the most essential elements in sentences; and we accordingly take these as the basis of our definitions. A simple sentence is one which has only one subject and one predicate, as "The army was dispersed." A complex sentence has only one principal predicate, with one or more subordinate clauses, as "As soon as the guns were lost, the army was dispersed." A compound sentence has more than one principal clause, each of which may have any number of subordinate clauses, as "As soon as the guns were lost, the army was dispersed; and the campaign, from which so much had been hoped, proved completely disastrous." The tyro in Composition must then, when going to write down or otherwise express an idea, have something to speak of and something to say of it; and he must likewise connect these two elements together. That which serves as the link between the subject and the predicate is called the copula. Having determined upon the subject, predicate, and copula, the next point to be considered is, how they are to be arranged. "This, it must be owned, has a very considerable influence in all languages, and yet there is not anything which it is more difficult to regulate by general laws. The placing of the words in a sentence resembles in some degree the disposition of the figures in a history-piece, as the principal figure ought to have that situation in the picture which will, at the first glance, fix the eye of the spectator, so the emphatical word ought to have that place in the sentence which will give it the greatest advantage for fixing the attention of the hearer." In every language, there is a natural order which the words in a sentence take—natural that is, to the particular language. What is natural in one language is the reverse in another; thus in the English language, the objective case of the personal pronoun is placed after the transitive verb which governs it; in

French, it is invariably placed before it. One collocation is no more natural or unnatural than the other; each is correct in its place. In English, the natural order for the construction of a sentence is to place the subject first, the copula next, and the predicate last. "The temperament of the language is phlegmatic, like that of the climate. When therefore, neither the liveliness of representation, nor the warmth of passion serves, as it were, to cover the trespass, it is not safe to leave the beaten track. Whatever is supposed to be written or spoken in a temperate mood must rigidly adhere to the established order, which with us allows but little freedom. What is said will otherwise inevitably be exposed to the censure of quaintness and affectation, than which perhaps no greater censure can do greater prejudice to a speaker or writer." To a beginner, it is never lawful to depart from the beaten track; he must, therefore, be content to walk in the old ways. This, though a check, is at the same time a guide. When teachers set pupils to write an exercise or a letter, the latter find the first step the most difficult. They stop, glance helplessly at the paper, look around them in despair, or begin to whisper. The teacher must aid them by asking them what they wish to say first, and then showing them how to say it. He must give their thought in as simple a form as possible; the expression may be bald provided it be clear. When the pupil sees that a very simple sentence will suffice, he is encouraged to proceed. When he is shown how to put what he wishes to speak of first, and what he has to say of it afterwards, and to trouble himself about nothing else, the formidable difficulties which surrounded the beginning dwindle away.

In our next lesson, we shall give some rules and examples relative to the construction of sentence.

Hints to Teachers.

When you enter the school-room do not wear upon your face a frown. Nothing will so discourage a young scholar (or even an older one), as to look up, expecting to receive a pleasant smile, or, perchance, a kind word, and instead, see nothing but sternness, or "ugliness," as he will term it. And as he takes his seat (not cheerfully by any means), and attempts to study, that dark frown rises up before him, like some omen of evil, and he throws aside the book he has been trying to study. He takes up another, goes through the same process, and throws that down. He sees nothing that is interesting. And they are as meaningless, to him, as so many dumb images. He sinks into a listless mood, from which he is awakened by hearing his name called, to come to his class. There he assumes an indifferent, or "don't care" attitude, which is very annoying to you. Now you use every means in your power to interest him. But to no avail. You touch upon his favorite theme, hoping to awaken him from his stupor. Here is a difficult problem in mathematics; that you know he has been trying to solve. You put it upon the board, give one of your *best* solutions, and then look round, feeling *sure* that his eyes are all aglow with interest, amounting almost to enthusiasm. But you are doomed to disappointment. He is amusing himself by playing with one of the little ones on the seat behind him. You excuse the class, and as he takes his seat your eyes follow him, and you wonder what has come over him, not once thinking that you were to blame. Everything has gone wrong through the day. And why is it? you ask. Just because you began the day with a frown. Enter upon your duties as though they were real pleasures, instead of hard tasks, by which you were

obliged to earn your daily bread. Do what you do with a willing, cheerful spirit, and not grudgingly, as if you were anxious to get through with the day's work. You have a small and easy school, perhaps, but you can't take it up and throw it down at your pleasure, as you would "knitting-work." And this is the point on which so many of us fail. We must keep up a good degree of interest, even in the smallest schools. If we fail in this, we fail to do our duty.

Do not hesitate to let your scholars know that you feel interested for them, and are doing all you can to promote their happiness and well-being. If at any time you see a pupil looking sad, or perhaps forsaken, do not shun him. You may not succeed at first. But be not discouraged; "try again;" and after a while you may be able to find out the cause of his sadness. Do not on any condition "give over" after you have once determined to know the cause of his grief. For if you do, it will prove an injury, rather than a benefit. He will think that you have ceased to care for him, and he will not care for himself. Speak kindly at all times, and let no harsh words pass your lips. "Kind words cost nothing, but are worth much."

Do not rule over your scholars as if they were your slaves, and were put there to work for your benefit. But teach the scholar that he is at work for himself, and that he will receive the benefit and not you. Teach him that God has given him to improve, and not to waste. "And for the manner in which he improves them, he will have to give an account in the last day." Teach him all this, in a plain, simple way, so that he may understand it. Never try to teach a scholar what you *know* he cannot understand. By this, I mean, what you do not really understand yourself. And if it is too hard for you to understand, how, I ask, can you make it clear to a scholar? And even if it is clear to you, do not expect him to understand it as easily as you do. If he is very dull, do not upbraid him, but deal kindly with him, and do not let him know that you ever feel discouraged about him, or ever despair of his success. His image is before you in your waking hours at night, and haunts you in your dreams. Let nothing that you can do to assist him be left undone. He sees it in a different light, and takes new courage. Do not let any kindness he may render you pass unheeded, be it ever so trifling. Thank him with your eyes, if you do not say it with your lips. You will be well paid by seeing a glad smile of happiness upon his face, that you do not remember of seeing before. Many times have I looked for kind words from my teachers when I have been studying hard and have got discouraged, but have received none. And many times have I received only a smile from my teachers, and it has lasted through the day. And ever and anon it would come up before me like a ministering angel, and I would feel new courage, and the task that once seemed so *hard* was accomplished, and I came off victorious.

And now let us take courage, and strive together to do our duty, and our *whole* duty, to the pupils placed under our charge.—*Maine Journal of Education.*

Can we Make Diamonds?

The following paragraphs are extracted from an exhaustive article on the diamond and other precious stones, by M. Babinet, of the Institute of France. It was translated for the Smithsonian Institution and is contained in the report for 1870.

What is the diamond? It is the most rare and most priceless of minerals. What is carbon? It is one of the

most common of known substances, found in the earth in immense quantities and furnished by all plants and trees in great abundance. The diamond is priceless, since one of pure quality, of the weight of a twenty-five-franc piece—that is, of 125 carats—will have a money value of at least four millions of francs. Now, the value of an equal weight of carbon is scarcely anything, and yet the two are identical; the diamond is only carbon crystallized. Every one knows that if a body is dissolved in a liquid—for example, common salt, saltpeter, sugar, or alum, in water—the deposit left by evaporation of the liquid will present regular geometrical forms. Salt assumes a form identical with that of playing-dice, to which the Greeks gave the name of cubes; saltpeter presents elongated bodies with four flat sides and square ends; sugar takes the form known as rock candy; and finally alum crystallizes into pointed pyramids. This latter form is precisely the same as that under which nature presents us with the crystals of carbon called diamonds.

As soon as the character of the diamond was discovered, chemistry aspired to emulate nature in producing the gem from carbon; but up to this time science has been baffled in her attempts—nature has never been induced to reveal the secret of her process. These geometrical products of nature, when not worn by attrition, are as smooth and as polished as the finest cut-glass. Colored crystals are also produced by nature as well as white ones. The red ruby, the blue sapphire, the green emerald, the yellow topaz, the violet amethyst, and the crimson garnet are all the products of her unrivaled laboratory.

Chemistry, it is true, furnishes us with hundreds of crystals of different forms, according to the character of the substances of which they are composed, and many of them are not found in mineralogy. Nature, however, as by way of revenge, has produced in the course of ages, and under the influence of actions, scarcely as yet recognized, crystals which art, directed by science, has not been able to imitate. Such is emphatically the diamond, and many other minerals not embraced among gems. To the study of these geometrical forms, whether the products of nature or of art, the celebrated Haüy, about the beginning of this century, gave many years of his life, and out of this study created a new science, one of the titles to glory in the human mind.

The old alchemists contended that the philosopher's stone could be produced from the commonest substance possible, and nature seems to have favored this idea in producing the most costly gems from the most worthless materials. She converts, as we have seen, a small quantity of black and friable carbon into a transparent diamond of a hardness and brilliancy unequalled. She takes a little of the glazing which the potter uses in his ordinary operations, and, coloring it with a trace of iron, produces a ruby or sapphire. From a little worthless pebble, with slight additions, she forms the topaz, the emerald, and the amethyst. Some of the last named gems have been reproduced in the furnaces of Sevres in the same manner, without doubt, as nature has elaborated them, in her vast volcanic workshops, by those mysterious operations which have given to Vesuvius the title of the great crystal manufactory. Every one knows of the sarcasm with which Rousseau reproached the chemist Rouelle, demanding of him that he should produce corn from the chemical materials of which it was composed, rather than destroy that already made in its analysis. What would he say if he had seen the chemist produce carbon from the diamond, as readily as from a bit of wood or sugar, while he was powerless from the carbon to create the precious gem?

After the consideration of crystallized minerals in nature, we should attempt the imitation of them in the laboratory. I do not mean such imitation as paste and color produces. I refer to the reproduction as nature gives the gems to us, and propose the making of real precious stones, such as has been attempted in the case of the diamond. I have already said that Ebelman, at Sevres, has crystallized aluminium and silice thus making a true *spinella*. M. Despretz, in the experiments by which he has volatilized charcoal and the diamond, has also melted aluminium and silice. He has obtained from these substances little hollow spheres, lined inside with crystals, like the cavities which are found in mines containing crystals of various kinds. In all the experiments of Despretz, the exceedingly intense heat which he produced by electricity only served to dissipate the particles of the diamond without producing any crystallization. It is therefore evident that the diamond is not an ingenious production. Its origin is probably electric; but what was the epoch of its first production from ordinary carbon, and where did its crystallization begin?

According to Mr. Bontigny the carbon of the earth comes from showers of hydrogen, united with carbon, which watered as it were the earth when it was too hot to receive ordinary rains. We have not yet seen the bearing of this hypothesis of the crystallization of the diamond. I have already said that sulphur and carbon, in uniting together, produce a liquid as limpid as water or pure alcohol. Now, with this it might be well to try the following experiment; Having filled a strong iron bottle with the liquid, and having covered it with an iron stopper, firmly screwed into the neck, I would place it in an oven at 200 or 300 degrees centigrade of heat. At this temperature the iron of the bottle and the sulphur would possibly react upon each other and enter into combination. Now, the sulphur, uniting with the iron, would leave the carbon free, which might thus slowly arrange itself in the crystalline form. I merely propose this experiment, which might require a long-continued heat of uniform temperature, to illustrate the play of chemical affinity.

Something Wrong with the Sun.

(From the London Spectator, Aug. 3.)

It will not be unknown to our readers—in these days, when every one knows everything about the sun—that astronomers no longer confine their attention to the actual aspect of the solar orb. By a contrivance which need not here be described, the astronomer can tell what is going on in a certain gaseous envelope surrounding the sun, which to ordinary telescopic research is altogether invisible, except during eclipses. This envelope, some 4,000 or 5,000 miles deep, is called the chromosphere [by purists, the chromatosphere], and consists in the main of glowing hydrogen, but in its lower strata contains the glowing vapours of sodium, magnesium, and many other elements. These, however, are ordinarily so low down that they can scarcely be recognised under the ordinary conditions of the new method of observation, except here and there round the sun's disc. It is as though our earth were examined by some highly ingenious astronomers in Venus or Mercury, who could recognize at times the vapour of water in our air, where it rose pretty freely and to a considerable height above oceans, but not over the continents, because less vapour there arose into the air. Only, in the sun's case, the vapours are not, like the vapour of water on earth, at a cool and pleasant temperature, but are such vapours as rise above the molten surface of

metal in our furnaces. They are at so high a temperature that a wind of such vapour, blowing, as such winds do, over the surface of the sun, would be competent to reduce our earth in a few seconds to vapour likewise.

Now certain Italian spectroscopists—Respighi, Secchi, Tacchini and others—have set themselves the task of keeping a continual watch upon the solar chromatosphere. They draw pictures of it, and of the mighty coloured prominences which are from time to time upheaved out of or through, the chromatospheric envelope. They note the vapours which are present, as well as what can be learned of the heat at which these vapours exist, their pressure, their rate of motion and other like circumstances. It was while engaged in some of the more difficult and delicate of these tasks that Tacchini noticed the strange occurrence now to be described.

"I have observed a phenomenon," he says, "which is altogether new in the whole series of my observations. Since May 6, I had found certain regions in the sun remarkable for the presence of magnesium." Some of these extended half way around the sun. This state of things continued, the extension of these magnesium regions gradually growing greater, until at length, "on June 18," says Tacchini, "I was able to recognize the presence of magnesium quite round the sun—that is to say, the chromatosphere was completely invaded by the vapour of this metal. This ebullition was accompanied by an absence of the coloured prominences, while, on the contrary, the flames of the chromatosphere were very marked and brilliant. It seemed to me as though I could see the surface of our great source of light renewing itself." While this was going on Tacchini noticed (as had frequently happened before in his experience) that the bright streaks of the sun which are called *faculae* were particularly brilliant close to those parts of the edge of the disc where the flames of the chromatosphere were most splendid and characteristic. The granulations also, which the astronomer can recognize all over the sun, when a large telescope is employed, were unusually distinct.

Tacchini concludes, and the inference seems just, that there had not been a number of local eruptions of magnesium vapour, but complete expulsions. Only we would venture to substitute for the word "expulsion" the expression "outflow" or "uprising," since it may well be that these vapours rise by a quiet process resembling evaporation, and not by any action so violent that it could properly be regarded as expulsive.

In whatever way, however, the glowing vapour of magnesium thus streamed into the envelope of the sun, it would seem that the aspect of our luminary was modified by the process—not indeed in a very striking manner, or our observers in England would have noticed the change, yet appreciably. "More than one person," says Tacchini, "has told me that the light of the sun has not at present its ordinary aspect; and at the Observatory we have judged that we might make the same remark. The change must be attributed to magnesium."

It is impossible to consider attentively the remarkable occurrence recorded by Tacchini without being struck by the evidence which it affords of solar mutability. We know that during thousands of years our sun has poured forth his light and heat upon the worlds which circle around him, and that there has been no marked intermittence of the supply. We hear, indeed, of occasions when the sun has been darkened for a while, and we have abundant reasons for believing that he has at times been so spot covered that there has been a notable diminution of the supply of light and heat for several days together. Yet we have had no reasons for anticipating that our sun might permanently lose so much of his heat and lustre

that the inhabitants of earth would suffer. Tacchini's observation reminds us, however, that processes are at work upon the sun which admit of being checked or increased, interrupted altogether or exaggerated so violently (as it were), that the whole aspect of the sun, his condition as the fire and lamp of the planetary system, may be seriously affected.

If we only remember that our sun is one of the stars, not in any way distinguished, unless perhaps by relative insignificance, from the great bulk of the stars which illuminate our skies at night, or are revealed by the telescope, we shall learn to recognize the possibility that he may undergo marked changes. There are stars which, after shining with apparent steadiness, for thousands of years, (possibly for millions of years before astronomy was thought of), have become suddenly much reduced in brightness, or after a few flickerings (as it were) have gone out altogether. There are others which have shone with equal steadiness, and have then suddenly blazed out for a while with a lustre exceeding a hundredfold that which they formerly possessed. It would be equally unpleasant for ourselves whether the sun suddenly lost the best part of his light, and presently went out altogether, or whether he suddenly grew fifty-fold brighter and hotter than he now is. Yet in the present position of sidereal astronomy it is quite impossible to assert confidently that one event or the other might not take place at any time.

What we owe to science.

That we may be able to take a fair view of the field before us, it will be necessary to consult history as to the social and industrial condition of the world when the achievements of Science—though considerable—were by no means such as they are now.

Let us, therefore, consulting the most approved historians—Shakespeare, Froude, and Macaulay—go back in our review some 400 years or so, and consider the state of the European people, and chiefly of the English, from that time till about 200 years ago, when Newton was announcing his grand discoveries in Science.

This may properly be considered as the commencement of the *bright era* of Physical knowledge, though it had begun to dawn on the morning of the sixth day. From time to time, as our race grew old upon earth, it had shot forth streamers and emitted coruscations dazzling the minds of men, as one bright genius after another flashed across the intellectual firmament. The light thus cast, though bewildering at the moment, did not fade entirely away; for in the glimmer, men managed to get a little knowledge.

This dawn, which ushered in the bright morning of our *science period*, embraces the discovery of America, the introduction of gunpowder among the munitions of war, and the establishment of the printing-press. The discoveries of Galileo in optics, and of Copernicus in Astronomy, were also made during this period. In the latter part of it Napier made his grand discovery.

After the Alphabet and Numerals, I have always thought the invention of Logarithms was the grandest mental—purely mental—achievement, ever accomplished by man. In all other great conquests of mind over matter, nature has assisted. She has given us hints; she has suggested; she has prompted and given us clues which led up into her chambers of knowledge. But then, after

* From a lecture delivered before the First and Second Classes of the Virginia Military Institute, by M. F. Maury, LL. D., Professor of Physics.

we saw and began to take her hints, how long did it take, with the clues thus placed in our hands, to follow them up, develop her laws, and then get at practical results? Look at falling bodies, and Newton with his gravitation. Look at fire and water and the hissing steam, and the attempt to utilize this force, and see what slow progress man was then able to make. First there was Hero 2,000 years ago, with his *Æolipile*;—then 1,800 years after that, came Blasco de Garay with his attempt to harness steam;—to be followed 12 years later by the Marquis of Worcester (1633); but still with nothing *practical*. In 1699 they began to see light, for that year Savery came out with his invention, which 6 years afterward Newcomen, the blacksmith, had contrived to rig up into an Atmospheric Engine. But it was not till 100 years ago, that man had learned enough about steam to break it to work and give us Watt's Steam-Engine. Look at the force of the wind and the weight of the atmosphere, and see how slow we were there with all the promptings of nature. Again, how many colors had faded in the sun, to suggest photography, before there was any one to take the hint? As long as there have been eyes to see and imaginations to behold, the rainbow has hung aloft, proclaiming that the light of the sun is seven-colored. Newton—only 166 years ago—was the first to see that it is so. Yet it has taken us all the time since to develop the discovery and expand it into that glorious achievement called *spectrum analysis*, by which we mount up to the sun and wander forth among the stars, examining them, trying them, pulling them to pieces, and telling what they are made of.

All these things have been of slow march and of gradual development. But Napier with his Logarithms was perfection at once; only with a *radix* a little less handy than that now in use. The rhythms of nature gave him no hint, and what, let me ask, would applied mathematics be without Logarithms? A fleet without a flag, a ship without a rudder! Without Logarithms, mathematical computation was as slow, up-hill, and tedious work, as sawing with an axe would be now.

The Tudors, the Stuarts, and Cromwell figured at the time of this *dawn* of science. Under its rays the great Armada was fitted out, the Inquisition raged, and Spain was in the height of her glory—the foremost for enterprise and power among the nations.

Then, Chemistry had not attained the dignity of a science. Those who claimed to be students of it were called "Alchemists," whose researches had for their object the discovery of the "Elixir of Life," of a universal menstruum, and of the "Philosopher's stone," which was to convert all metals into gold.

Neither was the Galvanic Battery, nor the Voltaic Pile, nor the Thermo-Electric Battery, nor Magneto-Electricity, nor Electro-Magnetism then known to Science or the Arts. In the latter part of this period, Harvey (1628) discovered the circulation of the blood. But the human mind was at that time incapable of appreciating this great conquest; and instead of receiving from his contemporaries the homage due to merit, he was made the object of their vindictiveness. Surgery did not begin to reap benefits from this achievement for many years. Cupping, leeching, and bleeding, together with surgery, continued to be left to the barbers;—whence their striped poles for signs at the present day. The amputation of an arm or a leg was almost certain death; for, instead of tying up the arteries to stanch the blood, the practice was to plunge the stump into a cauldron of seething pitch.

Astrology was then, it is true, beginning to give place to Astronomy, but Astrology even then was to Astronomy, as we understand it now, what Legend is to History—what alchemy was to Chemistry. The discovery of the

polarization of light, of photography, and of the elastic force of steam, the invention of the steam-engine and of the cotton-gin, of the power-loom, the magnetic telegraph, the steamship, and the railway, had not been made: these forces and appliances were all unknown in the age upon which I wish first to fix your attention, and as to the manners and customs of which, I am about to draw for you as faithful a picture as I can.

The people of those twilight times of sciences had already learned to utilize many of the physical principles which had been revealed to them, and were, in comparison with their ancestors, high up in the scale of civilization. Nevertheless, the difference between the condition of the masses *now*, and of the masses *then*, is sufficiently marked to show how much we owe to that knowledge of the laws of nature and the properties of matter which the revelations of science have placed at our service. Remember, *this* is the kind of knowledge which is *power*. It is physical law; and it was physical law which the Creator called into play, and with which He fashioned the earth and garnished the heavens. And nations are powerful—I will not say good—but great and mighty, precisely in proportion to their attainments in this kind of knowledge. Compare the heathen people with the Christian nations. Which have the most enlarged comprehension of the laws of nature? I estimate the heathen population of the world to be eight or nine hundred millions of souls; the Christian about half as many. Yet, for prowess and achievements in all those feats and fields which call for power, there are Christian nations that, single-handed and alone, could withstand the entire heathen world combined—so vast are the powers of science.

To realize how high we have been lifted—not in military glory, but in industrial resource and material prosperity—by even the little knowledge which we have as yet been able to gain from this great volume of nature, and to see how far it has placed us above our ancestors of not more than two centuries ago, accompany me retrospectively, if you please, in a short visit to England, that we may see how that country looked and her people fared in those times.

The state of agriculture was such that the productions of the island were held to be up to its capacity: the population—at one-fourth its present amount—remained stationary for generations. The wealth of the nation was in its sheep; and as a memento of how the prosperity of the realm depended upon wool above all other things, there is in the House of Lords at this day the wool-sack, upon which the Lord Chancellor is required to sit, bolt upright—for the seat is provided with neither back nor arms—that it may indicate that two hundred years ago, wool was at the foundation of the national prosperity, and that the wise men then thought that the kingdom required no other support.

Of course there was then but little commerce, and no internal improvements; whereas, now, other things have taken the place of wool in the industries of the realm, so that two-fifths of all the international commerce of the world is at present conducted under that flag, with wool and woollens, in considerable quantities, it is true; but, as considerable as they are, they by no means the chief articles of commerce. Then, nearly half of the entire country consisted of moors and fens, or of lands that were unarable and considered irreclaimable. Cultivation was in a rude state, yielding to the acre about one third of what it does now. The country of the North, especially about Newcastle, where there are now the most extensive chemical works in the world, was inhabited by a people said to be as rude as our wild Indians.

In the damp and rainy climate of England, the roads,

such as they were, were for the most part impossible for the transportation of produce and merchandise. Highways were infested by freebooters and robbers, who made travelling dangerous, and who were hunted by blood-hounds kept for the purpose by the parish. So that there was but little travelling in those days; and it not unfrequently happened that people in one part of the realm were starving of hunger while those in another—and not a distant part—had enough and to spare. On the best roads—as that from Birmingham to London—transportation was slow and uncertain, costing, it is said, fifteen times as much as is now charged between the same places by rail.

London, two hundred years ago, was a little over one-third larger than St. Louis now is, and there was no other town in the kingdom larger than our Petersburg. The drainage was bad, the streets were unlighted, narrow, and filthy, so that the death-rate in London averaged 1 in 23. It is now 1 in 40. The houses were of wood, relieved here and there by a more pretentious building of badly-burned brick. The shops and stalls projected far into the narrow streets, and were overhung by balconies—as a Chinese city—so that it was often difficult and frequently impossible for two carriages to pass each other. To keep out of the way of the mud, which was splashed right and left by the vehicles, the foot passengers hugged the wall. When two gentlemen met, the timid gave way, the bold took it. If it was disputed, there was a call for "pistols for two, and coffee for one."

The shops were by no means such as they are now; and as for the commerce and wealth of the city, it has been estimated that the merchandise in London alone is now, any day in the year, worth more than that of all England was then. The nobility in the provincial towns, instead of rolling through the streets, as they now do, in their elegant carriages and fine turn-outs, were followed along the dirty streets by trains of servants in rich liveries.

The *London Gazette* and *The Observer* (neither larger than a fly-leaf) made their appearance twice a week, about this time; but though any person might print at his own risk a sermon or a poem, the courts decided that this liberty did not extend to *Gazettes*, and that by the common law of England, no man, unless authorized by the Crown, had a right to publish political news. So the people had small knowledge of what was transpiring in the world.

The post-office was a new institution, and at the end of a whole generation after its first establishment, its revenues, derived not from letters alone, but chiefly from the hire of post-horses, which at that time was a perquisite of the establishment, amounted only to £20,000 a year. There were men in those days—who, like the newspaper correspondents of the present age—made their living by writing *news letters*, and sending them to the universities and to the towns, where they were received once a week, eagerly read, and then passed from hand to hand through the neighborhood.

Edward VI. had in his parliament peers of the realm who never wrote their names, but had a mark to themselves, like Jack Cade's honest plain-dealing men.

The domestic discipline, like that of the shop and school-room, was harsh and severe: masters whipped their servants; and husbands who beat their wives did not lose caste in decent society. As soon as a boy attained the age of seven years, the father was required to furnish him with a bow and two arrows, and to practise him in the art of shooting till he attained the age of seventeen; after that, till he was sixty, he was compelled to have at least one bow and four arrows.

During the period of which I treat, the wages of farm-hands rose from 1 d. to 2d. a day; farmers in this country

—and there too—now pay forty times as much. The average price of wheat was for many years 20 cts. the bushel; and of meat 1 ct. per pound. The wages of mechanics (they *finding* themselves) were fixed by law at 6d. a day in Summer, and 5d. in Winter. One person in every five received relief from the poor-rates; it is now only one in every eighteen, and we think that enormous.

Under Henry IV., the average income of an earl was £2,000; and the expenses of the Court in 1509 (which included the entertainment of ambassadors, the wages and maintenance of the guard, servants, and the whole cost of the King's establishment) was about £14,000; not as much as many noblemen and private citizens of that country now possess, nor as much—by half—as many planters among us enjoyed before the war. The average income of a farmer in those times was between £60 and £70. There were no large manufacturing towns then; all classes wore homespun, and every farm of sixty acres was required to have at least a quarter of an acre in flax, that the women might have occupation in working it up; as for cotton, the total import from this country, in 1770, was four bales. It is almost needless to say that self-acting machinery could scarcely have been employed in the art of spinning in that day; for though Napier had invented Logarithms, steam had not yet come into play.

It is curious and instructive to mark how inventions and discoveries have a sequence, as if it were in obedience to some natural law; and that they come one after another as the world is ready for them. You could not have had ocean steamers one hundred years ago, simply because the instruments of navigation were too rude, the astronomical tables too much in error, charts too faulty, and the whole science of ship-husbandry and navigation too imperfect for the safe conduct of an ocean steamship, such as are now seen daily walking the waters of the Atlantic; and so the manufacture of textile fabrics could never have attained its present proportions, even with steam, but for Logarithms.

You know that the thread, as it is spun, passes from the spindle to the spool to be wound; and as the spool grows, it must alter its rate of revolution, so that it may always take up the thread just as fast as it is spun—no faster, else it will break—no slower, else it will tangle. Now it was one of the nicest problems in mathematics—the elements of a comet and the prediction of its return are plain sailing to it—not only to develop the formula of the winding spool, but to tell how many revolutions the spool should make in a given time at the first going off, what should be the rate of decrease till it was full, and give a mechanical expression to it all.

The tonnage of the whole kingdom was about 200,000 tons. Now the tonnage of the steamships of Liverpool alone amounts to more than ten times as much.

The trade with the American Colonies made Bristol the chief shipping port of the kingdom, but some of it was of a savage kind. Men of high position, the mayor among them, did not hesitate to engage in the business of kidnapping their fellow-subjects, and sending them over to the plantations for sale. Other ports did the same.

Nor was it possible, with the state of science at that time, to develop the mineral resources of the realm or to bring mining up to the proportions of a large industry, simply because no such thing was known to science as a force-pump: mines had to be kept clear by bone and muscle; consequently, shafts could not be sunk where the water-veins were strong, nor could the mines be very deep. Now we have well-drained mines as far down as two thousand feet below the surface; and in England there is a gallery under the ocean half a mile long, from which the sea is kept out by calking with oakum the rifts in the vein.

Two hundred years ago, tin (of which the yield was about 1,600 tons) was the chief mineral product in Great Britain. The copper mines were undeveloped; indeed, the existence of that mineral is said, at that time, not to have been known. Now the annual production of tin alone is worth twice as much as was the production of all the English mines of all kinds two hundred years ago.

The increase of lead, coal, and iron is still more marked. The great pyramid of Cheops in Egypt is said to have required in times gone by, twenty years for 20,000 men to raise. But now, with the power which increase of knowledge has given, there is raised in England from the bowels of the earth, coal enough in every ten working days throughout the year to make a pile altogether as large as the largest of the Pyramids.

But still the English masses of those by-gone days were—if we may believe their chronicles—in a far better condition than were those of any of the Continental nations.

A state paper in the time of Henry VIII, goes into ecstasies upon this subject. "What," says it in the quaint language of the day, "what Comyn folk in all this world may compare with the Comyns of England in riches, in freedom, welfare, and all prosperity? What Comyn folk is so mighty, so strong in the feld as the Comyns of England?"

Thus you see what was the condition of that great English nation, that is said to have attained the highest degree of civilization in Europe, two hundred years ago. You have seen how little, comparatively, was the progress made by her in the first half of our period—and how meagre were the discoveries made in science, in comparison with the progress and the discoveries that have been made within the last two hundred years.

It is not overstepping the limit of probability to say that, in consequence of the acquisitions in physical knowledge within the last two centuries, the capacity of the earth to sustain population has been more than doubled. Did I not speak rightly when I called physical knowledge *power*? It has enabled man, in the short space of two centuries, to create another earth as it were, for, by doubling the capacity of this one to sustain population, it has been proportionably enlarged as his habitation. Every new force gathered from nature is another step to the ladder by which man rises in the scale of intelligence and in the excellence of power.

The Education of Citizens.

DOUGHT ANY KNOWLEDGE OF THE QUALIFICATIONS AND DUTIES OF CITIZENS BE TAUGHT IN THE SCHOOLS OF A FREE STATE?

The legal maxim, "*ignorantia legis non excusat*," is a valid reason for every citizen acquiring a competent knowledge of the laws which are the guardians of his rights, and the rules of his conduct as a citizen. The laws of England are a rich inheritance, founded upon sound principles and tested by the experience of many generations. Many of those laws are a continuation of the immemorial customs of the past, and some of the ancient laws of Alfred the Great and of good King Edward are still in force among us. A knowledge of the laws and enactments of the country in which we live is a necessary part of the education of every citizen. It was so regarded in the times of Cicero, who informs us (*De Legg. 22: 3*) that the Roman youth were set to learn by rote the laws of the ten tables as a necessary part of their education. It was deemed indispensable to imprint on their tender

minds an early knowledge of the laws and constitution of their country. History among the Romans was not composed merely to gratify curiosity, but also to inflame the minds of youth by the force of example, and urge them on to emulation. "I have regarded these things," writes an old Roman annalist, after giving an account of Regulus, "that they who read my commentaries may be rendered by his example greater and better."

The chief object of the constitution of this country is the maintenance of civil and religious liberty. This liberty consists in the power of a citizen to do whatever the laws permit, and to submit to those rules by which the weak is protected from the strong, the poor from the oppression of the rich. As every subject is interested in the preservation and observance of the laws, it is the duty of every man to become acquainted with those laws at least, which concern his duties; for how can a man perfectly do his duty if he be ignorant of what he ought, and what he ought not, as a citizen to do. Every man ought at least to know the laws which concern himself in his daily life, and the great objects and principles on which all the laws of the constitution stand. Every citizen who contributes to the rates for the house or dwelling he inhabits, is invested with the highly responsible power of voting for the return of persons to legislate in the Lower House of Parliament. Every such citizen may also be called to sit on a jury for trial of his equals in matters of life and death. Other duties of a citizen might be named which cannot be rightly discharged with benefit to the public without some degree of exact knowledge of the laws.

It is obvious to common sense that some other qualifications are needful in citizens besides a mere knowledge of the laws, if the constitution of a State is to be maintained in a healthy condition. If a man be a pauper, an idler, or a violator of the laws, it would not be wise or prudent to invest such a person with the privileges of citizenship. It is not unnatural to expect that such persons would elect as legislators such men as would be more disposed to unsettle than to maintain the laws which secure the rights of property, whether inherited or gained by honest toil. The old proverb is true—"He that hath nothing, is nothing" in the citizenship of States; and such a person cannot be trusted either to make laws or to elect others to make laws for those who have something to lose.

To persons of wealth and property, a knowledge of the laws to a greater extent, is not only useful, but necessary for the faithful discharge of the higher responsibilities and duties which devolve upon them both in public and private life. Such persons are liable to be summoned on grand juries, and sometimes on special juries, where, by their verdict, they have to establish rights, estimate injuries, weigh accusations, and sometimes dispose of the lives and property of their fellow citizens. The language and forms of expression peculiar to all laws require more care and attention to be understood fully and completely than is commonly supposed by a person not conversant with the exact and technical forms of law. The importance of the proper and exact words being employed in wills and bequests is illustrated by the cases which not unfrequently are brought before Courts of law. When questions of law and fact are closely involved and blended together, it is not possible to discriminate and decide such questions without a knowledge of what the law really is.

Again, there are those whose position in life is such as to qualify them to be invested with the power of a magistrate. Such a person should have a perfect knowledge of the common and municipal law, if he is to administer justice according to the law, and not according to his own ignorance and prejudices, or the interests of his class. A

magistrate well skilled in the law, may be the most useful man in his neighbourhood, in giving countenance to the peaceable and industrious, and discountenancing the idle and dissolute, as well as by healing party feuds and preventing vexatious litigations. An exact and extensive knowledge of the laws and their history is still more needful for such persons as are desirous of sitting as legislators in the Commons House of Parliament. Those representatives of the people who are ignorant of the old laws, can scarcely be well-qualified to vote for new laws. They are invested with the highest trust, to resist questionable or dangerous innovations, and to promote the adoption of improvements in the laws, and to transmit them to the next generation amended, and, if possible, better adapted to secure the well-being of all classes of the community. The House of Commons ought especially to be the people's guardian of the Constitution.

It is needless to state how much more important is a full and exact knowledge of the laws to the Lords Spiritual and Temporal, whose legislative functions continue during the whole period of their lives from the time when they take their seat in the House of Peers. The science of legislation is perhaps the more difficult of all sciences, and notwithstanding its importance, is so despised as to be unworthy of the attention of almost every one who does not follow it as a profession. The neglect of the laws by the class from which our hereditary legislators are supplied, appears to support the presumption that the knowledge of the laws of their country descends to them in the same way as the property of their ancestors. Cicero, himself no mean jurist, has left on record (Legg. 3 : 18) that, "it is necessary for a legislator to be thoroughly acquainted with the constitution of his country;" and this he declares "is a knowledge of the most extensive nature—a matter of science, of diligence, of reflection, without which no senator can possibly be fit for his office."—(*The Schoolmaster.*)

Protection from Lightning.

However much we may be disposed to exult in the alleged fact that Franklin's invention has robbed the skies of their terrors, it is nevertheless true that the amount of damage to life and property, occasioned every year by lightning, is something appalling. To those who think of the subject for the first time it may perhaps appear that the danger to which we are exposed from lightning is very slight; but those who have carefully noted the number of persons injured by lightning during the course of the year are aware that the risk of accident from this source is greater than that incurred by travellers on our railroads; in other words, that the number of persons killed by lightning is greater than that killed on our railroads. Thus, during the ten days succeeding July 3, 1872, no less than fifteen persons were killed by lightning in the Northern States. A succession of three railroad accidents, in each of which five persons had been killed, would have horrified the community; but these fifteen deaths by lightning seem to have attracted very little attention. When we come to extend our investigations over a longer period, we find substantially the same results. Poey, in 1855, found that, during the preceding twelve years, there were recorded 262 cases of persons that had been killed, and 430 injured; while, of course, as every one knows, the cases that escape the notice of the statistician are generally quite as numerous as those that are recorded. In France, during twenty nine years, an average of 77 persons lost their lives, and 232 were injured, per annum, as may be seen by referring to the

report of Boudin, presented to the Academy of Sciences, in 1874. The most perfect records were kept in Mecklenburg, where it was found that one person was killed out of every 247,200 inhabitants. Now, on English railroads, the death-rate is one for every 1,256,290 passengers; and, in France, the death-rate is one for every 1,955,555 passengers. In short, statistics fully bear us out in saying, that, on our worst-managed roads, the percentage of passengers killed is not as great as the percentage of the whole population that is killed by lightning. These melancholy facts should lead to an earnest consideration of the best means of avoiding lightning-strokes; and, fortunately, it is the opinion of our most judicious and most thoroughly informed men that all danger from this source may be avoided, at least in ships and houses. In the British navy, where the very perfect system of protection devised by Sir William Snow Harris, is in use, injury by lightning has become a thing almost unknown; while, previous to its adoption, the material loss was valued at \$250,000. The Cathedral of St. Peter, in Geneva, although so elevated as to be above all other buildings in the neighborhood, has for three centuries enjoyed perfect immunity from damage by lightning; while the tower of St. Gervaise, although much lower, has been frequently struck. This doubtless arises from the fact that all the towers of St. Peter are accidentally furnished with very perfect conductors. The great column of London, known as the Monument, erected in 1677, in commemoration of the great fire, although over two hundred feet in height, has never been struck; while much lower buildings in the vicinity have not escaped. The Monument, however, is protected by a most perfect conductor; the upper end terminating in a vase, from which proceed numerous metal plates, designed to imitate the appearance of tongues of flame. The vase communicates by means of stout bars of iron, with the metal staircase which descends through the middle of the column and terminates in the ground. A still more striking instance of the value of lightning-rods is a church on the estate of Count Orsini, in Carinthia. This building was placed upon an eminence, and had been so often struck by lightning that it was deemed no longer safe to celebrate divine service within its walls.

In 1730, a single stroke of lightning destroyed the entire steeple; after it had been rebuilt, it was struck, on an average, four or five times a year, without counting extraordinary storms, during which it was struck from five to ten times in a single day. In 1778, the building was reconstructed, and furnished with a conductor; and, according to Lichtenberg, up to 1783—that is to say, during the space of five years—the steeple had been struck only once, and this stroke had fallen upon the metallic point without producing any damage. In short, no doubt exists in the minds of intelligent and well-informed men in regard to the efficiency of well-constructed lightning-rods. Of course, in this, as in every other department of applied science, we find men who exclaim against them, and men who think that such appliances are worthless, unless some particular notions of their own are embodied in their construction; but, on the other hand, we find that the great bulk of our scientific men are unanimous in regard to their efficiency, as well as in respect to the best methods of constructing them; and it is a curious fact that the rod which now receives the greatest favor from those who are more competent to form an opinion in the matter is substantially the old rod described by Franklin. The country is at the present moment overrun by so-called lightning rod men, who palm off worthless and expensive articles upon their customers, and in many cases are, in addition to this, guilty of downright swindling. It may be well, therefore, to say that, by attending to a few essential points, any ordinary carpenter or house-

builder can easily erect a rod that will give perfect protection. The points to be attended to are three: 1. The rod should be of sufficient size—a solid-iron rod, half an inch square, or a copper rod, one inch wide and one-tenth of an inch thick, are the sizes recommended by the best authorities. Thin copper strip is most easily handled; but a copper wire, No. 1 or 0, may be more easily procured, and will answer quite as well. The light tubular and fancy rods by itinerant venders are almost always deficient in metal. There is no advantage in tubular, star-shaped, twisted, or other rods. Harris, the great authority, says: "Provided the quantity of metal be present, the form under which we place it is evidently of no consequence to its conducting powers" (Harris, "On Thunderstorms," p. 107). Becquerel, Pouillet, Farady, Noel, and every electrician of note that we have consulted, agree with him.

2. In arranging the rod, carry it along the ridge and along the corners of the gables. Connect it with all tin roof, gutters, water-spouts, etc.; and *do not insulate it*. Points of comparatively small consequence, and it is not best to disfigure a house by a row of bayonnets stuck on it. The crestings and finials of Mansard roofs are as good lightning-rod points as can be desired. The rod may be painted the same color as the house; but do not allow the paint to destroy the metallic connection between the rod and the masses of metal that we have mentioned. The best mode of attaching the rod to the building is by small staples for wires, an l tacks or nails for flat strips.

3. Beyond all question, the most important point in the construction and erection of lightning-rods is the ground-connection. Careful and extensive observation has convinced us that, in regard to this matter, fully two-thirds of the lightning-rods in existence are defective; and it is here that the itinerant vender generally manages to cheat his customer most thoroughly. There is no safety, unless the rod is carried into the ground to a depth below the level of the walls in the locality. This is the rule laid down by the commission appointed by the French Government, and, space permitted, it would be easy to show that it is based on sound principles.

Whether or not the rod should be connected with the gas and water-pipes, is an open question. We should say not. The joints of gas and water-pipes are generally formed of insulating substances; and in several well-authenticated cases these joints have been ruptured by the discharge, and the water allowed to flow out, and the gas set on fire. In this case, as the least of two evils, we would violate the rule which directs us to connect the rod with all metallic substances, and make no connection with the gas and water-pipes.

These are not the vague notions of an isolated dabbler in science, but the conclusions arrived at by the Governments of France and Britain, for the special purpose of investigating this subject. They may, therefore, be received with the most implicit confidence.

But, while it is easy to protect buildings and ships, it is not always possible to protect isolated human beings. All that we can do in this case is to avoid, as much as possible, the vicinity of those objects that are likely to attract the lightning. A few years ago some wiseacre invented a portable lightning-rod, consisting of an umbrella, having a metal-stem, to the lower end of which was attached a chain that was allowed to drag along the ground. Such a contrivance would be not only useless, but dangerous, as it would be utterly impossible to give such a portable rod a good ground-connection.

The old directions about feather-beds, glass-windows, etc., are all nonsense. One of the safest places is a house furnished with a good rod; one of the most dangerous is a barn filled with new hay. Another very dangerous

place is beneath a tree, and the middle of an open field is nearly as bad. A distance of fifteen to thirty feet from a tall tree is a tolerably safe position. In a house unfurnished with rods, the most dangerous places are near the fireplace or chimney, and those corners down which the water-spouts descend. The carrying of large metal bars or rods is, of course, dangerous, because every mass of metal tends to open up a line of least resistance of which it will form a part; and, if the human body should form part of this line, serious consequences may ensue. But it is not probable that small articles, like keys, watches, knives, etc., exert any appreciable influence.

Cases have frequently occurred where persons in small boats have been struck and killed. An instance of this kind occurred within a few weeks. In such cases, if the thunder-cloud is very near, it will be advisable to lie down in the boat, even at the risk of getting thoroughly drenched. Any object elevated above the surface of the water incurs great risk of being struck. Every small boat carrying a mast should be provided with a lightning-rod. It may be easily and cheaply applied, and will prove a perfect protection.—(*Appleton's Journal*.)

JOHN PHINN.

Jupiter's Satellites.

Jupiter's satellites are fast becoming important members of the solar system, and recent observations upon their movements seem to confirm the theory that the great primary around which they revolve gives out heat and light as the sun does, only on a vastly smaller scale.

We have alluded, in a former article on "The Planet Jupiter," to Mr. Browning's brilliant picture of Jupiter's belts, and the tremendous commotions which are agitating his surface. Mr. Lassell, the late president of the Royal Astronomical Society, and Father Secchi, of the Roman Observatory, by still more recent observations, have confirmed the former discoveries. They have also examined, with great care, the transits of Jupiter's satellites over his disk. This phenomenon is a delicate test of the planet's luminosity, compared with that of other orbs in similar conditions. For, as the satellites cross the disk, it can be easily seen if they are darker or brighter than the surface they transmit. The result bears out the theory so ingeniously elaborated by Mr. Proctor, in his recent interesting papers on this subject. The comparative blackness of the four satellites has been fully established. Mr. Lassell gives the following account of the transit of the fourth satellite, witnessed under favorable atmospheric conditions, on the night of the 30th of last December: "On its first entrance, it was scarcely to be distinguished from the edge, not appearing at all as the others do—as a round, bright spot. As it advanced, it grew gradually manifestly darker than the surface of the planet; and, by the time it had advanced a fourth of the way across it, had become a very dark if not a black spot; so dark that, if I had looked at Jupiter without knowing any thing of the positions of his satellites, I should have said that a shadow of a satellite was passing. I remember having seen the like phenomenon many years ago; but my impression is, that I had never seen the disk of the satellite so near to absolute blackness before. Of course, it is only by contrast that it can possibly so appear; and we have in this fact a striking proof of the exceeding brilliancy of the surface of the planet. In the same way the solar spots, if not surrounded by the marvellous splendor of the sun's surface, would doubtless appear as brilliant objects."

Father Secchi gives a similar report of the transit of the

third satellite. He says: "On the evening of the 3rd of February I observed the transit of the third satellite and that of its shadow. The satellite seemed almost black when it was upon the middle of the planet's disk, and notably smaller than its shadow, which was visible at the same time. In approaching the edge, the satellite disappeared, and reappeared soon after close by the edge, but as a bright point. This fact is not a new one for the other satellites, but for the third it is unique. This result shows, also, the great difference of luminosity at the centre and near the edge of the planet—a difference already confirmed by photography." The same observations have, much more frequently, been made upon the transits of the first and second satellites. It must be remembered that this extreme blackness is witnessed when both planet and satellite are equally reflecting back the sun's light. This comparative difference in light can only be accounted for upon the supposition that Jupiter shines with a relatively stronger light than that of the satellite passing over him, and must, therefore, give forth some light of his own.

It has been shown, by the most careful measurements, that Jupiter emits three times the light that a body constituted like Mars would give, and four times as much as a body constituted like the moon. We therefore argue that Jupiter and the three other exterior planets perform the office of suns for the systems that revolve about them, that they are sources of heat, and give forth light to them from their own inherent power. This theory, which makes the present condition of the primaries unsuited for life, under any circumstances analogous to our own, exalt the satellites into worlds suitable for the abode of living beings, and surrounds life with every imaginable source of enjoyment, from variety of experience and favor of position in the universe of space.

No members of the solar system have received more attention from astronomers than the four satellites that unceasingly accompany Jupiter in his twelve-year revolution around the sun. A small telescope reveals them to the eye as four small stars of brilliant lustre, apparently occupying a small field in the regions of space, but really forming, with the planet, an interesting system, measuring nearly two and a half millions of miles in diameter. On the supposition that the satellites are inhabited, it would be difficult to imagine a more charming position for astronomical study than that presented from their surface, specially that of the nearest one.

This satellite, named Io, revolves around the planet in about forty-two hours, at a distance nearly corresponding to that of the moon from the earth. There is a probability that it revolves on its axis at least once during each revolution, and thus every portion of it enjoys a view of the great primary. During a revolution, if this supposition be true, the inhabitants of Io have seen more than four complete revolutions of Jupiter, four Jovian days and nights. Therefore, the Ionian astronomers must see the planet once in twenty-one hours reflecting sunlight, and once in twenty-one hours shining dimly by its own light, and also watch a part shining by sunlight. They will have also the curious experience of tracing the motions of the three other satellites, as with varying speed, constantly-widening orbit, and exhibiting every imaginable phase, they complete their swift circuit around the huge centre, and illustrate the great laws which sway the universe with their transits, eclipses, and occultations.

Astronomers tell us how grand a spectacle the earth presents as seen from the moon, exhibiting all the lunar phases in inverse order, but increased to thirteen times the size. We can then, try to imagine the appearance of Jupiter from the nearest satellite, a red-hot globe, looming up from the horizon fourteen hundred times the size

of our moon. This great sphere, when not illuminated by sunlight, gives forth a dull-red or yellow-glare, like a light seen through a mist; but, when brought out by sunshine, it becomes a glowing orb, diversified with bands of gorgeous prismatic coloring, rose color mingled with yellow, alternating with brown, orange, blue and green, while their constant and marvellous changes of form afford the most sublime spectacle that fancy can paint.

But terrestrial astronomers have their compensations. The sun, as seen from the Jovian system, has only one twenty-fifth of the size of the sun we see, and gives forth only one twenty-fifth of the heat we receive. The rosy protuberances, the far-reaching corona, and the huge sun-spots, can by no means present to these distant orbs the magnificent proportions marked on the face of the great luminary whose phenomena our men of science delight to explore, whose gaseous clouds can often be seen by the naked eye, and whose epochs of magnetic storm are principally due to the giant planet whose satellites form the subject of this article.

One of the first discoveries made by Galileo with his telescope was that of the satellites of Jupiter, thus fully confirming the Copernican theory of the solar system. The eclipses of these satellites have been one of the most accurate methods we possess for measuring the velocity of light, and determining terrestrial longitude. And now we are indebted to the shining quartet, in their transits over the disk of their primary, for additional confirmation of the theory that not only Jupiter and his satellites, but the whole outer group of planets are partial suns to the orbs revolving around them.

We are contented for the present with the terrestrial star-gazing; but when the time comes for us to soar, *ad sidera*, we can think of no more attractive spot toward which to wing our flight than the little Io, the first and nearest satellite of Jupiter.—(*Appleton's Journal*.)

EMMA M. CONVERSE.

Literary Packmen.

We have had imaginative and fanciful critics—Leigh Hunt, for example—who hovered from shelf to shelf of a library as a bee does amongst flowers, and who took a kind of arch pleasure in often selecting apparently barren stalks for the manufacture of a clear, honeyed product. Then there were the valuable explorers of the old ways and bye-ways of literature, of whom the elder Disraeli was an illustrious example. He had all the passion and industry of the virtuoso in search of queer poets, quaint works, and suggestive anecdotes. He was the founder of a perfect museum of these curiosities; and if the museum, in some respects, serves a purpose analogous to that of the College of Surgeons, in others it has been as beneficial as an exhibition of designs based on principles of art that have proved themselves by longevity. But the literary packman of our time has no eclectic faculty. He starts on the trade of bookmongering with a gum-pot and scissors, and a sort of pointer-nose for anecdotes. As a rule, he employs big words which appear to lose their vitality under his pen, there being, in point of fact, no brain life in them. But he works at his book as swiftly as a tailor at a breeches, and to a great extent with the same implement. It does not in the least matter what his text may be. We have, for instance, numerous natural history packmen. One of these will fill a budget of stories concerning dogs with amazing rapidity. He unhesitatingly steals his wares, for though, easy as it is to invent an astonishing tarradiddle proving the foresight of a poodle, the literary packman is not equal to the enterprise. Or, instead of dogs, he is contracted with for a volume of poets. "How will you have them," he inquires of his employers "dead

County of Maskinongé—St. Elie—comprising an extent of territory of about eight miles in depth by five in breadth containing the seven ranges of the townships of Coxton, and bounded as follows : to the north east partly by the line which separates that township from the township of Shawenigan, and partly by the line which separates the seventh from the eight range ; to the north west by the north west line of the said first seven ranges ; to the south east by the line between Hunterstown and Coxton ; to the south east by the line which separates Coxton from the fief Gathman and the augmentation of Coxton.

County of Ottawa—Canteley—comprising the north side of the river of Gatineau in the township of Hull, bounded as follows : to the north by the township of Wakefield, to the east by Templeton, and to the south and west by the river Gatineau.

County of Temiscouata—St. Honoré—bounded on the west by St. Antonin, on the east by the thirty-first mile of the new Temiscouata road, comprising two ranges on each side of the said road.

St. Louis des Ha ! Ha !—bounded on the south east by N. D. du Lac Temiscouata, on the south west by the thirty-first mile of the new Temiscouata road, comprising two ranges on each side of the said road.

Ste. Rose du Dégeley—bounded on the south east by the Provincial line, on the north west by N. D. du Lac Temiscouata, comprising the ranges on each side of the new Temiscouata road.

County of Yamaska—St. Michel, No. 2—comprising the east of the river Yamaska with a frontage of one league, and a depth of forty acres from the land of Hubert Lavallée inclusively to the Common exclusively.

NOMINATIONS OF COMMISSIONERS AND TRUSTEES OF SCHOOLS.

COMMISSIONERS. 19th September 1872.

His Excellency the Lieutenant Governor, in Council, has been pleased to make the following nominations :

County of Argenteuil—St. André—Mr. Mathew Burwash continued in office and Mr. Edward Jones *vice* Mr. Finlay McMartin.

County of Arthabaska—Tingwick—MM. Thomas Nugent and Joseph Roux *vice* MM. Michael Fitzpatrick Octave Durand.

County of Beauce—St. Pierre de Broughton—Messire Louis Fournier and Mr. George Giroux *vice* MM. Cyrille Vallée and Patrick Doyle.

County of Bellechasse—St. Cajetan d'Armagh—MM. Charles Cadrin and Pierre Langlois *vice* MM. Octave Roy and Louis Noël.

County of Bonaventure—Nouvelle—Mr. Félix Thériault, jr., *vice* Mr. Raphaël Aubu

County of Bonaventure—Paspébiac—Mr. Moïse Toulem, *vice* M. André Delarosbil.

County of Brome—Bolton—MM. Francis P. Channell and William Hall *vice* MM. Francis P. Channell and John Mc. Laughlin

County of Charlevoix—Malbaie—Mr. Thomas Gagnon, *vice* Mr. Jean Murray.

County of Châteauguay—St. Jean Chrysostôme—Mr. Moïse Paré *vice* Mr. William Charters.

County of Chicoutimi—Bagotville—Mr. Ferdinand Fortin *vice* M. Abraham Tremblay.

County of Chicoutimi—Harvey—MM. Eliffe Simard and Eliffe Bolduc *vice* MM. Ferdinand Simard and Abel Bolduc.

County of Drummond—St. Bonaventure d'Upton—MM. Léon Côté and Magloire Forget *vice* MM. Joseph Lupien and Joseph Parenteau and Mr. Isidore Lecuyer *vice* Mr. Louis Cartier.

County of Lotbinière—St. Séverin—MM. Elzéar Pomerleau, Jean Baptiste Champagne, Augustin Couture, Vital Labbé and James Laughrey.

County of Maskinongé—St. Léon—MM. Pierre Julien and Magloire Lamy *vice* MM. Joseph Lamy and Jean Charles Peltier.

County of Maskinongé—Ste. Elie—MM. Pierre Poudrier and John Griffin, Léandre Guilmette, Pierre Déchaine and Charles Gélinas.

County of Megantic—St. Calixte de Somerset—Mr. Stanislas Doucet *vice* Mr. Antoine Tardif.

County of Ottawa—Township of Suffolk—MM. Joseph Ledue,

Baptiste Blais, Gédéon Major, Jacques Legant and Moïse Chartrand.

County of Portneuf—St. Raymond—MM. François Cantin and Pierre Robitaille *vice* MM. Alexis Cayer and Michel Julien.

County of Soulanges—Soulanges—Mr. Michel Dupont *vice* Mr. Julien Charlebois.

County of Soulanges—St. Zotique—MM. Moïse Bray and Olivier François Prieur, continued in office.

County of Temiscouata—St. Honoré—MM. Paschal Lebel Zozime Dubé, Moïse Bérubé, Pierre Bérubé and Revd. Messire T. Théberge.

County of Temiscouata—St. Louis des Ha ! Ha !—MM. François Michaud, Nicholas Marquis, Octave Pelletier, Nicholas Pelletier and Octave Dumont.

County of Yamaska—St. David—Mr. Narcisse Lambert *vice* Mr. Octave Poirier.

County of Yamaska—St. Michel, No. 2—MM. Michel Thérioux, Lactance Tonnancour, Elphège Cardin, Michel Parenteau and Michel Fortier.

TRUSTEES.

County of Arthabaska—Tingwick—Mr. Daniel George *vice* Mr. G. W. Pope.

County of Megantic—Inverness—Mr. Lawrence Murphy *vice* Mr. Thomas Devaney.

County of Ottawa—St. Etienne de Chelsea—M. John Hudson *vice* E. Sheffield.

County of Quebec—Tewkesbury, No. 2—Mr. Alexander McKee *vice* Alexander Fraser.

County of Quebec—St. Columban de Sillery—Mr. Evan John Price *vice* Col. Wm. Rhodes.

County of Napierreville—St. Michel Archange—Mr. Joseph Schyte, *vice* Mr. Wm. Forrester.

DIPLOMAS GRANTED BY THE BOARD OF EXAMINERS,

PROTESTANT BOARD, MONTREAL.

ELEMENTARY SCHOOL, 1st class (E) Misses Seliva MacLagan, Mary Wallace and Margaret Watson.

ELEMENTARY SCHOOL, 2d class (E) Misses Nancy Campbell, Isabella Hart, Mary Loynachan, Jessie McDonald, Margaret McDonald, Olive D. Mosher, Ninnettie Willford and Mr. James D. Smiley.

20th August 1872.

T. A. GIBSON,
Secretary.

WATERLOO AND SWEETSBURG BOARD.

ELEMENTARY SCHOOL, 1st class (E) Misses Edith Gordon Merab, K. Willard et M. Alfred A. Sergeant.

ELEMENTARY SCHOOL, 2d class (E) Misses Loella S. Blake, Margaret Murphy and Eliza Gaines.

6th August 1872.

Wm. GIBSON,
Secretary.

RIMOUSKI BOARD.

ELEMENTARY SCHOOL, 1st class (F) Misses Caroline Desjardins and Georgiana Lisotte.

ELEMENTARY SCHOOL, 2d class (F) Miss Philomène Ruais.

5th August 1872.

P. G. DUMAS,
Secretary.

KAMOURASKA BOARD.

ELEMENTARY SCHOOL, 1st class (F) Misses Sara Jane Blagdon, Victoria Mercier, Elizabeth Poussard, Marie Z. H. Ploudre.

ELEMENTARY SCHOOL, 2d class (F) Misses Domine Blanchet, Ophillie Fraser, Justine Gagnon, Vitaline Gagnon, Palmyre Pelletier, Emma Roy, Pelagie Rossignol, Anny Tériault.

ELEMENTARY SCHOOL, 2d class (F) Misses Amélie Dumont, Clotilde Gagnon, Sara Lavoie, Praxède Michaud, Georgina Martfn, Henriette Moreau, Justine Ouellet.

May 1870.

ELEMENTARY SCHOOL, 1st class (F) Misses Antoinette Côté,

Marie Octavie Dionne, Marie Adèle Hudon, Marie Hélène Hudon.

August 1870.

ELEMENTARY SCHOOL, 1st class (F) Miss Clémentine Charest.
November 1870.

ELEMENTARY SCHOOL, 2d class (F) Miss Elise Ouellet.
February 1871.

ELEMENTARY SCHOOL, 1st class (F) Misses Séverine Bélanger, Mélanie Bouchard, Georgina Caron, Alphonsine Dumont, Marie Dumont, Céline Jean, Dina Lavoie, Georgina Label, Déline Saucier.

ELEMENTARY SCHOOL, 2d class (F) Misses Alphonsine Beaulieu, Hortense Caron, Hermine Hudon, Clémentine Lévesque, Léopoldine Pelletier.
May 1871.

ELEMENTARY SCHOOL, 1st class (F) Misses Emma Gauvin, Louise Hudon, Marie Louise Lagacé.
August 1871.

ELEMENTARY SCHOOL, 1st class (F) Miss Alvina Dancause.

ELEMENTARY SCHOOL, 2d class (F) Misses Gèneviève Caron, Euphémie Délisle.
November 1871.

ELEMENTARY SCHOOL, 1st class (F) Misses Roses Anna Blagdon, Henriette Courberon, Marie Aurélie Dumais, Sophie Ouellet, Céline Ouellet, Caroline Piuze.

ELEMENTARY SCHOOL, 2d class (F) Miss Anna Pinet.
February 1872.

ELEMENTARY SCHOOL, 1st class (F) Misses Léontine Bérubé, Clémentine D'Auteuil, Sophie Duguemin.

ELEMENTARY SCHOOL, 2d class (F) Misses Léocade Beaulieu, Marie Langlais, Anna Ouellet, Alvina Tériault.

P. DUMAIS,
Secretary.

JOURNAL OF EDUCATION.

QUEBEC, SEPTEMBER & OCTOBER, 1872.

Visits of Their Excellencies the Governor General and the Countess of Dufferin to the Educational Institutions, Quebec.

We publish to day a record of the visits of Their Excellencies the Governor-General and the Countess of Dufferin to various educational institutions of this City. The great interest taken in educational matters by Their Excellencies cannot fail to be productive of much good, and many a one will hereafter recall with pleasure the bright day marked in their school boy life by the kind and encouraging visits of Lord and Lady Dufferin.

Visit to the Good Shepherd School.

Their Excellencies the Governor General and the Lieutenant-Governor accompanied by Hon. P. J. O. Chauveau, Minister of Education, and Mr. Delagrave, President of the Council of Public Instruction, visited, yesterday morning, 10th September, the convent of the Good Shepherd and the public schools attached to it.

Visit to the Laval Normal School.

His Excellency the Governor General and the Countess of Dufferin, accompanied by Colonel and Lady Harriet Fletcher, Hon. Mr. Chauveau, Madame and Mlle. Chauveau, Hon. Mr. de Boucherville, Speaker of the Legislative Council, Hon. Mr. Blanchet, Speaker of the Legislative Assembly, and Senator DeLery, His Worship the Mayor, Madame Garneau, and Mr. Delagrave, President of the Council of Public Instruction, visited the Laval Normal School at eleven o'clock yesterday morning 11th Sept. Their Excellencies were received by the Principal, the Revd. P. Lagacé, and shown through the building, after which the following addresses were presented :

To His Excellency Lord Dufferin, Governor General of Canada :

Your Excellency :

The students of Laval Normal School learned with feelings of real pleasure of Your Excellency's intention to visit them.

But a few days since, My Lord, we were at our own firesides enjoying the pleasures of home—we come for the most part from the rural districts, from those french canadian parishes whose loyalty and fidelity to the Crown of England are unsurpassed throughout the whole extent of the British Empire. Our parents have heard tell of the new Governor of the Dominion who seems so well pleased with our ancient Capital, who has traveled through so many lands, and who speaks our language. Without having seen you, My Lord, the people of our Country parishes already hold Your Excellency in high esteem, and the name of Lord Dufferin is often mentioned amongst them. As for us students of an Institution under Government control, we are happy to welcome the head of the Executive Power of the Dominion. But in our quality of students we are led to consider Your Excellency's visit from another point of view; we honour in the person of Your Excellency, the author, the distinguished man of letters, the learned, elegant, and witty writer.

We thank Your Excellency for the honour you have done us to-day, an honour for which we are indebted to the interest you take in education, and also no doubt to the kind intervention of the founder of the Normal School of this Province, the Honorable Mr. Chauveau, whom we see at Your Excellency's side at this moment. We humbly present to Your Excellency the tribute of our loyalty to our most Gracious Majesty Queen Victoria, and to yourself her worthy representative in this country. May heaven long preserve Your Excellency to the affection of the loyal people of this Province and of the whole Dominion which you have been called to govern.

The students of the Laval Normal School offer you their most fervent wishes for your peace and happiness, and for that of Lady Dufferin, and of all your family.

To Her Excellency the Countess of Dufferin.

Your Ladyship,

We deem it our duty to thank Your Excellency for the extreme goodness you manifest towards us in accompanying His Excellency the Governor General on his visit to the Laval Normal School. This visit will add another bright and interesting page to the history of the Old Castle St. Louis, now transformed into a school house, but which once was the residence of the English Governors of Canada, and, at a more remote period, one of the dependencies of the habitation of the Governors of New France. This tribute to the noble cause of education from Your Excellency and the distinguished persons who surround you, will also remain as one the brightest remembrances of our student life.

We pray Your Excellency to accept our ardent wishes for your happiness, and the assurance of our deep gratitude and most profound respect.

His Excellency responded verbally and was pleased to send the following reply afterwards.

To the students of the Laval Normal School.

I received your address with the greatest pleasure for it has procured me the satisfaction of hearing expressions of devotion to Her Majesty the Queen from those who will soon be called upon to direct the education of youth, and to instil into its mind the principles which should regulate its conduct and thereby the future state of society.

There is no lack, at the present day, of speeches and works on education; but in order to attain the highest standard, you will have to practice the most rigorous self denial, the greatest activity, and above all every virtue with which you desire to imbue the hearts of your pupils.

It is only since a few years that it has been generally admitted that one does not intuitively become skilful in the art of teaching, but that the teacher should be trained with care, so as to insure some uniformity in teaching and to develop completely the intellectual resources of a country. Such is the object of the education which you receive at the Normal School, and of which I expect to see the results in the intellectual progress of this Province.

Nothing that I may say could enhance the satisfaction which the Minister of Public instruction must feel in following the progress of his work, and in seeing that his efforts to establish a good system of education have already been crowned with so much success.

I will long remember with pleasure my visit to the Normal School, and I hope that I shall often have occasion to find in the future career of the pupils of this institution, the realisation of all that it promises to day.

Citadel, 13th September, 1872.

Visit to the Seminary and the Laval University.

Yesterday afternoon 18th Sept., His Excellency the Governor General and the Countess Dufferin, accompanied by Colonel Fletcher and Lady Harriet Fletcher, His Excellency the Lieut.-Governor, Hon. Mr. Chauveau, Premier of Quebec, Miss Chauveau, Hon. Mr. Cauchon, Mr. Delagrave, President of the Council of Public Instruction, Mr. Hale, of Boston, and many other prominent personages, visited the Seminary of Quebec and the Laval University. Their Excellencies inspected the Seminary buildings, quaint and curious, with great interest, full explanations being given by the Reverend Rector.

The following addresses were here presented to Their Excellencies, the first to Lord Dufferin by a student of the senior class, Mr. Alphonse Beaudet, and the second to Lady Dufferin by a pupil of the junior division. His Excellency responded verbally at the time, and forwarded on the following day the replies annexed:

My Lord,

Your Excellency has been in our midst but a few weeks only, and already has rumor every where made known those eminent qualities which warm all hearts towards you. Whilst we were yet enjoying our holidays amongst our respective families, often have the praises of Your Excellency sounded in our ears and moved our hearts. It behooves us not here to repeat all the good we have heard, nor to praise the political and administrative abilities which have attracted the notice of our most Gracious Sovereign—the choice which Her Majesty has made of Your Excellency to direct the destinies of Canada renders praise unnecessary—but at least, My Lord, we may be allowed to admire that affability and condescension which afford us today, the opportunity of offering to Your Excellency the tribute of our profound gratitude for the distinguished favour you have done us by honouring us with a visit.

We are cognizant, My Lord, of the expeditions and the labours which have been undertaken by Your Excellency through love of science and letters, we have heard of the interest with which Your Excellency encourages the thorough study of ancient languages; finally we could not notice without emotion the touching solicitude with which you have visited the humblest schools of this ancient City of Champlain. Everything assured us before hand that the youthful student possessed your sympathy, and we looked forward with impatience to the day when we might offer you the tribute of our admiration and our gratitude.

Be pleased, My Lord, to receive the testimony of our youthful but loyal devotion to the worthy representative of our most Gracious Majesty, and to believe that we offer our most fervent prayers to Almighty God that he may deign to shower down his abundant blessings on Your Excellency, on Her Ladyship the Countess of Dufferin, and on all your family.

To Her Excellency the Countess of Dufferin.

Your Excellency,

But a few days have elapsed since our return to the Seminary, but it already seems to us a long time since we were led to hope for the pleasure of seeing Your Excellency in our midst. During all that time we have heard extolled the many amiable qualities which distinguish your Ladyship; we have been told of your accomplished grace of manner, but above all we have heard of the kindness which Your Excellency has shown in visiting institutions where children like ourselves are brought up, extending your interest so far as to ask a holiday for them, a boon which embarrassment or respectful timidity prevented them from soliciting themselves.

I therefore come forward in the name of my schoolfellows to beg of Your Excellency to accept our best wishes for your happiness.

We are sure that His Excellency, your distinguished husband, will be by no means jealous, but will even second our request, if we express our wish to obtain from your own lips the much esteemed favour of a *grand conge*.

From His Excellency the Governor-General, to the Pupils of the Seminary of Quebec.

My Young Friends,

For some time past I have been looking forward to this day with the most pleasurable expectations.

The reputation justly enjoyed by the institution, under whose auspices you pursue your studies, had, indeed, prepared me for a gratifying spectacle, the actual exhibition of which, however, has exceeded my anticipations.

No one with any feeling or power of sympathy can find himself in the presence of the assembled youth of a country without being deeply moved. Such a sight is always suggestive of a multitude of considerations of the most interesting kind, but in Canada, whose future is full of hope, the prospects and condition of the growing generation is naturally the object of especial solicitude, for they are the heirs of that future, the destined artificers of her impending fortunes, and upon the mode and degree to which they are trained and prepared for the patriotic responsibilities which await them, will depend the power, the greatness, and the reputation of their country.

You cannot, therefore, my young friends, become too early impressed with the importance of this period of your lives.

In the Springtime every field presents a uniform appearance, but as the crops ripen for harvest how different is the estimation in which each is held?—the one shining with golden corn, the other defaced by sickly vegetation, and noxious weeds. Remember the actual information you require is but a small portion of the advantages now placed within your reach. Now is the time, not only for storing up the knowledge, but what is of much more importance for disciplining your minds, invigorating your intellects and acquiring those habits of industry, those powers of perception and of analysis which will render them engines capable of contending with every difficulty, mastering every opportunity, which the varied chances of life may afford.

In return for the kind welcome with which you have greeted my visit, I can only wish to every one of you, in your future lives, an honorable, useful and successful career.

Quebec, Sept. 18th, 1872.

From Her Excellency the Countess of Dufferin to the Pupils of the Seminary of Quebec.

My Young Friends,

I am very much pleased with this opportunity of seeing you, and thanking you for the kind welcome you have given me.

It is very gratifying to observe by so many indications that you appreciate the educational benefits which you enjoy, and that you do your best to take advantage of them.

It will give me very great pleasure to ask for a holiday for you, and I am sure that those learned personages to whom I address my demand will be too gallant to refuse the request of a lady.

Quebec, 18th Sept., 1872.

After leaving the Seminary Their Excellencies proceeded to the Laval University building, where they were received by His Grace the Roman Catholic Archbishop, the Rector, and Professors of the University, and escorted to the Grand Hall. There were assembled the Rev. Vicar General Cazeau, the Rev. Curé of Quebec, and over one hundred of the Roman Catholic clergy, from all parts of the diocese, many of whom were vicars whose annual retreat terminated yesterday. The distinguished visitors were welcomed, in the Grand Hall, by nineteen professors in academical costume; amongst whom we noted Rev. B. Paquet, Dean of the Faculty of Theology; Hon. J. U. Tessier, Dean of the Faculty of Law; Dr. J. A. Sewell, Dean of the Faculty of Medicine; Rev. E. A. Methot, Dean of the Faculty of Arts; Professors Langlois, Colston, and Turcotte, (Law); Professors Landry, Jackson, Lemieux, Verge, Audet, and La Rue, (Medicine.)

The pupils of the Seminary, three hundred in number, filled the galleries, and their Band performed marches in excellent style as their Excellencies entered and left the Hall.

The Rector of the University, Rev. Th. Hamel, presented the following address of welcome, in French:

To His Excellency Lord Dufferin Governor General of Canada.

My Lord,

It is with heartfelt joy that the Laval University, receives to-day the visit of Your Excellency.

Many distinguished and celebrated names adorn the list of the Governors of Canada, but none more illustrious than that of Your Excellency, either in the glory of your ancestors, my Lord, which is common to the first nations of Europe, or in the services you have rendered to the Crown of England in the highest diplomatic spheres, and further, and above all in the éclat which has been obtained by you in science and literature. And, My Lord, this high cultivation of thought, which places you in such an elevated rank among writers, the evident zeal for science in your remote expedition and the marked interest manifested by your Excellency in the cause of education since

your residence in this city, gives this University the assurance that in you it will find a patron and a friend. Twice already the Laval University has had the fortune in these halls of expressing to two members of the Royal family, the Prince of Wales and Prince Arthur, the sentiments of fidelity and respect which it has always entertained for Our Gracious Majesty the Queen. We seize with avidity this occasion of manifesting similar sentiments to the representative of Her Majesty in the Dominion of Canada.

The University of Laval, My Lord, always remembers with thankfulness that it owes to the solicitude of Her Majesty for her faithful Canadian subjects, the charter which secures its rights and privileges. It does not forget that in a great part it owes its existence to the valued patronage of one of your predecessors, Lord Elgin, whose name shall ever be venerated in this institution, who witnessed its foundation and did not cease to assist in its welfare. Following his example all his successors have taken the greatest interest in it. Your Excellency, My Lord, continues to-day this tradition which is so dear to us, and the University of Laval prays you to accept the expression of its gratitude.

The Countess of Dufferin, in accompanying Your Excellency on this visit, gives highly appreciated evidence thereby of her goodwill. We would ask permission Madame to express to you how sensible we are of this great favor and how we appreciate the delicate sympathy with which you have honored our institution. We join with our whole city in greeting you. Permit us, My Lord and Lady, to present our most profound respect and homage and the best wishes for your welfare and prosperity.

To which His Excellency was pleased to read the following answer in French:—

To the Rector and to the Members of the University of Laval:

Among the many privileges which my arrival in this country has procured me, I can assure you, gentlemen, there is none that I value more highly, or to which I attach greater importance, than that which I now enjoy in visiting this stately University.

Enthroned on its noble Plateau, and overlooking one of the loveliest prospects which is to be found in the whole world, the building which you occupy fitly dominates over the many beautiful and picturesque structures which decorate your ancient and beautiful city. The interior is most commodious, and is furnished with all the necessary conveniences for the cultivation of every branch of classical and scientific learning.

The excellence of its discipline, the wellknown ability of those who direct its studies, and the high standard of attainments demanded from its Graduates, have acquired for this Institution the confidence of the whole Province, and have given its Diplomas a degree of authority and value equal to that of any European University.

To anyone so deeply interested as I am bound to be in the future prosperity of the Dominion, it is an unspeakable encouragement to know that there should exist in the country so powerful an engine for developing the intellectual genius of its inhabitants, and for invigorating the mental growth of each successive generation.

Enriched as are the domains of Canada with every variety of material wealth, a peculiarly fruitful field is opened up in this country for the application of scientific and mechanical ingenuity to the development of its resources, while the exceptionally favorable conditions under which her domestic Parliament has embarked upon its legislative career, will afford to those of your students who may be versed in Politics, History, and Constitutional Law ample opportunities of future distinction, both at the Bar and in the political arena.

But, though these considerations have induced you to give a large and ample share to those studies which inform the practical side of life I am glad to observe that you neither despise nor neglect the rich heritage of thought, poetry and knowledge which has been bequeathed to us by the Ancient World.

Although their immediate utility may not be so readily recognized, the influence of classical studies and especially of the literature of Greece upon the human mind cannot fail to be beneficial, more especially in a young country where the constant struggle with the forces of nature and a righteous and praise-worthy desire to accumulate wealth renders it particularly desirable that the intellectual horizon should be extended to its utmost limits, that the lessons of the past should temper the exuberant expectations of the future, and that the refining

influences of the Poets and Philosophers who sung and taught in the springtide of the world should purify, refresh, and dignify the somewhat sordid and colourless accidents of modern civilization.

In conclusion, gentlemen, allow me to offer you both on my own behalf and on behalf of Lady Dufferin our best thanks for the extremely kind reception which you have accorded to us.

Ever since our arrival in this country we have met with nothing but the most gratifying expressions of loyalty and the most considerate kindness at the hands of those amongst whom we are to have the happiness of dwelling, and the reverential terms in which you mention the name of my Predecessor Lord Elgin is a gratifying proof of the fidelity with which you regard the memory of those who have the good fortune to win your good opinion.

As the representative of Her Majesty it is my duty to extend to you my countenance, protection, and assistance and in discharging this official function, I can assure you I shall at the same time be indulging one of my warmest personal inclinations. Quebec, Sept., 18th, 1872.

After this ceremony had been concluded the distinguished party visited the magnificent library and museum, among the finest on the continent, and viewed the lecture rooms, and departments of the College, expressing their very great pleasure at being enabled to examine such an institution, which was an honour to any country. They also declared their extreme gratification at the hearty manner in which they had been welcomed to the great Catholic University of the Province. They afterwards ascended to the terraced roof of the building, and surveyed the magnificent scenery of the surrounding country, an unequalled view of which is to be obtained here. The large telescope on the roof was exhibited by Rev. Abbe Bolduc. Their Excellencies and party left, after a lengthy visit, highly pleased with the events of the afternoon.

Visit to the Ursuline Convent.

Their Excellencies the Earl and Countess of Dufferin, accompanied by their staff, visited the Ursuline Convent on Monday last (16th Sept.). They were received by the Chaplain, Revd. Mr. Lemoine and conducted to his room where they were met by the Very Revd. Vicar General Cazeau, the Curé of Quebec, the Principal of the Laval Normal School, Revd. Mr. Bonneau of the Archbishop's Palace, the Honourable the Premier and Mrs. and Miss Chauveau, His Worship the Mayor and Madame Garneau, Mr. and Miss Delagrave, Dr. Comyn, R. A., and one of the Editors of the *Courier du Canada*.

At a few minutes past eleven, the main door of the Cloister opened, and the Lady Superior accompanied by several of the highest dignitaries of the Community came to the threshold to receive Their Excellencies, whom she welcomed to the Monastery. The distinguished party then proceeded to visit the Convent and some of rooms used by the pupils. The formal reception took place in one of the recreation rooms, where addresses and bouquets were presented to Their Excellencies by the Pupils, to whom Lord Dufferin addressed a few well chosen sentences, replete with good advice and kind words. Music and singing, such as can only be heard inside the Convent walls lent its charm to the scene, and Their Excellencies after a visit of over two hours duration, left the Monastery evidently bearing away with them a good impression of its inmates, who likewise seemed charmed by the kind manner and affability of their distinguished visitors.

Visit to the Commissioners' School.

On Friday, 13th Sept., His Excellency the Governor General and the Countess of Dufferin with a distinguished party visited the school of the Protestant School Commissioners, Artillery street, which was beautifully decorated for the occasion. They expressed much satisfaction with the appearance of the school and the pupils, and afterwards proceeded to the British and Canadian School, St. Rochs.

Visit to the National School.

His Excellency the Governor General and the Countess of Dufferin, visited the National School, D'Auteuil street, yesterday, 13th Sept., where the boys class, of 90, under Mr. Hatherly and Miss Brown, and the girls' class, of 70, under Miss Campbell,

were inspected in succession, and all looked bright and pleased at the visit. The Governor and Lady Dufferin, as in the High School, addressed several flattering remarks to the teachers, and spoke to several of the scholars, obtaining a holiday for the pupils in each institution. The National School, under its able management, is affording good practical education to numbers of boys and girls of the humbler classes, and deserves the full encouragement of the citizens. Lord and Lady Dufferin, and party, afterwards proceeded to the Morrin College, where the museum and Library of the Literary and Historical Society, and the departments of the College were examined.

Visit to the High School.

Yesterday morning 13th Sept., His Excellency the Governor General and the Countess of Dufferin visited the High School.—Their Excellencies were met at the school by the Premier of the Province, His Worship the Mayor and Madame Garneau, Mr. Delagrave, the Chairman of the Board of Instruction, the Lord Bishop of Quebec, Rev. Mr. Stuart, of New Glasgow, Chairman of the Education Commission, Pictou, N.S., Rev. Mr. Clark, Rev. Mr. Marsh, and H. S. Scott, Esq. Their Excellencies were received by the Rev. Dr. Cook, Chairman of the Board of Directors, who introduced the masters, Mr. Wilkie, M. A., Rector, Mr. Miller, Mr. DeVarro, and Mr. Elliott. Rev. Dr. Cook and the Rector made various explanations as to the condition and history of the school, when the 150 scholars were seated, and His Excellency examined several specimens of penmanship and essays. Master Rowley recited the lecture of the Rev. Robert Hall on "The projected invasion of Napoléon" in a very creditable manner, which spoke well for the way in which this branch of training is conducted.—His Excellency then addressed the pupils as follows:

My Young Friends,

I am happy on this occasion in being able to congratulate you in the first place on the fine establishment in which your education is being conducted, and secondly on the admirable system which is here adopted. Although you may not be aware of it this period of your lives is of the utmost importance, for you have not only to pursue those studies for which you are sent here, but at this time you can form habits of application and industry, which in your life will not only ensure you success in the different tasks which your several stations may involve but even procure for you the acquisition of those great prizes which, by the beneficent laws of your country, are placed within the reach of all without regard to antecedents or social position. You must ever remember that you are citizens of this country, that the eyes of all are on you, and upon you must depend the success of its future. Upon the youth of the country rests the responsibility of the welfare of this new and growing country. You would do well to remember that application and self-denial are the sure guarantees of success, and without them you cannot expect to secure the rich prizes that will be within your reach. (Applause.) I have but one other remark to make, which I am sure will be received with as much enthusiasm as evidenced in the loyalty you have just exhibited, and that is that I would ask of the Rector to grant you a holiday.

After the delivery of the forgoing address the Governor General visited the other parts of the building.

Visit to the Convent of Jesu Marie and Bellevue Convent.

Lord and Lady Dufferin, accompanied by Lady Harriet Fletcher, at about noon on Tuesday 17th Sept., visited the Sillery Academy. Among those present were the Archbishop of Quebec, Vicar-General Cozeau, the Rev. Mr. Harkin, curé of St. Columba, Mr. Sharples, Mayor of the parish, Hon. Mr. Chauveau, Mrs. Garneau, Mr. Delagrave, Col. Rhodes, Mrs. Rhodes, Miss Chauveau, Miss Delagrave, Dr. Lindsay, J. M. LeMoine, Esq., Mrs. Peters, J. Connolly, Esq., and others. Miss Darlington read the following address, and Miss Smith and Miss Poston presented bouquets to their Excellencies, after which Lord Dufferin made a suitable reply.

My Lady,

It is with emotions of joy and gratitude that we welcome you within our quiet walls to-day. The students of Sillery are favoured indeed, and we thank the good Genius which has prompted you to step aside from the stress of your daily cares, to visit us in our peaceful retreat, and by your approbation, to spur us on the thorny road of science:—Although gathered here from under many flags, yet you will seldom find

a band of young hearts more united in sincerely wishing the prosperity and growth of Canada, under British rule; nor can we doubt but that our extravagant desires will be fully realized in the person of His Excellency the Governor, who deigns to honor us with his presence to-day, and to whom the care of this Province is committed.—This tribute, my Lady, which I hold in my hand, is a very humble one in the eye of the world. Flowers thrive alike in the beautiful garden of the rich or the lowly one of the poor, and yet, who among men can form one of these delicate petals? Our God has formed and fashioned them, and given them to his children to brighten and cheer our exile on this earth. Then, dear Lady, we beg you to accept this priceless gift, and long after its blossoms shall have withered, deign to bestow a passing thought on the hearts you made happy at Sillery.

The distinguished party afterwards proceeded to the Bellevue Convent, on the St. Foye Road, where the foundations of the foundations of the new buildings were inspected, and much admiration expressed by His Excellency with the plan and site. Afterwards their Excellencies and party were received in the Convent by the Revd. Mother Superior and Rev. Abbe L. N. Paquet, chaplain of the establishment. The pupils sang several selections in a very charming manner, and an address was presented Lord Dufferin, to which he replied very graciously in French. A magnificent bouquet was presented the Countess of Dufferin, at whose request a holiday was accorded the pupils.

Books Received.

The Independent Sixth Reader, by J. Madison Watson.—A. S. Barnes & Co., New-York & Chicago.

This is a book of 456 pages designed for the use of instructors and advanced classes of Scholars in Elocution, divided into two parts, of which part I treats of the subject as a science, and part II constituting about five-sixths of the work, furnishes one hundred *Select Readings* chosen from the writings of sixty different authors.

As respects book Orthoëpy and Expression, taught and illustrated in Part I, we think that the author has succeeded in his main purpose,—that of producing a complete though concise treatise on the theory of his branch. The illustrative examples given in connection with the principles and rules laid down are sufficiently numerous, and they appear to have been carefully selected in each instance; while the many distinctive marks and varieties of type, which have been skillfully had recourse to, and which serve to remind us of certain noted features of the Pestalozzian system of teaching Arithmetic, must contribute much to conferring upon this portion of the work the practical character implied by its title. It must be understood of course that it is impossible by means of rules alone, or without the services of the living instructor, for the learner to perfect himself in the management of his voice in reading, and to give due effect to the tones, emphasis, and necessary pauses, nor can distinct articulation, a prime requisite for effective reading, depending wholly on the use of the organs of speech, be acquired without that aid.

As respects Part II, we may premise, without the least intention of disparaging the work of Mr. Watson, who is evidently an enthusiast in his branch and a practised teacher, that this portion of the book is likely to prove, outside of the United States, more acceptable to the general reader than extensively adopted as a manual or class-book for the practice of Elocution. Works of this kind are so very useful, when we consider what a pleasing and important accomplishment *good reading* is, and how much benefit youth may derive from the proper use of exercises selected with a due regard to their influence upon their language, sentiments, and emotions, and in inculcating the principles of piety and virtue, as well as patriotism, that new compilations of this kind can scarcely be other than welcome. Yet those who have charge of the practical instruction of youth in the Dominion would perhaps prefer to combine with the use of Mr. Watson's book, that of some other in which the selection of exercises has been made from a somewhat more extensive range of writers in the English tongue. British and Canadian readers, while fully appreciating the endeavour here made to impart the charm of novelty to the other attractions presented by the passages selected, will probably, as respects the instruction of youth, miss the names of great and favourite writers in the list of models given by this author. Even at the cost of rendering the work more bulky it might have been preferred by our teachers to have had some recourse to works like those of Raleigh & Bacon, Addison and his compeers, Blair, Goldsmith, Dr. Samuel Johnson, Swift, Robertson, and others who might be suggested, down to the times of Talfourd, Thackeray & Macaulay. Of the poets, we might have named Dryden, Cowper, Thompson, Hemans, and several more. The general reader is not

likely to find fault with the introduction of two or more selections from the same writers, as given in this book. For the purposes of instruction in the Dominion, and looking at the matter from a Canadian point of view (which must be our apology for what might otherwise seem exceptional in the foregoing remarks) we should welcome the appearance of another edition of this book somewhat enlarged in order the better to suit our local wants. Nevertheless it is a work of great merit, as we think, for, apart from the above suggestions, the author must have expended much time and labour to succeed so well as he has done in making appropriate selections from so vast an amount of materials as he had before him for the exercise of his discrimination.

University of Bishop's College.—Medical Faculty.

Yesterday morning 2nd October, the second session of the Medical Faculty of the University of Bishop's college, was opened in the New building at the corner of St. George and Ontario streets, with a lecture by Dr. F. W. Campbell. Among those present were Rev. J. H. Nicholls, D. D., Principal of the University; Rev. J. Fulton; C. Smallwood, M. D., D. C. L., F. R. G. S., with Messrs. A. H. David, M. D., Edinburg, L. R. C. S. E., D. C. L., Professor of Theory and Practice of Medicine, Dean of the Faculty; R. T. Godfrey, M. A., M. D., Professor of the Principals and Practice of Surgery; J. L. Leprohon, M. A., M. D.; F. W. Campbell, M. A., M. D., L. R. C. P., London, Professor of the Institutes of Medicine, Registrar of the Faculty; E. H. Trenholme, M. A., M. D. C. M., B. C. L., Professor of Midwifery and Diseases of Women and Children; J. Baker Edwards, M. A., Ph. D., D. C. L., Professor of Chemistry and Microscopy; A. H. Kollmyer, M. A., M. D., Professor of Materia Medica and Therapeutics; R. A. Kennedy, M. A., M. D. C. M., Professor of Anatomy; W. Gardner, M. A., M. D. C. M., Professor of Medica Jurisprudence; G. Wilkins, M. A., M. D., M. R. C. S., England, Professor of Pathology; S. E. Tabb, M. A., M. D. C. M., Professor of Botany and Zoology; J. Perrigo, M. A., M. D. C. M., M. R. C. S., England, Demonstrator of Anatomy and Curator of the Museum.

Dr. David presided.

Dr. F. W. Campbell's address was as follows:—Deputed, as I have been by my colleagues, to deliver the opening lecture of the second session of the Medical Faculty of the University of Bishop's College, allow me, on their behalf, to wish you, one and all, a cordial welcome. To those who return to us, after a comparative rest of six months, we extend our greetings, as to old and well-remembered friends. We feel that to you we owe much of the position which we occupy to-day. At a time when many had much to say against the establishment of a new Medical School in this the metropolitan city of the Dominion, you rallied around our standard, and enabled us to carry to completion the most successful first session of any medical faculty ever established in Canada. When I pause and look back upon the well nigh two years which have elapsed since the members of this school were formed, I am free to admit that the success which has attended us has been far beyond even what we felt sure would follow our efforts to establish in this fair and flourishing city a new school of medicine. It would be idle, gentlemen, to say that we did not feel anxious, for I can assure that among those who took part in the early work of organizing this Faculty there was much anxious consideration, many hours of perplexing consultation. It was not all smooth sailing. Difficulties, many of which we never dreamed of, were constantly rising in our path, and I do not think that I make an admission of cowardice, or of weakness when I say that more than once it seemed as if all our works and months of toil were to be for nought. We, however, felt that it was the interest of the general medical profession of this city, as well as your interest, gentlemen, that we should persevere, and open our school. Had it not been that we felt this most strongly, I fear we should have abandoned the idea. But having once put our hands to the plough, we determined to look steadily forward, and with faith in our cause, abide the issue. That we were right in doing so has, we think, been most satisfactorily attested by the twenty-five gentlemen who, last year, enrolled themselves upon our matriculation register as medical students of Bishop's College. With the exception of those who, last spring, took our diploma, I believe every member of the class of 1871-2 return to continue their studies with us. I need hardly say that to us this is an extremely gratifying fact, as it proves that the exertions which were made upon their behalf have been appreciated. I trust that the months which have intervened since the close of last session have not altogether been devoted to pleasure, that the warm and oppressive months of summer did not curdle the youthful blood within your veins, but that some little time was devoted to work, and that now you return to us laden with the knowledge that you have acquired. To those who come to us for the first time, who to-day enrol themselves as students of medicine,

we likewise extend our hearty welcome. At the very outset of your student's career I would not wish to say one word which will dampen the ardour which, I feel sure, pervades each breast, yet I feel that my duty would not be performed did I not ask each one of you if you have well considered the very important step which you are now if you taking. If you have, and it seems to me that your answer is in the affirmative, I welcome you to the work, which, though arduous, and entailing constant toil, has much about it which is pleasant and agreeable. Indeed, gentlemen, in after years, when the cares and the anxieties of practice surround you, you will often look back upon your student's life as being one of the green spots, an ever to be remembered landmark in your existence. To-day you enter upon your work, full of energy and of hope, and it is well you should do so, for on the very threshold of your studies you will meet with not a little which will perplex and worry you. Be not dismayed, gentlemen, but persevere; remember the proverbs, "There is no royal road to learning," and "What is worth having is worth fighting for." Every day of your student life will have its duties, which, if neglected and postponed, will accumulate so rapidly upon you that it will soon be out of your power to overtake them. Let me, therefore, impress upon you, with all the force I can command, not to procrastinate; but to arrange in a methodical manner your daily routine of work, and, having so arranged it, let no trivial circumstance cause you to deviate from it. This plan of methodarity is one which is invaluable at all periods of our lives, and I know no better time to adopt its practice than when commencing the study of medicine. It is really surprising what an amount of work can be gone through with when this course is followed; but as an additional inducement, I would say, that men who are methodical in their habits are generally of a practical turn of mind, and that practical men are usually not only those who deserve success, but who have it. Let not the allurements—the temptations of a great city, its gilt and glitter—dazzle your eye, and draw away your attention from that which for the next six months should be uppermost in your mind. Fix your eyes steadily at the points towards which you are aiming, turn your head neither to the right hand nor to the left hand, press steadily forward, and when the season closes next spring, you will have the satisfaction of knowing that your time has been properly passed, and that you have stored up not a little information, which will enable you next year to proceed to the more practical part of your studies. This session, to a very great extent, your attention will be directed to these elementary branches, which constitute the ground work of our profession. It is very essential that you should pay the closest possible attention to Anatomy, Chemistry, Materia Medica and Physiology. Under the head of Anatomy, I include, not only the regular course given by the Professor of that branch, but the continuance of its study, upon the dead body in the Dissecting Room. The importance of this portion of your studies, cannot be over-estimated, enabling you as it does, to examine *in situ*, those parts with which surgeons should be perfectly familiar. In being able to prosecute this study, openly, you are placed in a position of great privilege, compared with those who even a comparatively few years ago, occupied the same position that you do to-day. To the public mind, however, there is still the same horror, connected with the dead subject, as there was when Herophilus, a Greek physician, 570 years before Christ, first used, for the purpose of dissection, the human body. Not is it likely, that with the great mass of the public this feeling will ever be overcome. It is so thoroughly engrafted in human nature, that nothing but a thorough realization of its absolute necessity, can, I believe, ever reconcile any one to its adoption. While, therefore, I recommend close attention in the room, which is devoted to practical Anatomy, I also ask you to look with reverence upon those poor relics of humanity which are its occupants, and which the law of the land has appropriated for your use. Remember that the cold, inanimate form, which will then lie before you was once tenanted by an immortal soul, and walked erect—the image of its maker. Dr. Campbell then proceeded to speak of the other branches, laying especial stress on that of Physiology, which he considered the most interesting study to the student of medicine. He continued, I cannot allow this opportunity to pass without expressing my very strong conviction upon one portion of final study, I mean, hospital attendance. I am the more anxious to do so, because in this, the few weeks preceding the first session of this University, and during the past few weeks, the question has been very prominently brought before me. I have been asked by students—some of whom are present here to-day—whether I would advise attendance upon hospital practice during the first year of study. My answer to this enquiry has invariably been in the affirmative, and my reasons for doing so may be briefly stated. In passing from bed to bed, and from ward to ward, the eye of a first-year student is being gradually, though almost unconsciously educated to the appearances presented by the different forms of disease, he becomes familiar with the methods adopted to elucidate symptoms in something like regular order, he is soon able to distinguish a hard, a soft, a small, or a wiry pulse; his ear is gradually being

educated to the use of the stethoscope; and long before he fully comprehends the causes which give rise to *mucu rals*, or a *fine crepitus*, he is aptly able to distinguish the one from the other. Technical words, some of them difficult of pronunciation, get familiar to him—in fine, his faculty of observation, is being educated, and I know of no faculty more worthy of being taught or more necessary to the physician. If properly cultivated during your student's career, it will render the diagnosis of cases comparatively easy to you when thrown entirely upon your own responsibility. By closely following the hospital wards from the commencement of your pupillage, this faculty will be constantly brought into play—it will thus expand; and, to the keen observer, with one-half the trouble, signs and symptoms which may have escaped the attention of those in whom observation is dormant will be brought to the surface and receive due attention. Hospital attendance is every year assuming more importance in the eyes of those best qualified to judge, and I hope the day is not far distant when the amount of it which is at present required by the law of Canada—viz., one year—will at least be doubled. Two years' practical illustration of the doctrine inculcated in the lecture room is not more than enough, and in after life will be well appreciated by all who take it. In fact, gentlemen, when I look about me, and see the course of those who attended lectures with me, I am struck with the fact that those who have been most successful are those who, upon every possible opportunity, were at the bedside, examining, watching and recording cases. If I could urge no higher motive than that pecuniary and professional success was the sure reward of the close hospital student, I would still press you to it. But there is a nobler motive still, and when I mention it I am sure it will find a response in every breast. You accept a high and holy trust when the parchment which certifies your qualification to practice the healing art is placed in your possession. For the proper fulfilment of this trust you will one day have to give an account. It is therefore your *duty* to your fellow-men to prepare in every possible way, so that when called to practice your profession you may be able to bring to your aid every possible element of success. I know of none more likely to come to your assistance when you first commence practice and lack that which will alone give you confidence—experience—than the hours and days you have passed in Hospital attendance. At the very commencement then of your student's career, I would advise your commencing "to walk" the Hospital. Not in the too literal application of some students, who walk the wards without ever making an attempt to listen to the clinical remarks—passing their time in frivolous amusement—but with an honest determination to avail yourself of every opportunity to increase your store of practical knowledge. If you do this, gentlemen, I have no fear of the result when you commence practice, and are thrown upon your own responsibility. No matter how sudden or how great the emergency which may call for instant action, you will be found prepared, and will never cease to be thankful for the long and close attention you gave to the Hospital wards. I cannot leave this subject of Hospital attendance without a word or two with regard to a complaint which was becoming common even while I was a student. I allude to the comparatively small number of clinical teachers when compared to the number of students. At the Hospital, principally attended by the English speaking students, only two physicians attend at one time; and as the number of students is seldom much under one hundred, even if equally divided, it would give about fifty each. I need hardly express my opinion that this number is a half more than any one man can do justice to, and that when students complain that from the numbers crowding around the bed they are deprived of much information, which they might otherwise obtain—there is reason in their murmuring. I have good reason to know that this fact is well known and appreciated by a number of the influential governors of that institution, and I much mistake the spirit of these men and of the age in which we live if the system, which has so long prevailed in that institution, and which has prevented a fair representation of the general outside profession, upon its staff, and a thorough utilization of its material for the purposes of clinical teaching, is not fast drawing to a close.

The lecturer concluded with some remarks with regard to the proper function of the Profession of Medicine in society.

Dr. David regretted to have to state that the Chancellor of Bishop's College, Hon. Edward Hale, was, from unforeseen circumstances, unable to be present. He however, had written to say that though absent in person he was heart and soul with them. The opening of the session was, however, honoured with the presence of the Principal, who would address to them a few remarks.

Rev. Dr. Nicolls, after speaking of the surprise which he now felt at being called upon so unexpectedly to address them, said that one thing had struck him as he entered the building this morning—he being the first person to do so—was the similarity of their own beginning at Lennoxville with the present. There was one gentleman here who could recall the circumstances of those early times. The difficulties and struggles at the outset then appeared insurmount-

table. The same difficulties were here. At the opening of Lennoxville the building was full of workmen, and when he had gone down there, he had said to the trustees that he would go into it on the Saturday and commence the classes on Monday, no matter if he had to sit upon the floor. Determination and energy with God's blessing had made them successful, and he saw before him proofs of the same energy and determination which would make this faculty second to none. He congratulated the members of the school upon the excellent advice they had received, which would undoubtedly induce them to endeavour to raise the profession to a higher level than before. The work of the University and Medical School were alike comprised in setting forth the good of mankind and the glory of the Creator. He hoped that this latter subject would not be lost sight of, and that the school would have every prosperity.

The Dean then announced that the classes would commence to-day at eight a. m., after which the meeting broke up.

LITERATURE.

Evenings at home.—The winter evening is in the truest and closest sense the Evening at Home. What one most misses in it, perhaps, is a little sensible organisation. Nobody seems to realise how very hard it is for a number of people to amuse themselves and one another for dozens of nights in succession. There are a few traditions, like those of reading or music, that bring order into the chaos, but the books are chosen haphazard, and the music is left to chance. The family group which began so merrily over the fire breaks up by a series of quiet secessions. Mamma resumes silence and her knitting-needles, Mary wanders off to her music-stool, the schoolboy flings himself on the sofa with a novel, papa is asleep in the easy chair. Everybody yawns with a certain weary relief when the prayer-bell rings, and yet nobody could exactly say why the evening had been so wearisome. The truth is that the bulk of people think that entertainment comes of itself, and that the least organisation is the death of any real amusement. The evening is left to arrange itself, and it arranges itself in the way we have described. The boy who loafs about a playground soon finds how wearisome merely casual amusement is, and betakes himself to the organised "game;" and the woman who once set to organising her evenings at home would soon find that the prayer-bell came too early rather than too late. Variety is the first thing needful for amusement, and a little unwritten programme which arranged conversation, music, reading, and the round game in their due sequence, would be simply introducing into the family party the same principle which is proved by experience to be essential to the success of any public entertainment. Much again may be done with each of these elements of social enjoyment in themselves. Music, for instance, as it is at present employed in evenings at home, is one of the most irritating and annoying things in the world. It is a mere chance which piece is played, or who the composer is, or what the style of music may be. Conceive, instead of this, such a series of evenings as Mr. Chappell gives us at St. James's Hall; now a Beethoven night, now a Mendelssohn, now a Schubert night. Imagine a little thought given to the character and succession of the pieces played, the devotion of five minutes to the arrangement of a dexterous alternation of vocal with instrumental music, or the placing the more scientific pieces at the beginning of the little home concert and a lively glee at the close. These are of course mere hints, but they are hints which turn wholly on the one point, that amusement and a real evening at home can only be got at the cost of a little forethought and a little trouble. Or take the case of reading aloud. Our grandmothers used to gather round the fire and listen patiently to pages of a "classic author." Now-a-days we take the last Mudie's book from the table, plunge into the middle, and make the best of it. There are advantages in either course, but a little tact would combine them both. An essay of De Quincey would be an agreeable relief after Mr. Lecky; it would be amusing to contrast the light persiflage of "Lothair" with the lighter persiflage of "The Rape of the Lock." We once knew a family where Shakespeare was read in character, as it were, and each member of the circle round the home table took a separate personage in the play. Reading of this kind would give a real basis for conversation. There is no reason in the world that good conversation should be so rare as it is in England; but, as every mistress of a *salon* in France

knows, good talk does not come by accident. We puzzle ourselves, as we listen to the ceaseless gabble of girls on a "call," how any human beings can have fallen into such vacuous imbecility; but the secret of it lies at home. An English woman learns to dress, to dance, or to ride, but she picks up the art of conversation as she can. When the need for talk comes, she finds that conversation is just as difficult an art as that of riding, or dressing, or dancing. She is too plucky to give in, and too shy to hold her tongue, and so she plunges into a goose-like gabble. Men and women will only learn really to converse when conversation, in the true sense of the word, is familiar to them at home. But to converse—in other words, to find fresh subjects and treat them freshly; to preserve a tone of lightness and ease without falling into frivolity; to know how to avoid mere discussion and controversy, and yet to deal with topics of equal interest and value; to perceive when a theme is socially exhausted, and when the moment has come for a digression; how to check one member of the circle, or to draw out the other; how to give their proper place even to jest and repartee—all this is no easy matter. It requires, as we argued in the former cases, forethought and trouble, and a little organisation. But we can hardly conceive anything which would contribute in a higher degree to the happiness of an evening at home.

The bachelor in his chambers can only think with a bitter irony of such evenings as we have described. Conversation, music, family readings, are so many inaccessible heavens to the solitary refugee whom the ebb of the season has left stranded on the shore. "Doors where his hand once used to beat" are closed to him, the long array of cards vanishes from his table, the last friend with whom he might have found a chat and a cigar flitted yesterday on his way to the Engadine. Undoubtedly the first evening at home without the prospect of a single knock at the door, the dreary length of hours, the ticking of the clock, the space unbroken by aught but the light spiral smoke from his meerschaum, are trying enough to the bachelor. Blessings of a questionable character fall on the engagements that keep him a prisoner in town. But still, little by little, pleasures of his own open on him in those evenings at home. He takes down the old books that never get a chance in the bustle of nine months in the year. He rubs up his Montaigne, he roars again over "Tristram Shandy," his critical pencil wanders up and down the margins of his Massinger. He begins to feel, however gradually, the charms of solitude and indolence and the absolute liberty of doing what he will. His life groups itself in the quiet, and comes back to him in quaint little vignettes of the past, in dreamy recollections of school-days and college-days, and his first years at the Bar. Glad memories revive pleasantly for him; he recollects Jones's wonderful verses, and Brown's marvellous agility on the Finsteraarhorn. He wonders what has become of Robinson, and suddenly finds himself scribbling a letter to Smith, whom he has not seen for ten years and more. Letters, in fact, become possible. There is time now for something besides post-cards and notes. Sisters are gladdened with epistles as long and amusing as of old. His mother blushes like a girl on her birthday morning at receiving the prettiest and most flattering little sonnet in the world. Then, too, there is the pleasure of planning one's life, of writing imaginary books, of attaining imaginary fame. Fancy, so severely held in check by the icy prose of the season, wakes to fresh flights in the poetic stillness of an evening at home. It is possible that he will cease to be a bachelor, that Lily really cares for him, that his cousin's flirtation meant something. Charming little faces come out of the red embers, wondrous little figures come and go in the light smoke-clouds. Chords of pleasant music, voices of little children, chat and laughter, sound somehow in the silence of the desolate chambers. A row of neatly-lettered octavos spreads itself—his own immortal work—along the table; there is his Judge's wig in the chair; he hears the cheers and the hush as he rises for the great speech at St. Stephen's. Dreams, no doubt; but a man may do worse than dream. All those drums and dinners and balls of the last six months seem poor and ridiculous beside this world of happiness and fame. The smoke-wreaths die into the bowl again, the light dies away in the embers, but the bachelor has found a charm in his evening at home.—(*Saturday Review.*)

The Bores of History.

Mary Queen of Scots—or Marie, as some fair writers will insist on calling her—has become one of the greatest torments in the whole gallery of bores. We shall never, so far as we can see, hear the last of her "beautiful person" and "graces of manner." That snow-white little neck will apparently inspire the pens of the literary butchers until the world in anger cries, Shame! She has been done to death in countless leaders and essays. Her sorrows and her crimes—if she really committed any—have been the constant theme of hacks ever since Scott discovered her to the curious people who never read history unless it is tricked out in the garb of fiction. We confess we are utterly tired of her. In our youth we did think she was a persecuted and injured woman, but since she has so persistently persecuted and injured us we have no power to decapitate her shade.

Then, to go back to classic times, there is Cleopatra and Mark Antony. When shall we hear the last of them? What good genius or pious priest will undertake to lay the ghosts of this celebrated pair? When shall we hear the last of the profound speculations in which our "great writers" are wont to indulge ament the probable fate of the world had the lady's nose been but a trifle shorter? Surely we have had enough of her; and, as it is impossible to say an original thing about her and her great admirer, it would be as well to let them both rest quietly in the school-books until the crack of doom. We are willing to admit that, if a taboo were placed upon the remarkable persons who have figured in history, many of our picturesque writers would be deprived of their whole stock in trade. We are, however, not quite sure that the world would lose much if the whole tribe resigned their pens for good. We might be deprived of a great quantity of thrice-threshed straw, but, for our own part, we could get on quite as well without it. What we really need is a little more of the salt of originality, and a more sparing use of mere words. It is bad enough to be obliged to read the ordinary literature of the day, but it is really vexing that the common topics of the hour cannot be discussed without all this froth and folly.

Coming nearer to our own time, we find Samuel Pepys growing into a bore of the first water. We can all read his Diary if we please; but, having read it for ourselves, we do not care to see it hashed up on every occasion for the people who care nothing for Pepys nor the time in which he lived. The story of his first wig has gone from pole to pole, and, as far as we can judge, it is likely to travel round the world, like the Wandering Jew, until the last trump summons scribbler and diarist to the great account. Pepys did not bargain for this posthumous fame, and one knows not what agonies his shade must endure if it is conscious that it has become a stalking-horse behind which the fell writers of the hour hide their base designs on the innocent reader. Of all the bores of history, however, commend us to, or rather save us from, the Pilgrim Fathers and the Mayflower. We cannot open a book on a stall without meeting with them. These old bigots permeate all literature, and haunt our picture galleries, to the terror of all sensible people. Can we not let them rest in peace? Is it not possible to banish them for good into limbo? Hawthorne, heaven bless him! took some of the gilt off their Puritanical gingerbread in the "Scarlet Letter," and we thank him for that knightly service. If we were inclined to play the part of a literary Don Quixote, we should certainly try whether a vigorous lance prick or two would not frighten these grim old giants from the stage. But we have too great a horror of them to attempt the task of exorcism, and are only sorry that, for the purposes of this article, we are obliged to admit them again before the curtain.

Grace Darling is another, but a charming, bore of history. She has been rowing that old boat of hers daily in some print or other for the last thirty or forty years. She must tire of the work, and no doubt the fair heroine would gladly retire from business, but the literary hack finds her too valuable, and so her poor shade goes backwards and forwards from the wreck to the lighthouse as regularly as if she were expiating a crime; and so in truth she is. Her crime in the eyes of her persecutors is her heroism, and they will not let her rest until another victim, equally brave and interesting, takes her place. Had she reflected upon the possibility of being famous, we fear the unfortunate passengers on the Forfarshire steamer would have gone to the bottom before she would have lifted a finger to aid them.

We cannot close this article without some "allusion" more

or less "brilliant" to the New Zealander, who has been such an unconscionable time making that sketch of St. Paul's. Macaulay little knew, when he borrowed the gentleman from Volney, that he had inadvertently started the poor savage upon a never-ending series of travels through the press of the world; yet such is the mysterious dispensation of Providence. We hear of the great traveller daily, and he is always trying to finish that unlucky sketch. He crops up in the most unexpected places, and so popular is he that every tyro who puts pen to paper feels called upon to look over his shoulder to see how he is getting on. We wish to heaven he would close his portfolio, and go back to the land of tomahawks. We do not want him here. Perhaps, with the barbarous taste of a savage, he likes fame, and is glad to see the crowd of admirers who gaze in wonder at his masterly touches and bold outlines. But whether he is proud of his prominent position or not, he is a bore of the most vulgar type, and we do not thank the historian for so recklessly introducing him to the great masters of the art of chopping straw. Many a pen would no doubt be paralysed if harm came to the tiresome savage or any of his brethren of the company of bores. A universal paralysis of the pen however would, in our opinion, be preferable to this hashing up of history, this continual fitting-on of the cast-off clothes of great writers. Had we absolute power we would certainly interfere, to protect the public from the men who thus systematically annoy them. A decree of pains and penalties should at once be issued. We would make it treason without benefit of clergy to "allude" in any way to the Pilgrim Fathers. We would fine any man who dared to mention Cleopatra, or Hero and Leander, and we would send to the hulks or the treadmill the whole school of able editors who so persistently disturb the peace of Marie Antoinette. Society should be preserved from the nuisance of the literary organ grinder, and he should be compelled to go back to the plough, or to some other congenial employment.—(Civilian.)

SCIENCE.

Rocky Mountain Geysers.—In the Lower Geyser Basin, although there are many groups of most interesting springs, none of them can rank as geysers of the first class. Over an area of about three miles in width and five in length, the surface seems to be literally riddled with the orifices of active, quiet, dying and dead springs. There must be at least a thousand of them. Some of them may be called true geysers, having rather regular periods of activity, and throwing up columns of water from two to six feet in diameter to the height of fifteen to thirty.

One geyser, with quite a small orifice, played every fifteen minutes or so, sending up a column of water twenty to thirty feet high. A large number of the springs were in a constant state of violent ebullition, throwing the water up two to four feet. Occasionally an unusual impulse was given to the column, sending it up ten or twelve feet. One of the most remarkable of the springs in this lower basin had built up for itself a cistern, which, for beauty and elaborateness, would compare well with those of the springs on Gardiner's River. We call it the *architectural fountain*. The whole basin is about one hundred and fifty feet in diameter. Near the center is the rim of the spring, which is about twenty-five feet in diameter; the water is in constant agitation, occasionally spouting up a column of water, like an artificial fountain, and filling up the reservoirs and the sides for a radius of fifty feet or more. The siliceous accumulation made by this spring descends for several hundred feet in innumerable semi-circular steps varying from one fourth of an inch to two inches in height, and is exquisitely beautiful in all its details. When in active operation a column of water is thrown 30 to 60 feet high, when the water spread over a radius of fifty feet, filling the numerous reservoirs that surround the immense rim of the basins. There were others, funnel shaped basins with elegant scalloped rims, which were covered all over the inner side, to the depth of ten to twenty feet, with bead-like tubercles of silica. Sometimes these siliceous beads were arranged in large numbers like *Fungia* corals, or like the heads of cauliflowers.

Up the Firehole River about ten miles, there is the Upper Geyser Basin, where the great geysers are found.

In the Lower Geyser Basin on both sides of the Firehole,

even up among the foothills of the mountains on either side, are springs in a state of greater or less activity, and upon the very summits of the mountains is here and there a steam vent. But none of the Grand Geysers are found here. For four or five hours in the early morning, this valley presents one of the most interesting pictures than can well be imagined: columns of steam are rising from a thousand vents, completely shrouding the valley as with a dense fog. A view of the city of Pittsburgh from a high point would convey some idea of the appearance of this valley, except that in the former case the dense black arises in hundreds of columns, instead of the pure white feathery of clouds steam.

The Upper Geyser Basin is located very near the source of Firehole River, and between it and the Lower Geyser Basin there is an interval of about five miles in which the hills come close to the river on both sides, and the springs occur only in small groups. Although possessing some interest, yet there were so many others in the region that they did not attract much attention. The valley, as well as the bed of the creek, is covered with old deposits, showing clearly that these springs have been successively breaking out, reaching their culminating period of activity, and then dying out, ever since the Pliocene era. Above this woody and rocky interval, the valley again expands, and a branch come in from the southwest, which we call Iron Spring Creek, on which are located many more springs. This stream receives its name from the vivid yellow and pink clay, on both sides, from mouth to source. Ascending the Firehole, we find the surface, on both sides of the river, covered with a thick siliceous crust, and completely riddled with springs of every variety. Quiet springs, with basins varying from a few inches to a hundred feet in diameter, are distributed everywhere. Some high pyramidal cones, with steam issuing from the summits, indicate the last stages of what were once important geysers.

Near the center of the basin, which is about two miles long and half a mile in width, there is one of the most powerful geysers of the basin. During our short visit of two days it operated twice. Our camp was pitched within a few yards of it. The preliminary warning was indicated by a tremendous rumbling, which shook the ground all around us with a sound like distant thunder. Then an immense mass of steam burst out of the crater as from an escape-pipe, followed by a column of water eight feet in diameter, and rising by steady impulses to the height of two hundred feet; I can compare the noise and excitement which it produced only to that of a charge in battle. This wonderful fountain continued to play for the space of 15 minutes, when the water gradually subsided and settled down in the crater about two feet, and the temperature slowly diminished to 130°. There are here two separate basins, one of which is in a constant state of violent agitation, while the other plays only at intervals of about 32 hours; and although, so far as the eye could detect, there was a partition of not more than two feet in thickness between them, neither of them seems to be affected by the operation of the other. The decorations about these springs were beautiful beyond anything I had ever seen in nature. The most delicate embroidery could not rival them in variety and complexity. The surface within and without was covered with little tubercles of silica, which had a smooth, enameled appearance like the most delicate pearls; down on the sides of this basin were large rounded masses, like corals formed entirely of silica. There was one spring with a small elevated crater about two feet high, which threw up a small column of water, about twelve feet high, by continued impulses, like the movements of a saw, and thus it received the name of the Sawmill Geyser. There were probably from twenty to fifty geysers of greater or less importance in this valley; and it is quite possible that some of the springs placed in the quiet class, operated at times as first-class geysers. There were also the grotto Geyser and the Castle Geyser. The crater of the latter is about forty feet in height, one hundred and fifty to two hundred feet in diameter at its base; it was built up of thin layers of silica, which rise, much like steps, to the chimney on the summit, which is about ten feet high. Clouds of steam issue constantly from this chimney, and every few moments a column of heated water is thrown up fifteen to twenty feet.

But the most accommodating, and in some respects, the most instructive geyser in this basin was called by Messrs. Langford and Doane "Old Faithful." During our stay it operated every hour, throwing up a column of water six feet in diameter from one hundred to one hundred and fifty feet. When it is about to make a display, very little preliminary warning is given.

There is simply a rush of steam for a moment, and then a column of water shoots up vertically into the air, and by a succession of impulses is apparently held steadily up for the space of fifteen minutes, the water falling directly back into the crater and overflowing in large quantities. It then ceases, and with a rush of steam for a few seconds closes the display for the time. Words can convey but an inadequate conception of the intense excitement which the scene produces upon the mind. Night and day some of the geysers are in operation continually, and, at certain periods, several of them perform at the same time.—*Journal of Science and Arts.*

Echoes.—How they are caused.—Remarkable examples.—Echoes are produced by the reflected waves of sound. When a sufficient interval exist between a direct and a reflected sound, we hear the latter in an echo. But, as Professor Tyndall has shown us, sound, like light, "may be reflected several times in succession, and as the refracted light under these circumstances becomes gradually feebler to the eye, so the successive echoes become feebler, to the ear. The reflection of echoes is also in part due to the fact that the reflecting surfaces are at different distances from the hearer." Not only is sound in all respects reflected and refracted like light, but it may, like light, be condensed by suitable lenses. For instance, a bell placed on an eminence in Heligoland failed, on account of its distance, to be heard in the town. A parabolic reflector, placed behind the bell, so as to reflect the sound waves in the direction of the long sloping street, caused the strokes of the bell to be distinctly heard at all times. It is found, too, that curved roofs and coilings act as mirrors upon sound, a fact of interest to the architect. In some apartments the singing of a kettle seems, in certain positions, to come, not from the fire on which it is placed, but from the ceiling, and so with the ticking of a clock. A rather remarkable instance of the same thing is cited by Sir John Herschel. In one of the cathedrals in Sicily the confessional was so placed that the whispers of the penitents were reflected by the curved roof, and brought to a focus at a distant part of the edifice. The focus was discovered by accident, and for some time the person who discovered it took pleasure in hearing, and, bringing his friends to hear, utterances intended for the priest alone.

The whispering gallery of St. Paul's is another well known instance. Here the faintest sound is conveyed from one side to the other of the dome, but it is not heard at any intermediate point. In Gloucester Cathedral, a gallery of an octagonal form conveys a whisper seventy-five feet across the nave, while the ticks of a watch may be heard from one end of the Abbey church of St. Albans to the other.

While echoes whisper secrets in the areas of antique halls, in the windings of long corridors, in the melancholy aisles of arched cathedrals and groined abbeys, they are no less partial to caverns and grottoes, and reverberate with loudest voice among mountains. There are single and compound echoes. Some repeat only one syllable, and sounds of a certain pitch; others, known as tautological echoes, repeat the same words many times in varied tones. The reason of this is that, the echoing body is far off, and there is time for one reflection to pass away before another reaches the ear. Misson, in his description of Italy, mentions an echo in the vineyard of Simonetta, about two miles from Milan, which reflects a word twenty times over. Gasendi tells of another, near the tomb of Cecilia Metella at Rome, which repeated the first verse of the *Æneid* eight times; and a third near Coblenz repeats seventeen times. There is a deep *cul-de-sac* called the Ochsenthal formed of the great cliffs of the Engelhorner, near Rosenlaur, in Switzerland, where the echoes warble in a wonderful manner. The sound of the Alpine horn also, rebounding from the rocks of the Wetterhorn or the Jungfrau, is in the first instance heard roughly. But by successive reflections, the notes are rendered more soft and flute-like, the general diminution of intensity giving the impression that the source of sound is retreating further into the solitudes of ice and snow.

A very famous echo is that at Lurlei. It is thus described by the author of the "Rhine and its Picturesque Scenery": "An old soldier blows an old tantivy on his huge French hunting horn. No sooner have the fine brassy notes ceased, than you hear them repeated on the opposite shores, so distinctly, too, that, though you know it is but an echo, you can hardly persuade yourself that there is not some one concealed on the top of Lurlei imitating the sounds. The next portion of the entertainment is with the musket; and for this the old guard waits till the air is perfectly still. Then directly a lull ensues in the

breeze, click goes the trigger, and the report rattles against the wall of the opposite rock as if the crags were tumbling down in a shower; and no sooner had it burst upon the ear than you hear a second explosion, almost as loud as the first, clattering behind the summit of Lurlei. This time, however, the echo does not end here, for the moment after, the sound seems to be ascending the river in a kind of small thunder peal, mustering along the opposite cliffs; then comes a pause as it laps across the stream, after which you catch it again on the same side of the Rhine as yourself, ascending along the rocks in fainter and faster peals, till it reaches the vineyard adjoining the Falsenbank, by St. Goar; and the next instant, after another pause, the ear detects it across the river once more, where it ultimately expires, with a faint puff just above the ruins of Katz."

Visitors of Killarney will remember the fine echo in the Gap of Dunloe. When a trumpet is sounded in a certain place in the Gap, the sonorous waves reach the ear in succession after one, two, three, or more, reflections from the adjacent cliffs, and thus die away in the sweetest cadence. One at Woodstock Park, near Oxford, repeats seventeen syllables by day; and twenty by night; another at Shipley Church, in Sussex, does no fewer than twenty-one syllables.

We get more astonishing effect still at Ulleswater, lying between the Counties of Cumberland and Westmoreland. There used to be, and may be now, a small vessel on the lake, mounted with brass cannon for the purpose of exciting the echoes. A gun-shot was distinctly reverberated seven or eight times, it first rose overhead in one vast peal; then subduing a few seconds, it rose again in a grand interrupted burst on the left, and thus thrown from rock to rock, in a sort of aerial perspective, it was caught again returning full on the ear, surprised you, after you thought all was over with as loud a peal as at first. The grandest effect, however, was produced by a successive discharge of cannon, at the interval of a few seconds between each. The effect of the first was not over, when the echoes of the second, the third, or perhaps the fourth began. Such a variety of awful sounds, mingling and commingling, and at this same moment heard from all sides made one imagine that the very foundations of every rock on the lake were giving way, and the whole scene, from some strange convulsion of nature, was falling into general ruin.

Though the natives of Scotland are generally supposed to be extremely reticent of speech themselves, their country, as it happens, is very loquacious in the matter of echoes. This is accounted for by the rugged and mountainous character of the northern kingdom. Roseneath, near Glasgow; Carslane Craigs, Lanarkshire; Lock Dockart, Perthshire; Arthur's Seat, Edinburgh; Lock Kinellan, Cromarty; the castles of Achinduin and Kingerloch, in Argyllshire, are all noted for what Doctor Tindall calls wave motions, and tourists linger at these places and listen with delight at the curious effects produced. At Roseneath, if a trumpet be played, the echo will begin the tune, and repeat it accurately; as soon as this echo has ceased another will give the tune in a lower note and, after the second has ceased, a third will succeed with equal fidelity, though in a much feebler tone. But the most beautiful echo in Scotland—one of the finest, indeed, in the world—occurs in the ancient and ruined abbey church of Paisley. When the door of the chapel is shut, the reverberations are equal to the sound of thunder. Breathe a single note in music, and the tone ascends gradually till it dies away in soft and most bewitching murmurs. If a good voice sing, or a musical instrument be well played, the effect is indescribably agreeable.

Wood.—The variety of wood produced in different parts of the world is far greater than most people have an idea of. At the Paris Exposition of 1867 there were, from forty-five different countries, no less than three thousand seven hundred and sixty-nine different kinds of woods exhibited. Of these, three hundred and ninety-five came from Europe, two hundred and fifty-two from Africa, eight hundred and sixty-six from Asia, nine hundred and sixty-six from Oceania, and twelve hundred and ninety-eight from America. Owing to the improvident destruction of the forests, which materially increases the price of wood, it is less used from year to year, iron in most cases taking its place. Architects as well as engineers no longer prize this building-material as it deserves, although for many purposes it is far superior to any of its substitutes. Nature yields wood of such a variety of colors as to render paint quite unnecessary. Every shade of color may be found, from the pure white of the atlas-wood to the black of the ebony. In French Guiana grows the violet-wood (*Copaifera bractata*), which is exceedingly beautiful, and *Corpacas glabrum*, which is a brilliant yellow. Brazil yields a

red-wood (*Echrospermum Balkasarii*) and rose-wood (*Dalbergia nigra*). Zebra-wood (*Cordia zebra*) grows in Venezuela. In Australia there grows a wood peculiarly striped (*Senecio Bedfordii*), and another wood that has a net-like appearance in the transverse cut (*Banksia serrata*). All these woods are admirably adapted to the construction of handsome furniture and inlaid work.

Insanity.—That all forms of mental and moral disease are symptoms of morbid conditions of the brain is now as well established as any fact of science. The elaborate researches of Professor Schroeder van der Kolk and other European observers have shown most clearly that the brains of patients who die insane, idiotic, or imbecile, give evidence, on microscopic examination, of diseased conditions sufficient to account for all the symptoms they may have exhibited. Insanity, being then a symptom of disease of the brain, is not found among the inferior species, who have little or no nervous system, and only exceptionally among the higher orders of animals. It is comparatively rare among wild and barbarous tribes. As would logically be expected, its manifestations are most frequent and most severe in civilized communities, and among the intellectual or ruling classes. Insanity increases in frequency and in violence with the progress of civilization, and is, indeed, a part of the price that we pay for intellectuality and refinement. It was never before so common as at the present day, and it appears to be rapidly increasing and multiplying its phases, in direct proportion to our progress in art, in science, in literature, in trade, in finance, and in all the departments of modern activity through which the brain is so constantly harassed and overworked. While we escape or recover from many of the inflammations and fevers that decimate the savage tribes, and are, on the whole, healthier and longer-lived, we are yet afflicted with a thousand phases of insanity to which they are comparatively strangers.

Ursa Major.—This a constellation called by the people in England "Charles's Wain," in America the "Dipper," and in Scotland the "Plough," it has been discovered by a remarkably delicate test just brought into use, is receding from our system at the rate of some 36 miles a second, or 2,160 a minute, or 129,600 an hour, or a little over three millions of miles a day, or about eleven hundred millions a year. The remarkable thing is, that all those stars are receding at the same rate of speed, which shows either that they are all connected as parts of a system, or that it is we who are receding from them. The wonder is that, at this rate of increasing distance, they have not changed, so far as is known, their apparent magnitude, as far back as records go. Their are many others fixed stars found to be in motion in vast orbits round some invisible centre or centres; but their distances are so great that it must take ages to make any apparent difference in their positions.

The Artic Expeditions.—Seven new expeditions are to start this year to solve the riddle of the North Polar seas. The most important of these, according to Dr. Petermann of Gotha, is the Austrian, to which the Emperor, the government authorities, the war and admiralty departments and all classes of society in the empire have largely contributed. The sum of 175,000 florins was thus collected, and the expedition will sail by the end of next month. The object of the expedition is to make further researches in a northeasterly direction on the sea which was discovered last year, and also to explore the Arctic Sea to the north of Siberia. The duration of the expedition is fixed at three years. Sweden is also preparing a Polar expedition, which will pass the winter in the northern islands of Spitzbergen, and thence, in the spring 1873, proceed northward in carriages drawn by reindeer. Fifty reindeers have been already trained for this purpose, and the whole expedition is under the superintendence of the Swedish Academy of Sciences. The town of Gothenburg has contributed the principal portion of the funds for this expedition, as it did for those of 1868 and 1870; but the Swedish Academy and various private persons also support it. The Norwegian expeditions, like the Austrian, will proceed in steamers. Besides these there are the two French expeditions, one under M. Gustave d'Ambert, the other under M. Octave Pavy, which left San Francisco last year, and has just been heard of, and the American expedition under Hall, now in the American expedition under Hall, now in the high latitudes.

Astronomy.—In the June number of the "Nautical Magazine" the following problem was given for solution: "Astronomers allege that the moon now apparently takes (some few seconds) less time to complete her course round the earth than formerly. If this be so, whether would you say that the moon is falling in (*i. e.* coming nearer) towards the earth, or that the earth is revolving more slowly on her axis; and what reason would you give?" In the September number of the same Magazine, just received by the English mail, we notice an answer dated from this city. It is from the pen of Mr.

Seaton, of McNally & Seaton, proprietors of the Marine School here. The solution is given as follows:

"The law of gravitation asserts that all particles of matter mutually attract one another in the ratio of their respective masses, and inversely as the squares of their distances increase. Applying this law to the moon, it will be seen that she is more particularly subject to two attractive influences—that of the earth and of the sun; the comparative proximity of the former enables it to bring the moon under its own sway, and so force her to describe an orbit of which the earth occupies the central position; while the mass of the latter is such, that the moon is never free from its powerful influence, the tendency of which is to break the moon away from the control of the earth, and to thus make itself the centre of the moon's orbit.

"Again, as all particles of matter are *reciprocally* attractive, the planets in their respective orbits are each exerting an attraction upon the earth, the combined effect of which, at the present time, has been found in the decrease of the eccentricity of its orbit, that is, the earth's path around the sun is from this cause becoming by an almost infinitely slow change more circular, and therefore the earth is thus increasing its distance from the sun and necessarily taking the moon with it.

"Now as the attractive influence of one mass upon another decreases as the square of the distance between those bodies increases, it is evident, that as the moon increases her distance from the sun, not only will the sun have less power over her, but it follows that the earth, having a smaller opposing force to overcome, will necessarily have an increased power over her, the effect of which will be that the moon is drawn towards the earth, thereby causing a contraction of her orbit, an increase in her rate of motion, and as a consequence a decrease in the time taken by her to describe it."

WILLIAM C. SEATON.

Halifax, N. S., July 15th, 1872.

Detective Microscopy.—The use of science for the detection or disproof of crime has been greatly celebrated in theoretical disquisitions, which do not always establish themselves when the law seeks to avail itself of them in practical cases. Recent trials of alleged prisoners have developed very little apparent trustworthiness in chemical analysis and microscopical tests for the determination of questions respecting the character and quantity of poisonous drugs supposed to be present in the human remains subjected to examination; and the various attempts made from time to time in French courts to utilize the camera for detective purposes have scarcely proved more satisfactory. It may be, however, that the mere quackery of science, rather than its professional exactness, is what lawyers have willfully cited to confuse rather than instruct unprofessional jurymen; and that, in days of less audacious pettifoggery, crime may yet be made to tremble before witnesses who, by the wonders of scientific vision, may be able to trace the criminal unerringly in every step of his dark commission. The subject is suggested by an article in a late number of the English *Journal of Microscopy*, describing the experience of one Dr. B. in what may be technically called the detective use of the microscope. Having used the latter instrument for many years in the study of comparative anatomy, the medical practitioner in question has been particularly impressed by the varieties of hair appertaining to the human and the brute creations, and believes himself able to tell not only from what race of man—white or black—or from what particular animal, or part thereof, a given hirsute tuft has been taken, but also whether it was removed by violence or not. Consequent upon his fame in this relation, there came to him, not long ago, inclosed in an envelope, a number of short hairs, with the request that he would examine them and give his judgment of their character. Submitting them to a microscope, he found that they were from a human eyebrow, and had been greatly bruised; and recorded his decision to this effect upon a paper with them in the envelope. Soon thereafter a stranger called for the latter; and though tendering a fee for the professional service rendered, abstained from revealing why the examination had been asked. It ensued, however, that Dr. B. was to hear more of the matter, for he was presently subpoenaed to attend at the L—assizes as a witness for the prosecution in a murder. A man had been killed by a heavy blow upon the eyebrow with some blunt instrument; upon a hammer found in the possession of the suspected murderer had been discovered the hairs which had been sent to the microscopist, and the latter's identification of these hairs was just the link in the chain of evidence requisite to fasten the crime upon the accused. It required no little positive assurance from the presiding judge that "scientific" testimony was incontrovertible to induce the jury to act upon it and render a verdict of conviction, and even then one of the

jurors was skeptical as to the exactness of the science involved. Asking the doctor if he could surely distinguish the hair of one creature, or part, from another, and being answered in the affirmative, he expressed an intention to test the matter for himself at some future time. Accordingly, one day in the same week the skeptic appeared at the microscopist's office with a lock of soft, dark hair, and, with a few words, leaving it for identification, departed for the neighboring house of a friend. When next he called he wished to know "what kind of a person had been the original possessor of the hair?" to which Dr. B. responded with due gravity that, according to the revelation of his microscope, it had been taken from the back of a Norway rat some time after death. And this was exactly the truth. The ex-juror had a son in Norway from whom he had received a Norway ratskin, wherefrom he had plucked the tuft, with which he hoped to baffle the pretences of science. Of course the result left him no doubt as to the incriminating testimony of the hairs which had been found upon the hammer, and he went his way thoroughly convinced that the microscope is an instrument of vital importance to society.—(*"Social Studies" in the N. Y. World.*)

A geological talk concerning Niagara Falls.—Professor Gunning, during a recent course of geological lectures, spoke as follows about Niagara Falls and its history: Ten years ago, he said, he had stood on Prospect point and looked searchingly at the American fall. Within a few days he had stood there again, but what he saw did not answer to the image his mind had carried for ten years. The rim of the precipice is more indented. Here and there a mass of rock has fallen, leaving a notch, the beginnings of a little horseshoe. The great horseshoe itself had changed. At the point of deepest water and deepest green the curve is deeply notched. Any observer whose knowledge of the fall covers only a few years will see that they are receding. The recession has been very slow, the speaker thought not more than six inches a year. At the present rate of recession it would have taken 75,000 years to cut the channel from Lewiston to the present site of the horseshoe. The speaker drew a section of the river bank from Lewiston upwards, and showed the seven groups of strata come to the surface between Lewiston and the falls. The rate of recession would depend on the character of the rock at the base of the falls. At the whirlpool a very hard, flinty sandstone appears on the water's edge. Through this the fall would cut its way slowly. Here for ages the cataract was almost stationary. Above the new suspension bridge the Clinton group dips to the water's edge. These rocks are compact, and here the falls made another halt. Several thousand years are not enough. We can only approximate, but perhaps 150,000 would be a closer approximation to the age of the channel than 65,000 years. This is not all. We find an old river bed, filled with drift, between the whirlpool and St. David's. The fall began not at Lewiston, but St. David's. Perhaps 200,000 years for the entire history of the fall would not be above the demand. We think of this as long, and our wonder is that the falls are so old. But he who looks with a geologic eye thinks of the time as short; and his wonder is that the falls are so young. The upper lakes are old. Geologically, the lake era is very old. It was dry land long before the Alleghany mountains were lifted up. The river which drains it should be old. And yet the Niagara, perhaps, is only 200,000 years old! How shall we account for the drainage of the lakes through so many millions of years not registered in the channels of Niagara. The speaker showed that the Niagara River at the head of the rapids is only thirty feet higher than the face of Lake Michigan. A barrier more than thirty feet high, across the Niagara plateau, would throw the waters of Lake Erie back on Lake Michigan, and the drainage would be through the Mississippi to the Gulf of Mexico. Western geologists have found an old river channel from the lake to the Illinois, and the speaker drew sections of a great barrier which once reached across the plateau. The old river bed in Illinois and the broken bridge across the Niagara plateau account for the extreme youth of the falls.

Astronomical Phenomenon.—*Meteoric display by daylight.*—George Modera, of Santa Cruz, writes to the *Sacramento Union* concerning a meteoric display witnessed in Stockton on the 11th, 12th and 13th days of September. He says:

On the morning of the 11th instant while taking observations of the solar spots, my attention was attracted to a small dark spot that was rapidly passing the solar disk. This was followed by others in rapid succession, all moving with uniform rates of speed across the solar photosphere. They all appeared as dark spots, when on the disk of the sun; after leaving, as bright

globular masses of the apparent size of a pin-head to that of a small pea, and by moving the telescope, could be seen two or three degrees from the body of the sun. While some were visible on the face of the disk, others came out from behind the luminous ball, like bubbles rising from a glass of soda. Nearly all of these small bodies crossed the sun at an inclination of 15 degrees to the equator of the sun or plane of the ecliptic, moving from south-west to north-east in six seconds of time, that is, one and a half seconds in passing the dark eye-glass to the edge of the sun, three in crossing the disk, and the remaining one and a half seconds to the edge of the field of the telescope. That they were near the earth, perhaps revolving around it, is proven from the fact of their very rapid revolution, six seconds, in passing the field of view. Taking the diameter of the sun at 888,000 miles, they would have to travel at the rate of 296,000 miles a second (that is if they were near the sun), an incredible, and, we may say, impossible rate of speed. That they were globes of fire, or in an incandescent state, is proven by their being visible through the dark sun glass before and after they had passed the sun's disc.

The sun glass used was a heavy stained glass through which a candle flame is not visible, and when turned from the sun, is dark as midnight, therefore they must have been in an incandescent state to have been able to project their image through the eye-glass. The only explanation that can be offered is that the earth, at that time, was passing through a meteoric belt, and by their passage through the earth's atmosphere. The fact of their appearing as dark spots on the sun does not prove them to be opaque bodies, as the brightest light known on the earth, the oxyhydrogen flame, which has a temperature of 8,061 degrees centigrade, when projected on the sun and viewed with a telescope, appears as a dark spot. All attempts to measure the meteorite with a micrometer scale were failures, as their movements were so rapid that the eye was not quick enough to read the scale during their passage across the sun. This phenomenon was seen by two or three hundred of the citizens of Stockton, and, I presume, by many observers in other parts of the globe, of which we will be informed in due time. The duration of the display was from 8 a. m., September 11th, to 10 a. m., September 13th, since which time I have been unable to detect any.

Medical Instruction in Turkey.—The Porte, it seems, has definitely decided that the use of the French language in the course of instruction at the Imperial Ottoman School of Medicine at Stamboul shall be superseded by the use of Turkish, which will henceforth be the only language employed in the delivery of the lectures. The best friends of Turkish medical progress, says the *Levant Herald*, lament this step as unwise and retrograde, for there are no books in the Turkish language from which the science and progress of medicine can properly be taught, nor are there any Turkish professors to be found who are sufficiently competent to give young Turkish medical students a sound instruction in their important art. The education they will receive in medicine and surgery from Turkish professors cannot compare for a moment, in extent and efficiency, with that imparted to them by the European medical professors who have hitherto conducted each session's course of lectures, including as the latter do, in their ranks some of the most eminent medical practitioners in Constantinople, whose professional reputation extends even beyond Turkey. The services of these gentlemen have, moreover, according to the *Herald*, been dispensed with in a very summary manner, and notwithstanding the number of years during which many of them have devoted their talents and experience to the advance of medical education in the Imperial School, no proposal has as yet emanated from the Government to provide them with the pensions to which they are fairly entitled.

STATISTICAL.

—A correspondent at Yeddo, Japan, sends us the following interesting particulars in regard to the great educational movement in that city: "By an official report recently published in Japan, it is shown that the actual number of pupils in the private, city, and government schools of Yeddo is 39,181. This, in a population of not quite 800,000, shows that nearly every Japanese youth is being taught to read and write. The pupils in the large government-schools are as follows: In the Yeddo University, 500; in the two medical hospitals, 300; in the naval college, 230; in the agricultural school, 100; in the young ladies', 30 (number limited). The remainder are scattered throughout the city, taught by foreign teachers or by educated natives. Nearly every department of the imperial government has a special school of its own, to educate young men to be translators, assistants, etc. All these help to swell

MISCELLANEOUS.

the grand total. Of the one hundred and thirty or more foreigners now resident in Yeddo, it is estimated that more than one hundred are instructors of Japanese young men. While Yokohama is the great mart of trade, and the seat of foreign fashion and life—the New York of Japan—Yeddo is the great school of the country, and the temple theatre for the display and development of that civilization at which—and justly, too—'all the world wonders.'—Appleton's Journal.

Ignorance and Crime.—A paper published by Mr. A. M. Fiske on the relation of ignorance to crime shows that there was in 1870 one homicide to every 56,000 people in the Northern States, one to every 4,000 in the Pacific States and Territories, and one to every 10,000 in the Southern States. Taking the statistics of prisons and reformatories in New England as being more complete than elsewhere he draws these conclusions: "1. At least 80 per cent of the crime of New England is committed by those who have no education, or none sufficient to serve them a valuable purpose in life. In 1868, 28 per cent. of all prisoners in the country were unable to read or write. From 3 to 7 per cent. of the population of the United States committed 30 per cent. of all our crime, and less than one-fifth of one per cent. is committed by those who are educated. 2. As in New England, so throughout all the country, from 20 to 30 per cent. have never learned any trade or mastered any skilled labor, which leads to the conclusion that 'education in labor bears the same ratio to freedom from crime as education in schools.' 3. Not far from 75 per cent. of New England crime is committed by persons of foreign extraction. Therefore, 20 per cent. of the population furnishes 75 per cent. of the criminals. It is noticeable, however, that 'the immigrant coming hither with education, either in schools or labor, does not betake himself to crime.' 4. From 80 to 90 per cent. of our criminals connect their career of crime with intemperance. 5. In all juvenile reformatories 95 per cent. of the offenders come from idle, ignorant, vicious homes. Almost all children are truant from school at the time of their committal and almost all are children of ignorant parents. These children furnish the future inmates of our prisons."

Statistics of the British Postal Service for 1871.—Of the 75,000,000 post-cards, nearly 300,000 came to a dead lock in the returned letter office. Of the 915,000,000 letters, above 8,500,000 found their way to that species of prison house, but a large proportion was ultimately liberated. About 175,000 went back to foreign countries, and of the remainder more than nine-tenths either reached their destination by means of corrected addresses or were returned to the sender. About 80,000 of the undelivered letters contained property of various kinds, and of those "340 had no address, although in not a few instances the letter inclosed coins or bank notes." As usual, there were sundry letters posted without any address, the number last year being nearly 14,000. The registered letters amounted to about 8,000,000, or something like one in 300 of the whole, being an increase of 11 per cent. on the number in the previous year. Of newspapers 99,000,000 past through the post office last year, and of book packets 103,000,000; the year's increase on the two collectively being 72,000,000. About 1,000,000 of the newspapers failed to be delivered. There are now more than 4,300 money-order offices in the United Kingdom, nearly 250 having been added during the year. The number of inland money-orders increased from upwards of 10,200,000 in 1870 to more than 12,500,000 in 1871—a growth exceeding 18 per cent.—and the report states that this has now become more than 24 per cent. More than 1,300 new telegraph offices were opened during the year, making the whole number at the end of 1871 upward of 5,000, while the messages transmitted increased by 25 per cent., the total of the year being close upon 12,000,000, in addition to 700,000 messages sent on behalf of the newspaper press.

—The number of Irishmen in charge of the Colonial possessions is very striking. A Parliamentary paper, just published, gives the following as in office in June, 1872: Dominion of Canada, Lord Lisgar, Governor-General, Lord Dufferin (just appointed to succeed Lord Lisgar); W. Robinson, Lieut.-Governor Prince Edward's Island; W. W. Cairns, Lieut.-Governor British Honduras; John P. Kennedy, C. M. G., Bahamas; Colonel D'Arcy, Falkland Islands; J. F. Callaghan, Gambia; Right Hon. W. H. Gregory, Ceylon; Sir A. E. Kennedy, K. C. M. G., C. B., Hong Kong; Commander Shaw, Malacca; Sir H. G. R. Robinson, K. C. M. G., Governor of New South Wales; and Sir G. F. Bowen, C. M. G., Governor of New Zealand. It is but a few months since the supreme government of the Indian Empire fell into the hands of the Earl of Mayo; the Earl of Belmore had been Governor of New South Wales, Lord Monck of the Dominion of Canada; and Sir R. G. Macdonald and Sir F. A. Weld, an Englishman appears amongst the Colonial Governors.

Literary madmen.—Dr. Moreau (de Tours) has written a work in which he contends that genius arises from the same organic conditions as insanity, and is, in fact, synonymous with it. His theory substantially amounts to this: That genius, like insanity, is a symptom disease of the brain. Without conceding all that is claimed by Dr. Moreau, it cannot be denied that a very large number of the geniuses of the world have been either melancholic or very eccentric, and, in some instances, have been the victims of violent and repeated attacks of insanity. Dr. Johnson was hypochondriacal, and in various ways gave evidence of a morbid condition of the brain. At the early age of twenty he became the victim of melancholic delusions, and from that time forward was never happy. On one occasion he exclaimed, despairingly, "I would consent to have an arm amputated to recover my spirits." Wretchedness like this, when it is temporary or spasmodic, may signify but little; but, when it is persistent and life-long, it must be regarded as the symptom of cerebral disease that may and often does, advance to absolute madness. The violent impetuosity of Dr. Johnson, his unreasonable prejudices, may be accounted for on the same theory. Some of the brightest geniuses in literature have been at intervals subject to attacks of madness. Southey lived for years in perpetual dread of insanity, and, when at last he kneeled in the furrow, worn out through mental excitement and fatigue, he composed that most instructive and useful of his works, "The Life of Cowper." That Rousseau was a lunatic will be admitted without question by those who have studied his life and writings, however ardently they may admire his genius. Pascal was one of the most original thinkers of France, but no inmate of any asylum ever presented more indisputable proofs of mental disease than those which characterized his whole career. All his life he walked in darkness, knowing not at what he stumbled, in constant fear both of the present and the future. He was the victim of absurd delusions, was harassed by excessive nervousness, and was the slave of uncontrollable eccentricities. On examination after death, his brain was found to be very seriously diseased.

A hard student.—Thomas Cooper, author of "The Purgatory of Suicides" and other poems, was a shoe-maker in early life, and, in his recently-published autobiography, thus sketches his efforts at self-education: "I thought it possible that, by the time I reached the age of twenty-four, I might be able to master the elements of Latin, Greek, Hebrew, and French; might get well through Euclid, and through a course of algebra; might commit the entire 'Paradise Lost' and seven of the best plays of Shakespeare to memory; and might read a large and solid course of history, and of religious evidences, and be well acquainted also with the current literature of the day. I failed considerably; but I sped on joyfully, while health and strength lasted. I was between nineteen and twenty when I began to commit Ruddiman's 'Rudiments' to memory, thinking it was better to begin to learn Latin with the book that Lee used, though I found afterward I might have done better. I committed almost the entire volume to memory—notes and all. Afterward I found Lyon's small Hebrew Grammar on a stall, bought it for a shilling, and practised Hebrew writing, as the surest means of beginning to learn, every Sunday evening. I got hold of a Greek Grammar about a year after, but did not master it thoroughly, because I thought it better to keep close to the Latin for some time. I also picked up a small French Grammar; but that seemed so easy that I thought I could master it without care or trouble."

Historical studies or grammar were his employment on week-day mornings, when he rose at three or four, till seven o'clock, when he sat down in his stall. A book or periodical "in my hand while I breakfasted" gave him another half-hour's reading, while from one to two o'clock he passed "eating my food with a spoon after I had cut it to pieces, and having my eyes on a book all the time." He worked at his trade till eight, and then commenced his studies in earnest, committing "Hamlet," word for word, to memory, for one thing, which he repeated, as well as the propositions of Euclid, while making his shoes.

Habits of literary men.—John Calvin commenced his daily studies at five or six in the morning, reading and writing in bed for hours together. If business required him to go out, he would rise and dress, but, on his return, again went to bed. As he advanced in years, he wrote little with his own hand, but dictated to secretaries, rarely having occasion to make any corrections. Sometimes his faculty of composition would fail; then he would quit his bed, attend to his out-door duties for days, weeks, and even months together, and not think of writing until he felt the power had returned. Then he would go to bed, send for his secretary, and resume his labors.—The great Cardinal Richelieu, who was a dramatist as well

as prime-minister of France, usually went to bed at eleven, slept three hours, would rise and write till eight in the morning, now and then amusing himself by playing with his cats, of which he was very fond.—Buffon, the naturalist, rose early, and worked perpetually. His great "Studies of Nature" cost him fifty years of labor, and he recopied it eighteen times before he sent it to the printers. He composed in a singular manner, writing on large-sized paper, on which, as in a ledger, five distinct columns were ruled. In the first column he wrote down the first thought; in the second he corrected, enlarged, and pruned it; and so on, until he had reached the fifth column, within which he finally wrote the result of his labor. But, even after this, he would re-compose a sentence twenty times, and once devoted fourteen hours to find the proper word with which to round off a period.—Cuvier, who raised comparative anatomy to a science, never had occasion to copy his manuscript. He composed very rapidly, the proper words falling into the proper place, and every thing being arranged in a very orderly manner.—Bossuet, the French divine, who left fifty volumes of his own manuscripts, rose at four, wrapped himself up in a loose dress of bear-skin, and wrote until, from sheer fatigue, his hand refused to hold the pen. Then he would return to bed, take the sleep of exhaustion, and, on awaking, go through the same process again.

Military Ballooning—Story of the Paris Siege Balloons.—The London *Echo* summarizes an interesting account just published of the doings of the Paris siege Balloons, which show that ballooning is by no means so dangerous a mode of travelling as many would have us believe. Out of 64 balloons which left the French capital, only two came to a bad end, and as these were lost at sea trying to escape the enemy, it is but fair to suppose that they would otherwise have descended safely. Curiously enough, a northerly wind, which would obviously have been the most favorable for driving the balloons to the South of France, and therefore out of reach of the enemy, seems rarely to have helped the besieged. This fact alone added much to the difficulties to be encountered by the aerial navigators in keeping out of harm's way, and really the only wonder is that in so many of the voyages, being made in a northeasterly direction, there were not more captures effected. Only five balloons were actually taken by Germans, although, as may be supposed, many had narrow escapes, sixteen in all falling within the enemy's lines. Two of these there was no chance of saving, for they went right over into hostile territory, one of these unfortunate conveyances descended into Prussia and the other in Bavaria. Several accidents happened to the aeronauts in their descent, but if we except the two instances of balloons going out to sea, only one of these ended fatally. Of the sixty-four balloons despatched, fifty-seven reached a safe destination, carrying 150 navigators and passengers. The duration of the voyage was, on an average, but three hours at the commencement of the service in September, 1870, but as the German troops approached nearer and surrounded the capital more effectually, it was deemed desirable to make a longer journey, and in January the average voyage was between six and seven hours. At this period, too, it was found necessary to dispatch the balloons during the night, so that they might get a fair start and be well out of rifle shot when passing over Versailles and the outposts of the German army. The most memorable voyage was that made on the 21st November, when the North Sea was traversed by a balloon which reached Christiana, after a voyage of some fourteen hours. The distance travelled was certainly not less than 1000 miles and at the rate of seventy miles an hour—beyond a doubt the fastest rate of locomotion on record. The balloons themselves were constructed of oiled silk and mostly contained some 2000 cubic metres of gas. They were designed and manufactured under the superintendance of M. Goddard, whose fame as an aeronaut was well established before the siege. A number of volunteers from the French navy, chosen for their peculiar fitness for the service were trained to navigate the balloon. Most of the balloons carried passengers, and generally several hundred weight of despatches, together with a basket of pigeons to be employed as return messengers. In some instances, too, dogs were carried out, in the hope that these would find their way back into Paris, laden with letters for the besieged; but there was no instance, we believe, of these animal's fulfilling the hopes of their sanguine owners.

The manner in which news was conveyed by aid of these balloons at very regular intervals from the 23d September, 1870, until the 28th January, 1871, will long be remembered. The 50,000 messages which were actually sent into the beleaguered City, between the same dates, by means of pigeons brought out by the aeronauts, must all be put down to the credit of the balloon service, so wonderfully organized and effectively carried out.

Old Scotch songs.—"Up in the Morning Early."—I believe the oldest printed Scotch air is generally conceded to be "Up in the morning early." This was a great favourite of Queen Mary (the Consort of William the Third,) and on one occasion she gave great offence to Purcell by preferring its quaint melody and sly humour to

his finished classical compositions. Another very ancient melody, and one far too little known, is called "Braw, Braw Lads." Burns has set to it words full of a wild, tender happiness; and the celebrated Dr. Haydn has left a manuscript arrangement of the air, on which he has inscribed (doubtless in the best English he was master of,) "This one, Dr. Haydn favourite song."

"Auld Robin Gray."—The private history of "Auld Robin Gray" is amusing, and shows how near together are the fountains of mirth and pathos. It was composed by Lady Ann Lindsay just a century ago to be sung to a very ancient air called "The Bridegroom Greets," of which she was passionately fond. The music was exquisite, but the old words were very objectionable; so she determined to give some little history of virtuous distress to its plaintive tones. One day while attempting this in her closet, she called out her young sister—"I am writing a ballad my dear; I am oppressing my heroine with misfortune; I have sent her Jamie to sea, and broken her father's arm, and made her mother fall sick, and given her auld Robin Gray for a lover; but I wish to load her with a fifth sorrow within the four lines, poor thing! "Help me to one!" "Steal the cow, sister Annie, said the little Elizabeth; and the cow was immediately lifted and the ballad completed. Lady Ann's charming little romance is still sung, but it was set by a clergyman called Lewes in 1828 to the eminently beautiful melody which is now popularly and universally known as "Auld Robin Gray."

Something for young men.—Few things in the lives of young men are so impressive, or so full of valuable suggestions, as their frequent laments over lost opportunity for mental or moral culture.

In his autobiography, Sir Walter Scott says: "If it should ever fall to the lot of any youth to peruse these pages, let such a youth remember it is with the deepest regret that I recollect in my manhood the opportunities for learning which I neglected in my youth, that through every part of my literary career I have felt pinched and hampered by my own ignorance, and that I would at this moment give half the reputation I have had the good fortune to acquire, if by doing so I could rest the remaining part upon a sound foundation of science and learning."

Edmund Burke grew wise in this respect while not too late to retrieve the most of his errors and losses, for before his youth was entirely past he wrote to a friend:

"What would I give to have my spirits a little more settled! I am too giddy; this is the bane of my life; it hurries me from my studies to trifles and I am afraid it will hinder me from knowing anything thoroughly. I have superficial knowledge of many things, but scarcely the bottom of any."

Washington Irving, when giving counsel to a young friend, exclaimed in the bitterness of his heart:

"How many an hour of hard labor and study have I had to subject myself to, to atone in a slight degree, for the hours that I suffered society to cheat me out of."

Even Josiah Quincy, the last man in the world that we should have suspected of having wasted a moment in his daily life, laments more than once his "neglect for that mental and moral cultivation" which he regards as the "noblest of human pursuits." On one occasion he says:

"I resolve therefore to be more circumspect, to hoard my moments with a more thrifty spirit—not to listen to the suggestions of indolence, and so quicken that spirit of intellectual improvement to which I devote my life."

It will do no young man the least harm to ponder the lesson to be learned from these eloquent confessions.

The history of the trials of different marshals of France who have been called on to answer for their acts since the office was first instituted by Francis I., is hardly of a nature to console Marshal Bazaine. Only five marshals of France have been tried for their lives by regular tribunals, and all five were found guilty and executed. Marshal de Retz, who was the first holder of the highest military dignity in France, was brought to trial for high treason, or rather for repeated acts of rebellion against the authority of his liege lord John VI., Duke of Brittany. Found guilty not only of the crime with which he was originally charged, but others still more heinous, the Marechal de Retz was hanged and his body burned in 1440. The next offender was Marshal Biron the friend and companion at arms of Henry IV. In spite of all the favours heaped on him by his royal master, Marshal Biron was found guilty of conspiracy with the King of Spain against the first of the Bourbons. Henri IV, would have pardoned him if he would have confessed his crimes; but on his refusal to admit his guilt, the King allowed the sentence to be carried out, and Marshal Biron was decapitated on the Place de Greve in 1602. Marshal de Marillac, who was executed in 1632 for conspiracy and rebellion against Cardinal Richelieu, was the third marshal of France who perished on the scaffold. Marshal de Montmorency, who was executed in the same year

on a similar charge, was another of the victims of the Cardinal. The last of the marshals of France who have undergone a capital sentence was the best known and most celebrated of them all, Marshal Ney, shot on the 7th of December, 1815, for fidelity to his old and treachery to his new master. But Marshal Bazaine is the first marshal of France arraigned on a charge of bad conduct in the face of the enemy.

A Distinctive Class of English University Men.—In the heart of my deep admiration and enthusiasm for these beautiful homes of letters, these academic groves and porches of English classics, there was always a gnawing worm of envy that Americans have no such schools, nor ever can have; and it is not the same thing for them to come here, at best they can but feel as stepsons. I think many of them would love and reverence the hallowed haunts more than the young Britons do who have the privilege of calling them their own, and my countrymen might gain a grace which they lack. I lost my way one afternoon in the mazes of inner courts and fellows' gardens, and came out upon a green bank where a young man was lying under a tree; he had not the college-gown on, but was dressed in a rough gray suit and a straw hat with a ruby ribbon, which looked as if it might have been a young lady's sash, I liked the looks of his back before I saw his face, and asked him the way; he sprang up with an ease, simplicity, and frankness which one would not find, alas! from Boston to New Orleans, told me through which archway to turn, in a voice so clear and deep and fruity that it was a pleasure to hear him speak. Then I turned away, and he bowed and dropped, on the grass again as easily and naturally as he had got up. Now, some of my readers will wonder what in the world I mean: others will understand me; but I walked away trying to analyse this young fellow's attraction, and why our young fellows do not have it. I came to a good many conclusions, none of which were satisfactory. Our self-consciousness is partly in fault, and this might be helped, though it is not easily got rid of; but it is partly that we want the mellowing influence of venerable and beautiful surroundings; and the worm of envy gnawed amain. There is a class of men (I have seen too many not to believe that they belong to a class) on whom this influence of the university seems to rest like a halo through after-life. They are sometimes to be met in London, but more often in out-of-the-way country villages, generally in the parsonages; they are not much interested in general questions, public measures and events of the day: they are seldom called upon to speak or act upon such matters, and are more wont to have prejudices than opinions: they constitute no society, they follow no leader, they make no school.—*Lippincott's Magazine.*

Niagara.—About 9,800 cubic miles of water—nearly half the fresh water on the globe—are in the upper lakes, and 18,000 cubic feet of this plunge over Niagara Falls every minute, all the water of the lakes making the circuit of the Falls, the St. Lawrence, the ocean, vapor, rain, and lakes again, in 152 years. Through the Illinois Canal 8,000,000 cubic feet of water are taken every minute from Lake Michigan to the Illinois River; through the Welland Canal 14,000 cubic feet flow every minute; from Lake Erie into Lake Ontario, and through the Erie Canal 30,000 cubic feet pass every minute from the same lake into the Hudson. Thus, 52,000 cubic feet of water which nature would give to Niagara, are diverted every minute by artificial channels, some into the Mexican Gulf and some into the bay of New York. Add this to 18,000,000, it is as a drop in the bucket, and would make no appreciable difference in the character of the Falls or their rate of recession. Was there ever a time when the Niagara was appreciably a greater river than now? We assume, then, from all the monuments the river has left of its own history that the present rate of recession would be a fair measure of the past, except at the Whirlpool and Ferry Landing. Six inches a year, measured on the channel would place the Falls at Lewiston 74,000 years ago. We have no means of knowing how long the quartzose sand-stone, which forms the lowest part of the bank at the Whirlpool, would have arrested the cataract. This stratum is 25 feet thick, and, as its southward dip is twenty feet a mile, and the slope of the river-channel fifteen feet a mile, the Falls would have to cut back through this rock more than half a mile. The halt may have been many thousand years. Add another period for the halt at the landing, and the age of the channel from Lewiston to the Horse-shoe may not fall below 200,000 years. Unquestionably the channel has been excavated since the close of the glacial epoch, which science has well nigh demonstrated occurred about 200,000 years ago. But the channel is only the last chapter in the history of Niagara.—*Popular Science Monthly.*

Biography.

The Late Charles Lever.—Within the last two or three years several of the most distinguished names have been struck off

the roll of living English authors, but there has scarcely been one the erasure of which has been regarded with more general and profound sorrow than that of Charles James Lever. Certainly no modern English novelist, with the exception of Charles Dickens, attained so wide a popularity, or more fully deserved it. It may be doubted whether the critics have, as a rule, done justice to the deceased novelist; contemporary criticism is seldom just either in praise or blame. In the case of Lever, all have agreed in extolling his exuberant wit and his unequalled skill in the delineation of Irish character; but the serious purpose which underlies the drollery, when seemingly most reckless, and the description when most picturesque, has not to our thinking been fully appreciated. Lever stood head and shoulders above the crowd of Irish reformers. From the day that he first took pen in hand, his aim was to show to his own countrymen their deficiencies, and the world at large their excellences, and this high purpose he kept constantly in view. The lives of literary men are as a general thing not very eventful, and Lever's was no exception to the rule. His biography can be summed up in a few sentences. He was born in 1809, in Dublin. Destined at an early age for the medical profession, he entered Trinity College, Cambridge, attended lectures, and took his degrees in medicine. He continued his professional studies at the University of Göttingen, where he also graduated. Returning to his native country at the time of the outbreak of cholera, he was appointed, though only twenty-three years of age, medical superintendent of a populous district in the north of Ireland, including Londonderry and the towns of Coleraine and Newton-limavady. So well did he acquit himself in this position that in acknowledgment of his services he received the appointment of physician to the British Legation at Brussels. It was during his residence in that city that he made his first literary venture, "Henry Lorrequer," which was published as a serial, and at once secured to the author the popularity which has since ripened into fame. It is unnecessary to enumerate his works; it would be a very bold thing to pronounce any one of them the best. Perhaps it might be said of Lever's fictions, as an eminent scholar said of the books of the Iliad, "the longer of any two is the better of the two." He was perhaps most successful in depicting phases of Irish military life, though he is never otherwise than happy in describing the ludicrous shifts to which the needy Irish gentry were obliged to resort before the Encumbered Estates Court was established to put an end to their struggle to keep up an appearance on nothing. From 1842-1845 Mr. Lever edited the *Dublin University Magazine*, and the general tone of the periodical and many a racy paper which charmed its readers during that period were proofs that the office was more than nominal. On relinquishing the post, he retired to the Continent, and resided for a time in the Tyrol, subsequently removing to Florence. During his residence in Italy, he was appointed by Lord Derby Vice-Consul at Spezzia, and was afterwards transferred to a similar but more lucrative post at Trieste, where, according to the telegrams, he breathed his last. We have not attempted even a sketch of the literary career of Ireland's greatest novelist, but such a sketch would be worse than imperfect if it did not class among his most valuable contributions to literature the long series of shrewd racy paper which appeared in *Blackwood* over the pseudonym of Cornelius O'Dowd.—(*Montreal Herald.*)

EDUCATIONAL ITEMS.

The Germans have established no university for the last half-century. Their plan is to strengthen those they have, rather than to found new ones.

The president of Columbia Collège receives \$8000 a year, the professors \$6000 each. These salaries are the largest paid by any college in the country. The property owned by this institution amounts to \$3,500,000, and yields an income of nearly \$200,000.

As a proof that education is, even in Russia, on the way to progress, statistics have been forwarded us showing that in the province of Moscow at least one child in ten now enjoys the benefits of an elementary education. It should be remembered that the proportion in highly-educated countries is one in six.

Mr. Mori, the Japanese minister at Washington, has decided to have the five Japanese girls, placed under his charge, educated by the Kindergarten system, and will place them under the supervision

of Miss Loring, of Boston. Already there are four Japanese cadets at the Annapolis Naval Academy.

Quetelet's statistics of crime in France and England show that, in the former country, out of one hundred criminals, sixty-one could not read or write, twenty-seven could read imperfectly, and only twelve could read and write well. In England, thirty-six could not read at all, sixty-one could read and write imperfectly, and only three could read and write well.

Father Secchi communicates to *Les Mondes* the particulars of a violent solar explosion on the evening of the 7th of July. The internal movements of the incandescent vapors were so intense that the luminous clouds were seen to change form rapidly, their height being six times greater than the earth's diameter. The eruption continued about two hours. On the same date, an aurora borealis was seen at Madrid and in many other parts of Europe, and the magnetic perturbations were very violent at all the observatories.

Brain-work costs more food than hand-work. According to careful estimates and analyses of the excretions, three hours of hard study wear out the body more than a whole day of severe physical labor. Another evidence of the cost of brain-work is obtained from the fact that, though the brain is only one-fortieth the weight of the body, it receives about one-fifth of all the blood sent by the heart into the system. Brain-workers therefore require a more liberal supply of food, and richer food, than manual laborers.

On the 8th of February, 1875, the University of Leyden will celebrate its three hundredth year. On that day Mr. Martinus Nyhoff, bookseller, of the Hague, will publish the roll of members of the University, from its foundation to the present time. The book will form a handsome double-columned quarto, and will be accompanied by an alphabetical index of names.

Scotland.—Efforts are being made for the promotion of science and art instruction in Scotland. The local papers report a series of meetings in the large towns, which appear to have been very successful. Mr. Buckmaster has forcibly pointed out what is required in the education of working men and their employers; instead of teaching boys abstractions and metaphysical ideas, as if they were all to be parishministers, they must be taught things. A knowledge of the laws and properties of matters, by which the earth is subjugated to our use, is the proper education of men who have to work on matter. Several local committees have been appointed to co-operate with the Science and Art Department in promoting scientific instruction in Scotland.

A work of much interest to teachers and advanced students is Professor Hallowell's "Geometrical Analysis." The leading features of this book are, the construction and solution of various geometrical problems from analysis, by geometry, algebra, and the differential calculus; the geometrical construction of algebraic equations; and a mode of constructing curves of the higher order by means of points. Each problem is first analysed, then constructed, demonstrated, and the method of calculation by plane trigonometry clearly indicated. The value of the system here presented and rendered available for both teachers and pupils can scarcely be overestimated, especially when we consider the admirable mental discipline which results from the use of the analytic method in any scientific study.

A Vienna contemporary speaks of an encouraging phenomenon in the promotion of practical education. The Society of Stenography in Austria has opened a competition in shorthand-writing to the pupils of the middle-class schools in Vienna. It appears from this and many other matters that in Austria as well as in the German Empire time is looked upon as money. In Belgium also the practice of shorthand-writing has of late been strongly recommended as a useful branch to be added to the curriculum of scholastic instruction.

According to the census of 1870, the total number of schools in the United States was 141,629 were males, and 127,713 females. The total number of pupils was 7,209,938, 3,621,996 being male, and 3,587,942 female. The total income of all the schools was \$96,404,726, of which \$3,663,785 came from endowments, \$61,746,039 from taxation, and \$29,992,902 from all other sources, including tuition. The total income reported is nearly three times that for 1860, and nearly six times that for 1870. It is considered quite impossible that there should have been any such increase; and the apparent augmentation is, without doubt, referable to a failure on the part of the former census officials to secure complete returns. Of the total number of schools reported, the public schools were 127,059, classical, professional, and technical, 2545, and others, 14,024. The total number of teachers in the public schools was 183,198; and in the classical, professional, and technical, 12,767. The number of pupils in the latter class was 245,190, and in the public schools, 6,228,069.

The London School Board *Chronicle*, speaking of Mr. Walford's "Juvenal," the most recently issued volume of that entertaining series, "Ancient Classics for English Readers," compares it to Mr. Theodore Martin's "charming Horace," of the same collection, and adds, "We like the divisions into which Mr. Walford has arranged

the treatment of his difficult subject, wherein he discusses the most interesting points in the life of Juvenal, compares Horace and Juvenal as satirists, pictures in colors neither too strong nor too vivid the moral phenomena of imperial Rome as it appeared in Juvenal's time, as well as its philosophy and religion (if super-titulation of the grossest and atheism of the most pronounced character may so be called); and delights us with a review of the state of literature and the condition of the *literati* in the imperial city." In concluding its criticism, the *Chronicle* remarks, "We cannot part from Mr. Walford's little book without acknowledging that we have learned much from its pages, and have been much charmed by a work that will add considerably to the reputation of one of the most mature and most accomplished Latin scholars yet among us."

The London School Board is still actively engaged in procuring the dimensions of existing school-rooms, and has just sent out forms to schools recently examined by the inspectorate and judged inefficient, requesting the managers to improve the teaching power of such schools, and so enable them to keep down the rates. This has only been the case where the buildings have been judged suitable for school purposes.

Three prizes have been placed by the Joiners' Company at the disposal of the Birkbeck Literary and Scientific Institution for the encouragement of technical education. The same company was pleased last year to present two prizes for a similar purpose. Since its foundation, in 1823, the Birkbeck Institution has continued to impart instruction in the arts and sciences. In so doing it has carried out the design of its benevolent founder, Dr Birkbeck, whose efforts in this respect will be remembered by many. The council hopes that many other of the City companies will be led to follow in the steps of the Joiners' Company by instituting prizes for the extension of technical education.

The principle that it is lawful to learn from the enemy seems to have been adopted in France. Compulsory drill for schoolboys has been introduced, and the enemy's language is to be taught at the Polytechnic Institutions and the military school of St. Cyr. From the 1st January, 1873, lectures at both establishments in German are to be given.

Drawing has been adopted as a branch of instruction in all the departments of the Public Schools of Philadelphia, except the Primary, and in this department it will be taught as a matter of course. This is considered by the friends of education in that city a very gratifying step in advance.

Of Schoolmasters now Bishops.—Of the famous men of England now living, who were formerly schoolmasters, are the Archbishop of Canterbury, who was master of Rugby, the Bishop of London, who was master of Islington School, and the Bishop of Lincoln, who was master of Harrow.

Don. In the middle ages the professors of the University of Oxford were called "Dominus," or "Don." In the case of the learned professor whose name is known to scholars as "Duns Scotus," the title was of course conferred, and the opprobrious name, "dunce," came into use somewhat on the *lucus a non lucendo* principle. Hence the common term "dunce."

Oxford.—The nobleman's gown, and the gold "tuft" on the velvet cap which was formerly worn by peers' sons at Oxford, is now a thing of the past; the "gentleman commoner's" silk gown, too, is all but extinct in the University, and quite extinct at Christ Church, where it formerly prevailed most extensively. Is this a sign of the increasing "liberty, equality, and fraternity" which mark the present age?

An experiment in Saxony.—A novel and most interesting experiment in the field of elementary instruction has just been resolved upon in Saxony. Hitherto, as everywhere else, so in that small but highly-developed kingdom, the youth of the lower orders, upon being apprenticed to a trade, have been left at liberty to forget the little they have learned at school. Attendance at Sunday school and evening instruction provided by the State and charitable societies was perfectly optional. By a law just passed this liberty is abridged, and compulsory attendance at evening schools exacted for a period of three years. This is the first time, if we are not mistaken, in the annals of the world, that an attempt has been made by a State to extend the education of the humblest classes beyond the rudiments, and after they have entered upon the business of life. Saxony, already the best taught portion of Germany, will by the new law be more than ever in advance of her sister States.

Schooldays and Festivals in Switzerland.—The festivals and holidays of a Switzer are connected with his life at school. Each change is made the pretext for a feast. On going to school there is a feast; on leaving school there is a feast; at every stage of his advance there is a feast. There is a vacation feast, assembling feast; when a new teacher comes there is a feast, and when a teacher leaves

there is a feast. The school is made to him by public and private acts a centre of all happy thoughts and times. It shares the joys of home and the rewards of church. At school a Swiss boy finds his mates, with whom he learns to sing and play, to drill and shoot. The teacher is to him a father. With this teacher he will grow into a man, assisted on his way with care and love, unmixed with either foolish fondness or paternal pride. With him and with his mates, the lad will take his country strolls, collecting rocks and plants, will push his boat across the lake, dive into the secret of the ancient waterfoik, will pass by train into some neighbouring commune where the arts are other than he sees at home. All bright and pleasant things are grouped about him; and in after time, when farm and counter occupy his cares, these classroom days will seem to him the merriest of his life.—“*The Switzers*,” by W. Hepworth Dixon.

—Children hunger perpetually for new ideas. They will learn with pleasure from the lips of parents what they deem it drudgery to study in books; and, even if they have the misfortune to be deprived of many educational advantages, they will grow up intelligent if they enjoy in childhood the privilege of listening daily to the conversation of intelligent people. We sometimes see parents who are the life of every company which they enter, dull, silent, and uninteresting at home among their children. If they have not mental activity or mental stores sufficient for both, let them use what they have for their own households. A silent house is a dull place for young people—a place from which they will escape if they can. How much useful information, on the other hand, is often given in pleasant family conversation, and what unconscious, but excellent mental training in lively social argument. Cultivate to the utmost all the graces of home conversation.

—A mathematical gentleman, named Benson, has reformed Euclid, so as to “do away with the illogical *reductio ad absurdum* ;” has squared the circle; and finally, proved that the inscribed dodecagon, is exactly equal to the circumscribing circle. Now, Mr. Benson, please favor us with “perpetual motion.”

According to a decision of the Hungarian Ministry, the native Magyar tongue is to be exclusively used by the railway officials. Latin has long been the polite and official language of Hungary; but we doubt whether Cicero himself could find equivalents for “shunting”, &c.

Some points for young teachers.

- Do not assign a lesson for young pupils to prepare in half an hour which, to prepare yourself upon so as to hear it without a book, would require two hours.
- Have common sense enough not to expect your pupils to be more thorough in the lesson without a book than you are with the book.
- Be just enough not to use a book at a recitation when you do not permit the pupils to do so.
- Have a definite, fixed length of time for your recitations and never overreach it.
- If you are forgetful, make a pupil in your class monitor, to tell you when to stop the lesson in time to hear the review, or give the preparatory drill.
- Introduce every recitation by reviewing, briefly the preceding lesson.
- Conduct the recitation with a view to having the pupils realize the few points involved.
- Take time, before excusing the class, to recapitulate points made.
- Just before assigning the next lesson, give preparatory drills on the coming hard points.
- Be sure that the whole lesson has tested the reasoning power, not the memory of your pupils.

Situation as Teacher Wanted.

A female teacher, holding an Elementary diploma from the McGill Normal School, who has had several years experience in teaching in the old country and in Canada, is desirous of obtaining a situation as teacher.

Best references can be given. Apply to
MINISTRY OF PUBLIC INSTRUCTION

A female teacher, holding a First Class (Elementary) diploma wants a situation. Unexceptionable references given.
Address (post paid) “Teacher,”
St. Joseph de Wakefield, Ottawa County P. Q.

Teacher wanted.

For the Protestant school at Lake Beauport. A male teacher preferred. Liberal Salary will be given.

Address : GEORGE SMITH,
President School Commr.,
Lake Beauport, Quebec.

IMPORTANT TO TEACHERS.

**A COMPENDIUM
OF
MENTAL ARITHMETIC**

FOR THE USE OF SCHOOLS

BY

F. E. JUNEAU.

Sold by all Booksellers.

Meteorological Observations.—From the Records of the Montreal Observatory, Lat. 45° 31 N., Long. 4h. 54m. 11 sec. west of Greenwich. Height above the level of the sea, 182 feet. For the month of Sept., 1872. By CHARLES SMALLWOOD, M.D., LL.D., D.C.L.

DAYS.	Barometer at 32°			Temperature of the Air.			Direction of Wind.			Miles in 24 hours.
	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	2 a m	2 p m	9 p m	
1	29.884	29.850	29.850	54.0	73.1	62.5	nw	w	w	227.11
2	.820	.898	.961	59.5	70.0	54.9	w	nne	ne	242.17
3	30.020	.954	.975	49.1	64.0	53.0	nne	nne	nse	207.12
4	.000	.900	.876	47.4	69.0	57.0	nne	w	w	211.17
5	29.874	.834	.850	52.1	76.0	61.8	ws	w	w	84.01
6	.890	.899	.887	58.4	79.0	69.3	s	s	s	61.13
7	.871	.862	.850	66.0	80.1	70.0	s	s	nne	246.12
8	.900	.881	.960	69.6	76.1	66.0	w	w	w	214.16
9	30.126	30.200	30.271	58.1	78.9	62.0	ne	ne	ne	112.04
10	.251	.223	.250	54.3	74.8	68.0	ne	s	se	96.24
11	.200	.176	.150	62.0	68.2	65.0	s	s	s	78.12
12	.052	29.962	29.900	65.0	79.9	72.0	s	s	s	201.71
13	29.901	.979	.951	64.0	67.0	63.5	s	s	w	262.24
14	30.040	30.178	30.200	56.0	72.2	57.5	ne	n	ne	104.11
15	.272	.902	.152	50.0	75.1	58.0	nne	ne	ne	64.18
16	.026	29.965	29.972	52.8	62.7	57.8	ne	e	e	72.12
17	29.997	.913	.900	56.0	70.1	60.3	e	e	e	104.16
18	.862	.822	.810	56.0	68.0	59.6	w	s	s	87.11
19	.680	.632	.625	55.5	64.8	57.0	se	s	w	194.27
20	.679	.776	.898	55.5	66.0	53.0	w	nw	nw	287.12
21	.932	.900	.899	47.9	70.3	56.3	w	w	w	197.00
22	.874	.950	30.000	55.5	76.0	64.4	w	ws	nw	101.74
23	30.250	30.232	.201	56.0	63.8	59.6	ne	ne	ne	167.17
24	.176	.175	.150	55.5	71.0	64.2	ne	n	n	86.14
25	.076	29.945	29.951	65.2	80.4	66.0	s	s	s	205.17
26	.000	.962	.875	57.0	67.2	61.0	w	w	w	64.15
27	29.852	.852	.951	58.1	69.2	56.2	s	w	w	90.71
28	30.063	30.052	30.100	48.6	64.8	54.6	w	w	w	84.12
29	29.778	.849	29.800	49.9	55.1	57.8	e	se	s	201.10
30	.776	.826	.896	54.8	60.0	57.4	w	ws	w	87.24
31										

REMARKS.—The highest reading of the Barometer was at 11.15 p. m. of the 9th day, and was 30.294 inches; the lowest reading occurred at 4 p. m. of the 19th day, 29.890 inch., giving a monthly range of 0.704 in. The atmospheric pressure for the month was 29.992 inches.—The highest Temperature was on the 25th day, and indicated 83° 6; the lowest on the 21st day, and was 45° 2, giving a monthly range or climate difference of 38° 4. The mean Temperature of the month was 62° 61. Rain fell on 20 d., amounting to 6.450 inch., and was accompanied by thunder and lightning on 4 d. Aurora Borealis was visible on 2 nights.

Synopsis of temperature, cloud and precipitation for Aug. 1872, compiled at the Toronto Observatory, from observations in several Provinces of the Dominion of Canada :

PROVINCE.	ONTARIO.		QUEBEC.		NOVA SCOTIA.	NEW BRUNSWICK.		MANITOBA.
STATION.	Toronto.	London.	Montreal.	Quebec.	Halifax.	St. John.	Fredericton.	Winnipeg.
Hours from which means are derived.	6, 8 A. M. 2, 4, 10, 12 P. M.	8 A. M. 2, 9 P. M.	7 A. M. 2, 9 P. M.	Maximum and Minimum.	3, 6, 9, noon. 3, 6, 9 midnight	6 A. M. 2, 10 P. M.	7 A. M. 2 & 9 P. M.	7 A. M. 2 & 9 P. M.
	Magnetic Observatory		Dr. Smallwood.	Capt. Ashe, RN Lt. Murray, RA	F. Allison.	G. Murdoch		
Mean Temperature uncorrected for diurnal variation	69.48	67.00	72.65	67.10	64.12	60.17	65.40	66.12
Warmest day.....	22	21	9	10	9	23	9	20
Temperature.....	78.63	79.25	81.70	78.10	73.32	67.00	78.70	80.25
Coldest day.....	30	30	31	31	8	8.30	30	17
Temperature.....	56.08	54.70	56.70	55.50	58.95	55.70	54.53	57.18
Mean of daily Maxima.....	78.57	80.28	80.42	76.60	74.78	66.71	73.80	81.88
Mean of daily Minima.....	61.22	55.70	64.44	57.60	56.46	54.94	56.90	52.66
Highest Temperature.....	91	92.0	94.0	87.0	93.1	80.00	89.0	93.5
Date.....	22	12	9	10	2	23	9	24
Lowest Temperature.....	51.0	46.0	51.0	49.0	47.9	48.0	45.0	43.3
Date.....	30	31	31	29	2	30	30	29
Percentage of Cloud.....	56	47	31	50	66	71	57	31
Depth of Rain in inches ...	2.405	2.551	3.320	7.330	6.824	6.755	3.820	1.850
Number of days without rain	12	18	15	17	16	19	15	25
Number of days in which rain fell.....	19	13	16	14	15	12	16	6
Depth of snow in inches....	.....	.....	.....	.....	.....	.....	.....	.....
Number of days in which snow fell.....	.....	.....	.....	.....	.....	.....	.....	.....
Total depth of rain and melted snow .....	.....	.....	.....	.....	.....	.....	.....	.....

METEOROLOGICAL OBSERVATIONS.

—Observations taken at Halifax, N. S. during the month of August, 1872, Lat. 44° 39' north ; Long. 63° 36' west ; height above the Sea 175 feet, by Sergt. Thurlin, A. H. C. Halifax.

Barometer, highest reading on the 21st.....	30.176 inches.
“ lowest “ “ 31st.....	29.495
“ range of pressure .....	.681
“ mean for month (reduced to 32°).....	29.830
Thermometer, highest in shade on the 9th.....	93.0 degrees.
“ lowest “ “ 2nd.....	43.8
“ range in month.....	49.2
“ mean of all highest	76.7
“ mean of all lowest.....	53.7
“ mean daily range	23.0
“ mean for month.....	65.2
“ highest reading in sun's rays.....	135.2
“ lowest on grass	36.8
Hygrometer, mean detection of dry bulb.....	68.2
“ mean of wet bulb.....	63.6
“ mean dew point.....	60.0
“ elastic force of vapour.....	518
“ weight of vapour in a cubic foot of air....	5.7 grains.
“ weight required to saturate do.....	1.8
“ the figure of humidity (Sat. 100).....	75
“ average weight of a cubic foot of air.....	521.7 grains.
Wind, mean direction of North.....	8.50 days.
“ “ East.....	2.00
“ “ South.....	9.75
“ “ West.....	10.75
“ daily force.....	2.0
“ daily horizontal movement.....	233.0 miles.
Cloud, mean amount of (0-10).....	7.1
Ozone, mean amount of (0-10).....	2.4
Rain, number of days it fell.....	10
Aount of rain collected on ground	7.36 inches.
Fog, number of days.....	7

JOHN THURLING,
Sergt. A. H. C.,
Halifax.

—Observations taken at Halifax, N. S. during the month of September, 1872, Lat. 44° 39' north ; Long. 63° 36' west ; height above the level of the Sea. 175 feet ; by Sergt. Thurlin, A. H. C.

Barometer, highest reading on the 24th	30.340 inches.
“ lowest “ “ 20th	29.429
“ range of pressure .....	.911
“ mean for month reduced to 32° 0'.....	29.818
Thermometer, highest in shade on the 8th.....	84.1 degrees.
“ lowest “ “ 11th.....	38.7
“ range in month.....	45.4
“ mean of all highest	70.2
“ mean of all lowest.....	48.3
“ mean daily range	21.9
“ mean for month.....	59.2
“ highest reading in sun's rays.....	129.8
“ lowest reading on grass	28.0
Hygrometer, mean of dry bulb.....	62.4
“ mean of wet bulb.....	58.4
“ mean dew point.....	55.0
“ elastic force of vapour.....	433
“ weight of vapour in a cubic foot of air... ..	4.9 grains.
“ weight required to saturate do	1.3
“ the figure of humidity.....	77
“ average weight of a cubic foot of air.....	528.1 grains.
Wind, mean direction of North.....	8.25 days.
“ “ East.....	0.00
“ “ South.....	3.75
“ “ West.....	18.00
“ daily by horizontal movement.....	218.7 miles.
“ mean daily force.....	2.2
Cloud, mean amount of (0-10)	6.6
Ozone, mean amount of (0-10).....	3.2
Rain, number of days it fell.....	9
Amount collected on ground	1.44 inches.
Fog, number of days.....	4

JOHN THURLING,
Sergt. A. H. C.,
Halifax.