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Random Thoughts on Astronomy.

What a magnificent scene would we behold could we view the universe as it is! Let the limits of our vision be extended till we could look over the whole creation, and let us be endowed with a faculty to comprehend the vastness of the mighty orbs that whirl around us, and to measure and understand the immense distances which separate us from them, and them from one another, and what a panorama of glittering worlds—what a scene of awful grandeur and sublimity would be presented to our view!

But even the *imagination* becomes bewildered, and as utterly and hopelessly fails to comprehend the immensity of creation, as it does to touch the confines of space or eternity.

And how miserably do *figures* succeed in giving us an adequate idea of the magnitude or distances they are employed to represent in astronomy! How meaningless to us are the enormous numbers which indicate the weight in tons of some vast sphere, or the distance in miles from the solar system to some of its neighboring systems!

"How far is it to the sun?" we ask the astronomer, and he tells us that it is *ninety-one million five hundred thousand miles.* "And how far to the pole star?" "Not less than *two hundred eighty five trillions of miles.*" Now the first idea that strikes us is *that it is a great deal farther to Polaris than to the sun:* but *how much* farther, we have not the slightest conception.

Indeed, so vague are our conceptions of numbers above millions or billions that the impression upon the mind would scarcely have been more forcible had we been told that the distance is two hundred eighty-five *quintillions*, instead of so many *trillions* of miles; or at least it would seem greater only in about the proportion of five to three, while the real difference of these numbers is as 100,000 to 1.

A railway train traveling day and night at the rate of fifty miles an hour, without making any stoppages, would run from New York to San Francisco in sixty-six hours, or less than three days. At the same rate it would make the circuit of the earth at the equator in a little less than twenty-one days; and should it then leave the earth *en route* for the sun, it would arrive at the solar station in 76,250 days more, or about 209 years; but to reach Polaris, it would require no less than 636,600,000 years. Had Adam taken passage in such a train moved on at the above rate without a single pause until the present time, less than the $\frac{1}{100000}$ part of his journey would now be accomplished. And had Eve started at the same time upon a tour around the earth, traveling just fast enough to finish her journey by the time Adam reached Polaris, she would *now* have traveled *less than a quarter of a* MILE.

Even light, which moves with the fearful velocity of 183,000 miles per second, requiring but eight and a quarter minutes to pass from the sun to the earth, is nearly *fifty years* in crossing this vast chasm.

The time required for the light of the *nearest* fixed star to reach the earth is about three years and nine months; while that of some of the farthest visible to the naked eye requires 125 years. Over what an infinite expanse must the eye wander, as we gaze at the starry heavens on a clear night!

And yet the number of stars visible to the unaided eye is but as a handful of sand scattered upon the seashore when compared with the myriads revealed by the telescope, to say nothing of the countless multitudes so inconceivably distant as to appear as "mere fleecy whiteness" in the most powerful instruments.

The Galaxy or "Milky Way" (to which our sun and system belongs) is said to contain alone upward of *twenty-one million of stars;* and these stars are *suns*, and we may reasonably suppose each to be surrounded by a retinue of worlds like those attendant upon our sun. What an innumerable number of minor worlds must then exist! And as the mind labors to comprehend the extent of the magnificent scene, what eager questionings crowd upon us! Are all those worlds inhabited? Do living, thinking beings dwell upon them. If so,

"———— Do they bear
The stamp of human nature? Or has God
Peopled these purer realms with lovelier forms
And more celestial minds? Does Innocence
Still wear her native and untainted bloom?

"Has War trod o'er them with his foot of fire?
And Slavery forged his chains; and Wrath, and Hate,
And sordid Selfishness, and cruel Lust
Leagued their base bands to tread out light and *truth*,
And scatter woe where Heaven had planted joy?
Or are they yet all paradise, unfallen
And uncorrupt? existence one long joy,
Without disease upon the frame, or sin
Upon the heart, or weariness of life;
Hope never quenched, and age unknown
And death unfeared; while fresh and fadeless youth
Glows in the light from God's near throne of love?"

But the imagination only wearies itself in its attempts to solve the mysterious problems, and we cannot fail to be impressed with the utter insignificance of man, and the omnipotence of Him who

"Summons into being with like ease
A whole creation and a single grain,"

and we are led to exclaim with the Psalmist—"When I consider thy heavens, the work of thy fingers, the moon and the stars which thou hast ordained; what is man that thou art mindful of him? and the son of man that thou visitest him?"

But while we marvel at the *sublime* and *infinite*, we cannot fail to be delighted with the *beauty* and *harmony* everywhere displayed in the celestial regions.

What ideal scene of majestic beauty can surpass that presented by the solar system, could we view it as a whole!

Blazing out from the centre and illuminating the whole grand spectacle, a fiery globe 800,000 miles in diameter, and flying around this with inconceivable velocity, the planets, each at the same time whirling upon its own axis, and carrying with them their satellites, which also revolve about them as they revolve about the central sphere; the comets, with their long fiery trains, sweeping up till they almost graze the sun, and then speeding away again in their long elliptical orbits, crossing the path of the planets and darting out into the profound depths of space till they seem lost in the trackless waste of ether; meteors and shooting-stars darting hither and thither, and finally the whole system itself in motion, plunging through space with a velocity of more than 17,000 miles per hour, yet with every orb moving with the utmost precision and regularity, would indeed be a scene of grandeur surpassing anything of which we are able to conceive.

Or consider the effects which must be produced in some of those systems having *colored suns*. Take, for example, a planet revolving about Psi Cassiopiæ. This is a triple star, consisting of a red, a blue, and a green sun. Imagine a world bathed in soft-blue sunshine one day, the next in emerald green, and this succeeded by a fiery-red day. Or think of the beautiful phenomenon of a bright-green sun just rising to view, while another blood-red or violet-blue one is sinking beyond the opposite horizon.

Many of the star-clusters and nebulæ present to the astronomer the most beautiful and pleasing pictures. A cluster in Toucan is described as being "compact and of an orange-red color at the centre, while the exterior is composed of pure white stars, making a border of exquisite contrast." In the Southern Cross is a group of over a hundred stars of various colors, looking upon which, says Herschel, is "like gazing into a casket of precious gems."

Indeed the whole heavens, viewed from certain standpoints, would appear to flash with jewels of every conceivable hue; and throughout the universe we meet with objects and scenes which evince the same Divine love of the beautiful which we behold in the painting of the delicate petals of the summer flower, and the rich tints and graceful arch of the rainbow.—CHAUNCEY C. JENCKS.

The Teaching of Natural Philosophy in Schools.

Read by the REVD. P. MAGNUS, B. A., B. Sc.

BEFORE THE COLLEGE OF PRECEPTORS.

No fact is, at the present day, more generally recognised than that Science-teaching should form an essential element in Education. But a long time often elapses between the recognition of a principle and its practical application; and in the Sixth Report of the Royal Commission on Scientific Instruction, published in the middle of last year, we are surprised by the statement that of the endowed schools of the country not more than thirty per cent. have introduced Science into their school course; and that of these scarcely more than one-quarter devote to it as much time as four hours a week. The statistics furnished by the Commissioners are so important that I quote them *in extenso.* "Information was also sought from the Head-masters of the 202 schools which appear in the Report of the Schools Inquiry Commission as possessing endowments of over £200 per annum, and from 128 of these schools replies have been received......... Among the 128 schools from which we have received returns. Science is taught in only 63, and of these only 13 have a Laboratory, and only 18 Apparatus, often very scanty. Out of the 128 schools definite information has been received from 87. Of these 30 allot no regular time whatever to scientific study; 7 only one hour a week; 16 only 2 hours; while out of the whole number only 18 devote as much as four hours to it." If this is the case with respect to the boys' endowed schools, we cannot help fearing that the statistics would present a still more unfavourable appearance, if they had been collected from private adventure schools of both sexes.

The reasons of this indifference to Science are not far to seek. They lie partly in the inertia common to all institutions, in consequence of which they yield but gradually to change; and partly in the supposed cost of introducing Science-classes into schools, in the difficulty of obtaining Science-masters, in the general uncertainty with respect to the branches of Science that ought to be taught, and in the adverse influence of the older universities, which have not hitherto attached the same importance in their examinations to Science as to Language and Mathematics. All these causes, we may hope, will gradually be removed. In the meantime public attention cannot be too frequently called to the advisableness of making Science lessons a necessary part of school education; and the discussion of methods of teaching particular branches of Science, if it do no more than rouse an interest in the subject, is likely to be attended with some beneficial results.

With this object before me, I have undertaken, at the request of the Council, to offer a few remarks on the teaching of Natural Philosophy in Schools. The term Natural Philosophy is sufficiently vague to cover several branches of Physical Science. As employed by some writers, it actually includes the whole range of Physics. By others it is limited to the Sciences of Heat, Light, and Electricity, as distinguished from the subjects generally known as Mechanics and Hydrostatics. The term "Mechanics," again, is made by some to include the application of the principles of Dynamics to the motion and equilibrium of solid and fluid bodies, whilst others restrict its use to solid bodies only, and others again, following the example of Newton, use the word in its strict etymological signification as applying to the theory of Machines. Other terms sometimes employed are Mechanical Philosophy and Experimental Physics: but whilst the former of these can hardly be regarded as an improvement on the term Mechanics, for which it is occasionally substituted, the latter is almost too general to be restricted to any particular branch of Physics, since all Physical Science rests on experiment for its basis, and the appeal to experience is necessary for the verification of conclusions which are deductively arrived at. The term Experimental Physics, however, serves very fairly to designate those branches of Physics, such as Heat, Electricity, and Magnetism, in the explanation of which experiment is the essential instrument, and to which the application of number is extremely difficult, and, except in a few cases, only partially satisfactory; but we are still left without a descriptive title for Mechanics and Hydrostatics, unless we use the ambiguous term Mechanics to include both. A better distinction is found in the fact that, whilst Physics is essentially the science of motion, the so-called Experimental Sciences treat of the invisible motions of the molecules of which bodies consist, and the Mechanical section treats of the visible motion of bodies as such, whether they be solid, liquid, or gaseous. Much precision, therefore, would be introduced into the subject if these two branches of Physical Science were known as Molecular Physics, or the Physics of Molecules, and Molar Physics, or the Physics of Masses.

The branches of Physics most commonly taught in schools, viz., Statics, Dynamics, and Hydrostatics, are generally comprised under the term Natural Philosophy, which is so used in the regulations of the Council of this College, and, till quite recently, in those for the Matriculation of the University of London, though it now includes the additional subject Heat. It would seem, therefore, that Natural Philosophy is generally understood by schoolmasters to include Molar Physics only; and in this restricted sense I have used the word in the title to this paper.

Notwithstanding the experience that has been gained in teaching this branch of Physics, the failures of candidates at elementary examinations are very numerous, as may be seen from the statistics of the London University Matriculation which show that over thirty-five per cent. of all the candidates who have presented themselves during the last five years have been rejected in Natural Philosophy. Presuming, therefore, that the examiners are not over exacting, we must necessarily infer that the subject itself is still imperfectly taught in very many schools.

The causes of these failures are not difficult to find. In the first place, those who teach the subject are often themselves insufficiently informed, and possess very little knowledge of the best methods of instruction. Men who have been educated at a good school, and who have afterwards graduated in honours at one of the Universities, not only have learnt a respectable amount of Classics or Mathematics, but have been so taught that they are capable of applying to the instruction of others the methods by which they acquired their own knowledge. But this is hardly the case with Science. There are very few Science-teachers who have had the advantage of sound instruction during their school-course, and they consequently have to invent for themselves a method, when they are called upon to instruct young pupils. It is a truth well recognised in this institution, that an extensive acquaintance with a subject, and the power of teaching it, do not necessarily go hand in hand; and although doubts may very well be entertained with respect to the possibility of theoretically showing teachers how to teach, it is quite certain that those who, as children, have been clearly and methodically instructed will become better teachers than those who have missed this training. Every good teacher knows how frequently he recalls to mind the difficulties he himself experienced as a learner, and how, by reflecting on the causes of these difficulties, he afterwards succeeds in removing them from the minds of his pupils.

Another reason for the failure of candidates in elementary examinations in Natural Philosophy, is the short period of time which in most schools is set apart for the study of the subject. Boys are not expected to obtain a knowledge of Latin or Greek by attending a course of lectures during the last few months of their school career, but they are carefully grounded during several successive years in the elements of these languages. Moreover, their instruction is based on some plan or method, so that they are enabled gradually to advance, by regular and progressive stages, to the acquisition of higher knowledge. But, there are few schools, below those of the first grade, into which any systematic method of teaching. Science has, up to the present time, been introduced. In fact, Science is too often regarded as a body of truths, the full significance of which a pupil ought to grasp as soon as they have been once presented to his notice, but for the mastery of which anything like the same kind of training as a boy receives in learning Greek or Latin is wholly unnecessary.

It very frequently happens that boys who are going to be examined in Natural Philosophy receive six months' instruction in Mechanics during the year preceding their examination. They may have had no previous training which might fit them for the acquisition of scientific principles, and give them the power of applying these principles to cases coming under their notice; but, with minds wholly unaccustomed to scientific thinking, they are brought face to face with the problems of Mechanics; and when, as must naturally happen, these boys fail to satisfy the examiners, the examinations are pronounced too difficult.

This leads me to consider what amount of school time ought to be devoted to the teaching of Natural Philosophy, and at what age a pupil should begin to receive instruction in this subject.

With respect to the age at which children should enter upon the study of Scientific subjects, a great deal has been said of late, some teachers advocating a very young age, and others considering that the study of these subjects should not be commenced till nearly the end of the school career. Practically, the opinion of the latter is carried into effect. Complaints have recently been made that the knowledge of Science required from candidates for the Leaving-certificate Examinations of the Oxford and Cambridge Conjoint Board is very much less in quantity, and much more easily acquired, than the knowledge of Classics. This, no doubt, is true; and the reason assigned is, that the number of years devoted to the study of Classics, or even of Mathematics (including Arithmetic) is much greater than the maximum period given in the best schools to Science. But I cannot help thinking that this ought to be so. Science, as a part of general education, is principally useful when regarded as the means of developing the reasoning and observing faculties of those who study it; and, if too exclusively pursued, to the neglect of other equally, if not more important subjects, it is likely to result in a one-sided and inefficient training. There is no doubt that the study of Language and of Number ought to precede the study of Science; for language is necessary to thought, and Number gives definiteness and accuracy to the conclusions at which reason enables us to arrive. They are both the instruments of Science; and hence, from a logical point of view, they should be previously studied.

Then again, we must remember that youth is the period of life when the memory is most efficient, and is therefore the age which is best adapted for the acquiring of languages. There are many persons who, having in their early youth neglected the study of Classics, are never able to obtain the culture and elevated sympathies which those studies afford. But a knowledge of Science can be gained at any age; and what is learnt with difficulty in early youth is often more easily acquired when the mental powers have already been subjected to some amount of training. Much, however, may be done in very early years, without prejudice to other studies, in developing a taste for Science. If the faculties of observation, which at this period are always active, be wisely exercised, a child may acquire, during the early years of his education, the knowledge of a considerable number of scientific facts, which will afterwards afford him subject-matter for reflection. This is proved by the interest children so often exhibit in collecting coins, stamps, butterflies, &c. But Science proper, or systematised knowledge, involving the relations of cause and effect, and of facts to the principles that explain them, ought not, I venture to think, to occupy the attention of young persons until their minds shall have been duly prepared for it by other work.

In the teaching of Science there are two separate stages. There is the methodical collection of facts, and there is the explanation of these facts by the referring of them to general laws. The collection and arrangement of facts, which may be regarded as preliminary to real Science-teaching, may engage children at a very early age, and may be made a useful exercise in all the classes of an ordinary school. No subject seems to me to be bettersuited for giving precision in the description of natural objects than Botany; and the facility with which it can be taught, even to very young children, and the increasing interest which the study of it evokes, would seem to constitute it one of the best subjects for the purposes of scientific education, and to render it well adapted to schools of all grades and of both sexes.

But the subject I am now considering cannot be treated as a descriptive science; it is essentially a science of reasoning; and the pupil must be trained to see, in the facts themselves, instances and illustrations of general principles. Science-teaching of this kind should not commence at too early an age, and the pupil should not at first be occupied with a detailed study of any one particular subject. The teaching, in the beginning, should be general and only simple explanations of the more common phenomena should be attempted. A course of lessons, comprising much that is included in Erdkunde, or Physical Geography, ought, indeed, to precede the specific study of any one branch of Physics. Lessons such as these would introduce the pupils to a variety of different scientific facts, and would call forth a desire on their part to obtain a more intimate acquaintance with the processes of nature. These lessons might be followed up by more detailed instruction in the elements of the science of Heat, the study of which subject seems to be well adapted to open the pupil's mind to the comprehension of a number of frequently observed and interesting appearances. At the same time the teacher might practically explain the various units of measurement commonly employed in Physics; an accurate knowledge of which is very essential to the pupil's subsequent progress.

At this stage of the learner's school course he might with advantage commence Mechanics. Although many principles in Molar Physics can be explained to those who know no more Mathematics than is involved in an acquaintance with the rules of Arithmetic, the pupil's progress will be much more satisfactory, if he does not commence it till he has acquired some knowledge of the elements of Algebra and Geometry. The opportunity of being better grounded in Mathematics would be afforded to him by his pursuing the study of it during the two or three years that should be devoted to the introductory Science lessons of which I have just spoken. A long course of preliminary mathematical instruction is not necessary; but if a pupil enters on the study of Mechanics without having attained to so much knowledge of Algebra and Geometry as a boy of average ability might gain in two years, the subject will present unnecessary difficulties, which will impede his progress, and give him a distaste for the study. The simplest problems of elementary Mechanics too often prove a stumbling-block to young students, on account of their very inefficient knowledge of even the elements of mathematical reasoning. Among the many advantages which the study of Mechanics includes, certainly not the least is the excercise which it affords to the pupil, in applying numerical relations to physical principles, and in obtaining, possibly for the first time, definite and exact knowledge of force as a magnitude. In Mechanics, a large number of isolated facts are capable of being connected together by a simple numerical-relation, and a few elementary laws having been ascertained, the pupil who knows even a little Mathematics is able to deduce therefrom important results, many of which can be approximately verified by experiment. It seems to me, therefore, very advisable that boys and girls at school should not be permitted to commence the study of this branch of Physics until they know fairly Simple Equations, and as much Geometry as is comprised in the First Book of Euclid.

I do not think that Mechanics ought to be considered simply as a branch of Experimental Physics: it is essentially a deductive Science, and should be taught as such. In saying this, I do not wish to convey the impression that experimental illustrations are valueless, or that the pupils should not be trained to conduct experiments for themselves; but what I mean is, that the deductive character of the science should be carefully kept in view. In Mechanics a variety of different results can be calculated from two or three general laws quantitatively expressed. Moreover, many of these results are of so simple a character that they can easily be realized in imagination, even without the aid of practical illustrations. This is not the case in the so-called experimental sciences. In these the result cannot always be easily calculated with exactness, and the phenomena themselves are complex, and require to be seen in order that they may be understood.

If Mechanics be taught to beginners as a mere experimental science, it is taught with very little advantage. The student misses the exercise, so useful to him, of deducing, by the aid of simple numerical and geometrical relations, exact results from elementary principles. If he learns these laws qualitatively and not quantitatively, and must appeal to experiment for a knowledge of what will happen under each variety of circumstances, his progress will necessarily be retarded. Very little is gained, therefore, by teaching the principles of Mechanics until the pupil is sufficiently advanced to be able to apply a general principle to a particular instance, and to deduce theoretically a result expressed in exact quantities.

In the teaching of Mechanics, the several stages of the Deductive method may be carefully distinguished and exemplified. The science rests on certain general laws, which have gradually been discovered by a series of observations and experiments. An outline of these experiments should be presented to the pupil, so that he may know the nature of the processes of reasoning by which these principles have been establish. This may be easily done in explaining such laws as the Composition of Velocities. Newton's third Law of Motion, the principle of Archimedes, or Boyle's law. The nature of these observations or experiments having been explained, and if possible practically illustrated, the student should be taught to employ them in the explanation of various simple phenomena. He should be made to feel that the law he has obtained is an instrument enabling him to explain the cause of a variety of different facts which daily impress his senses. The endeavour to apply a general principle to the explanation of appearances, the nature of which had previously been unheeded, is a useful mental exercise, which helps to develope scientific thinking.

Having traced this law in a variety of instances, the pupil should be trained in deducing, by the aid of number, definite results corresponding to particular problems will present very little difficulty when the pupil knows that they are special cases of the law in question. The result having been theoretically determined, should be experimentally verified, whenever the means for such verification are at hand. It is most probable that the two results so obtained will slightly differ. The cause of the difference should then be carefully pointed out; and if the discrepancy has arisen from circumstances which can be numerically expressed and calculated, the theoretical should be modified accordingly. When this shall have been done, the problem may be said to be completely solved, and the principle involved in it to be verified. The student should be taught to distinguish between the two kinds of experimental illustrations that have been brought before him—between those which led to the discovery of the law and those which served to verify it. The former only are true experimens, real instruments of research; the latter serve to test and verify the law previously ascertained. The practical illustrations which lecturers so often call experiments, can hardly be regarded as such, since they are not employed for the discovery of new truths, but for exemplifying those previously known. The student should be told that experiment as a means of research is a laborious process—a groping in the dark for something not yet found, and involves a series of trials under a variety of circumstances. Such experiments are very different from the carefully prepared illustrations which serve to show the truth of a known law

The principles of Mechanics, and such deductions as easily follow from them, being presented to the pupil in this way, the subject will naturally arouse his interest, and the study of it will become a most important instrument in the education of his mental powers: for he will not only learn the elements of the science he is studying, but he will also obtain some knowledge of the method of science generally, and habits of exact thinking, which are more useful than the acquisition of mere facts, and which constitute Science-teaching an essential element in general education.

There are few branches of Science which admit so completely of being treated by the Deductive method as Mechanics; and for this reason, as well as for the power it gives the student of explaining the causes of some of the most elementary phenomena of Nature, Mechanics seems to me to be the suitable introduction to the systematic study of Physical Science, and a most valuable discipline for boys and girls during their school course.

The method of dealing with this subject, which I have very faintly indicated, enables the teacher to keep clear of two imperfect methods, one or other of which is frequently adopted. The one is the purely mathematical; the other the purely experimental. We very often find Mechanics treated as a branch of Mathematics, and the conclusions are made to follow from certain elementary principles, in much the same way as the results of algebraic reasoning are deduced from the properties of quantity and number. This theoretical method of treating the subject, in which is found no indication of the experiments whence the laws of Mechanics were first derived, nor of the observations that suggested them, would appear, if we may judge from the text-books still in use, and from the examination papers one sometimes sees, to be even now very commonly employed. Although the higher branches of Mechanics, involving Mathematics of a complicated character, may be advantageously studied as a purely theoretical science, the same method is not well applicable to the teaching of the elements of the subject. Much of the benefit which Mechanics, considered as a means of mental culture, is capable of yielding, is lost when the subject is treated from an abstract point of view, as a branch of Mathematics and nothing more. The study of Mechanics ought to serve as an introduction to other sections of Physics; and the pupil ought to gain from it clear ideas with respect to those fundamental laws of force which underlie the whole area of Physical Science. But this is hardly possible if, before the pupil has had the opportunity of becoming practically acquainted with the action of moving bodies on other bodies at rest and in motion, and of thus acquiring some clear idea of what is understood by momentum, force, and energy, or of seeing separate motions combined, so as to gain a practical notion of a resultant, he is made to learn Duchayla's proof of the Paralelogram of Forces.

The other method of teaching Mechanics, viz. by experiment only, in which the results obtained are qualitatively but not quantitatively true, seems to me to be hardly more satisfactory. The chief interest of mechanical experiments consists in their being absolutely true, in their agrreing eactly with the results of previous calculation, or in their differing therefrom by somme amount that can be easily accounted for. If these calculations are omitted, two-thirds of the interest and value of the study are gone. It ceases to be the means of giving clearness and exactness to the ideas which previously existed in the mind. That unsupported bodies fall to the ground is an experience very early and generally acquired; but the study of Mechanics gives a precise and definite form to our ideas with respect to falling bodies which enables us to calculate their velocity, time of motion, &c., and to see the connection between the law of a falling body and the nature of the earth's orbit about the sun. So, too, every one knows what is meant by work and energy; but the meaning of these words is never clearly apprehended till they have been fixed on the mind by means of definite numerical relations, which show, not only what energy is, but how a given quantity of energy may be numerically expressed.

So far, I have not referred to the practical work to be done by the pupil himself, which it is generally admitted should form an essential part of Science Education. The amount of such work, which can be done by the pupil, depends a great deal on the practical appliances possessed by the school, and upon the time the pupils are able to devote to the subject. I am inclined to think that the first principles of Mechanics should be carefully mastered before the pupil begins to perform for himself any but the simplest experiments, and that his special taste and inclination should be consulted with respect to the nature of the work which he should undertake. Very many opportunities will be afforded to the teacher in the course of his lessons, of encouraging his pupils in conducting simple experiments for themselves: but time does not now permit me to consider this matter as fully as I might wish.

With respect to the order in which the subjects comprised under Mechanics should be studied by the pupil, I cannot help thinking that it is very desirable that he should be made familiar with the laws of Motion, and with facts that illustrate them, before he enters upon than part of the subject known as Statics. As Motion is universally present, it may be regarded as the most elementary physical condition of matter, and the pupil ought therefore, at the commencement of his studies, to be made familiar with its principles and laws. Moreover, the idea of Force is necessarily and rightly connected with that of Motion, and those two ideas ought never to be dissociated from one another in the student's mind. In spite of the many advantages which result from clearly explaining the principles of Dynamics before introducing the pupil to Statical Problems, this order of studying the subject is by no means uniformly adopted. When Statics is made to precede Dynamics, not only is the natural order inverted, in which the ideas connected with Mechanics ought to enter the mind, but the whole subject is rendered unnecessarily difficult and abstract. Observation is constantly making us familiar with moving bodies, and consequently Mechanics should be treated, as far as possible, as the Science of Bodies in Motion. The theory of Equilibrium should be presented to the student as a series of deductions from the Laws of Motion. The principle of Energy, so important in the discussion of all Physical problems, should be clearly explained to the pupil, at a very early stage of his lessons; and this principle should be illustrated by the action of simple machines, which should be considered in their practical bearing as instruments producing motion and not rest.

In illustrating this part of the subject, the experiments cannot be too simple: for there are so many facts coming within the range of observation of the pupil, on which his thoughts can be easily directed, and which the principles he has acquired enable him to explain, that the roughest and simplest experiments suffice. In teaching Hydrostatics there is more scope and more necessity for carefully conducted experiments. The facts to be explained are not quite so familiar to the beginner. He knows less about the behaviour of liquids and gases than of solids, and consequently practical illustrations give him more assistance in realizing the principles involved in the explanation of the phenomena. At this stage of his progress he might with advantage be permitted to conduct for himself such simple experiments as finding the specific gravity of solid and liquid bodies, and determining the volume of a certain quantity of air under different pressures. In all cases, however, the results to be arrived at should be independently deduced from the first principles of the science.

With respect to the use of text-books, it is hardly necessary to say that the teacher should use no text-book whatever when actually engaged in giving his lesson to his class. Not only is it necessary that the pupils should have confidence in the powers of their teacher, but the teacher himself cannot possibly appeal to the minds of his pupils unless his explanations spring spontaneously from his own mind, and are clothed in the language which seems at the moment to best fit them. Without sympathy between the teacher and the taught, there can be no good instruction. The teacher, by frequent questions, should lead his pupils to evolve for themselves the results to which he is endeavouring to conduct them. Even the numerical examples by which he illustrates his result should be constructed as they are required; and, it is far less important that they should *come out* neatly, than that they should exactly correspond with the principle that is being treated. A text-book, when a suitable one can be found, is useful to the pupils for home work, in helping them to write out and revise their notes, and in furnishing them with additional information beyond what the teacher may have time to give.

I will add, in conclusion, one word with respect to the use of formulæ in solving problems. It often happens that a pupil who has been taught to make extensive use of formulæ, finds himself unable to solve a problem till the correct formula has been given to him, when his solution consists only of the substitution of certain numbers for certain symbols, and of the application of the ordinary process of solving an equation to the determination of the result. Now, I need not say that such work does not necessarily show any scientific knowledge whatever. In all cases I would urge that the use of formulæ should, as far as possible, be discouraged. Pupils should be exercised in discovering the scientific principle rather than the symbolic formula of which their problem is an example, and they should then endeavour to build up their result by simple reasoning.

I know very well that different teachers adopt different methods, and that amid many methods that are good no *one* can be pronounced *the best*. I am therefore fully conscious that much that I have said may appear unduly dogmatic, and open to various objections from persons whose opinions justly carry more authority than mine. The nature of my subject, however, rather than my own wish, has forced this tone upon me. I can only say, that, whilst I shall be very glad, if my somewhat disconnected observations shall have furnished those who may have given to the subject, less consideration than I have with any idea that may help them in making the study of Natural Philosophy more interesting to their pupils, I shall be still more pleased to learn from others who are more experienced than I, and who may possibly dissent from much that I have advanced, better methods of teaching than I have suggested. I need hardly add that, althoug I have had occasion frequently to refer to teachers and pupils in the masculine gender, I have endeavoured to keep in view the requirements of girls' as well as boys' schools, and to make my remarks equally applicable to either. —(*The Educational Times.*)

McGill University.

ANNUAL PUBLIC MEETING OF CONVOCATION FOR THE CONFERRING OF DEGREES IN ARTS—A LARGE ATTENDANCE—ORDER OF PROCEEDINGS —THE PRIZE LIST—ADDRESS BY THE VICE-CHANCELLOR, &c.

Notwithstanding the inclemency of the weather yesterday afternoon, 1st May, a very large number of ladies and gentlemen assembled in the William Molson Hall, to witness the ceremonies attendant on the conferring of the degrees and award of honors in the Faculty of Arts.

Shortly after 3 o'clock the governing body of the University, headed by the President and Chancellor of the University, Hon. Charles D. Day, LL. D, D. C. L., entered and took their seats on the dais. There were present, besides the President, the Hon. James Ferrier, Senator, M. L. C., Andrew Robertson, M. A., Q. C., Peter Redpath and Sir Francis Hincks, Principal Dawson, M. A. LL. D., F. R. S., Vice-Chancellor. The following Fellows of the University were also present:—The Ven. Archedeacon Leach, D. C. L., LL. D., Vice-Principal and Dean of the Faculty of Arts; Alexander Johnson, M. A., LL. D; the Rev. George Cornish, M. A., LL. D., Professor of Classical Literature; the Rev. Henry Wilkes, M. A., LL. D., Principal and Professor of Theology and Church History in the Congregational College of British North America; the Rev. Dr. McVicar, LL. D., Principal and Professor of Theology in the Presbyterian College of Montreal; R. A. Ramsay, M. A., B. C. L., Representative Fellow in Arts, John Reddy, M. D., Representative Fellow in Medicine; J. J. McLaren, M. A., B. C. L., Representative Fellow in Law; Edward Holton, B. C. L., Representative Fellow in Law; Samuel B. Schmidt, M. D., Representative Fellow in Medicine, J. R. Dougall, M. A., Representative Fellow in Arts; W. H. Kerr, D. C. L., Q. C.; the Rev. J. Clark Murray, LL. D.,; His Lordship the Bishop of Montreal, the Hon. Mr. Justice Sanborn, W. E. Scott, M. D., Professor of Anatomy; Robert Howard, M. D., Professor of the Theory and Practice of Medicine; C. F. A. Markgraff, M. A., Professor of German Language and Literature; Robert Craik, M. D., Professor of Chemistry; P. J. Darcy, M. A., B. C. L., Professor of French Language and Literature; G. E. Fenwick, M. D., Professor of Surgery, Gilbert P. Girdwood, M. D., Professor of Practical Chemistry; George Ross, M. A., M. D., Professor of Clinical Medicine; Bernard J. Harrington, B. A., Ph. D., Professor of Assaying and Mining and Lecturer on Chemistry; William Osler, M. D., Professor of Institutes of Medicine; C. H. McLeod, Bachelor of Applied Science, Superintendent of Meteorological Observatory; the Rev. J. F. Stevenson, B. A., L. B., London, Eng.; the Rev. Canon Bancroft, D. D., LL. D., the Rev. Charles Chapman, M. A., London University; Archibald Duff, B. A.; John S. Hall, Bernard J. Harrison, Fred. W. Kelley, Ph. D., Cornell; the Rev. Robert Laing, Kutusoff McFee, C. H. McLeod, and W. C. Baynes, B. A., Secretary and Bursar.

The proceedings were commenced with prayer by the Ven. Archdeacon Leach, who afterwards read the following list announcing the award of prizes and honors to Students in Arts:—

FACULTY OF ARTS.

PASSED FOR THE DEGREE OF B. A.—*In Honors.*—(Alphabetically arranged.)—Crothers, Robert Alexander, Duffy, Henry Thomas; Graham, John; Lyman, Henry Herbert; McGoun, Archibald; Rexford, Elson Irving.

Ordinary.

Class I.—Pedley, Hugh; Watson, Alindus S. Class II.—None. Class III.—Cox, Jacob Whitman; Mathewson, John; Gray, Wm.

PASSED IN THE INTERMEDIATE EXAMINATION.

Class I.—Ross, James; Ross, Donald C.; Donald. Class II.—Dawson, Blakely, Thornton, Guerin. Class III.—Torrance, Lyman, Clarence; McLaren, Sweeny.

PASSED FOR THE DEGREE OF BACHELOR OF APPLIED SCIENCE.

Course of Civil and Mechanical Engineering—(In order of relative standing.)—Chapman, Willis; Hawley, David F.; Hetherington Frederick.

HONORS AND PRIZES.

Graduating Class.—B. A. Honors in Classics.—Robert A. Crothers—First Rank Honors and Chapman Gold Medal.

B. A. Honors in Natural Science.—Henry H. Lyman—First Rank Honors and Logan Gold Medal.

B. A. Honors in Mental and Moral Philosophy.—Archibald McGoun—First Rank Honors and Prince of Wales Gold Medal. Elson Irving Rexford—First Rank Honors.

B. A. Honors in English Language, Literature and History.—John Graham—First Rank Honors and Skakspere Gold Medal. Henry Thomas Duffy—Second Rank Honors.

Third Year.—Eugène Lalleur—First Rank Honours in Mental and Moral Philosophy and Prize; First Rank General Standing. Charles H. Gould—First Rank Honours in Classics and Second Prize; Prize in German. Mathew H. Scott—First Rank Honours in Natural Sciences and Logan Prize. First Rank General Standing. Jervois A. Newnham—First Rank Honours in Mental and Moral Philosophy. Price in Zoology. Calvin E. Amaron—First Ranks Honours in Mental and Moral Philosophy. William H. Warriner—First Rank General Standing; Prize for Collection of Plants; Stewart Prize for Hebrew.

Passed the Sessional Examinations—Lalleur, Warriner, Scott, Mewham, Gould, Robertson, Amaron, McGregor (A.F.), Fornerct, McGibbon.

Second Year.—Donald C. Ross.—(Prince of Wales College, Charlottetown, (P.E.I.)—Second Rank Honours in Mathematics and Prize, First Rank General Standing, Prize in English. Hasterwell W. Thornton.—(Felsted Grammar School, England.)—Second Rank Honors in Mathematics, Prize in Botany. James Ross.—(Huntingdon Academy.)—First Rank General Standing, Prize in Logic, Prize in German. James Thomas Donald.—(High School, Montreal.) First Rank General Standing. Edmund J. Guerin.—(Montreal College.)—Prize in French.

Passed the Sessional Examinations.—Ross (James), Ross (Donald C.), Donald, Dawson, McFadyen, Blakely, Thornton, Guerin, Torrance (Fred.), McLaren, Sweeny, Lyman (A. Clarence.)

First Year.—William McClure—(Lachute Academy).—First Rank Honors in Mathematics and prize; First Rank General Standing, second prize in Classics, prize in French, prize in Chemistry. Richard McConnell.—(Private Tuition)—Second Rank Honors in Mathematics and prize. Robert Eadie.—(Brantford High School, Ont.)—First Rank General Standing, first prize in Classics, prize for English essay. William D. Lighthall.—(High School, Montreal. —Prize in English. Ernest J. Houghton.—(Diocesan School, Isle of Wight, England).—Prize for English essay.

Passed the Sessional Examinations.—McClure, Eadie, Lighthall, Cross, Stevens, Morrison, Howard (R. J. B.), McConnell, Redpath, Robertson, Allan, Shearer, Meighen, Rutledge, McKibbin (R). Houghton, Haley.

DEPARTMENT OF PRACTICAL AND APPLIED SCIENCE.

Graduating Class—Willis Chapman.—Certificate of Merit in Engineering; First Rank Honors in Natural Science.

Middle Year.—William J. Sproule—(Toronto High School.)—Prize in Engineering subjects, prize in Zoology.

Passed the Sessional Examination.—Sproule, Jones, Wardrop, Thompson.

Junior Year.—John Swan, (High School, Montreal)—First Rank Honors in Mathematics and Prize. John S. O'Dwyer (Granby Academy)—Prize in French. Frank Adams (High School, Montreal)—Prize in Chemistry.

Passed the Sessional Examination.—O'Dwyer, Swan, Adams, Scriver.

The Earl of Dufferin's Gold Medal for a Prize Essay has been awarded to Kutusoff N. McFee, B.A.

In the Examinations in September, 1875, the following Scholarships and Exhibitions were awarded:—

Third Year.—Newnsham, Warriner and Lalleur—W. C. MacDonald Scholarships. Second Year—Ross (James), Donald, and Ross (Donald)—W. C. MacDonald Exhibitions. Thornton—T. M. Taylor Exhibitian. First Year—Eadie and Stevens—W. C. MacDonald Exhibition; Knowles-Jane Redpath Exhibition; Lighthall—Governors' Exhibition.

SESSIONAL EXAMINATIONS, 1876.

ORDINARY COURSE IN ARTS.

GREEK.

B. A. Ordinary.—Class I.—Crothers and Pedley (Hugh), equal.—Watson. Class II.—Cox. Class III.—Gray and Matheson, equal.

Third Year.—Class I.—Lalleur, (First Prize);—Gould, (Second Prize);—Warriner;—Newnham and Scott, equal. Class II.—Anderson, Amaron, Robertson. Class III.—McGibbon, McGregor, Fornerct.

Second Year.—Class I.—Ross (Donald), Ross (James), Donald, Blakely. Class II.—McFadyen ;—Lyman (A. C.) and Thornton, equal ;—Dawson and Taylor, equal ;—Torrance. Class III.—McKillop and Sweeny, equal ;—McLaren, Guerin.

First Year.—Class I.—Eadie, (First Prize) ;—McClure, (Second Prize) ;—Cross. Class II.—Lighthall and Stevens, equal, —Morrison ;—Howard and Lane, equal—McConnell and Robertson, equal :—McLean, Shearer, Wood. Class III.—Meighen ;—Allan and Redpath, equal ,—Haley, Rutledge :—Houghton and McKibbin, equal.

LATIN.

B. A. Ordinary.—Class I.—Pedley (Hugh), Grothers. Class II.—Watson, Cox. Class III.—Duffy, Grey, Matheson.

Third Year.—Class I.—Lafleur, Gould, Newnham :—Scott and Warriner, equal. Class II.—Anderson, McGibbon, McGrego. Class III.—Robertson and Amaron, equal ;—Forneret.

Second Year.—Class I.—Ross (Donald), Ross (James), Donald, Blakely. Class II.—Dawson and McFayden, equal ; Guerin and Thornton, equal ;—Lyman (A. C.), McLaren. Class III.—Taylor, Torrance, Ewing, Sweeny.

First Year.—Class I.—Eadie, la McClure, Stevens, Lighthall, Howard. Class II—Morrison Cross, McLean . Lane and McConnell, equal . Robertson, Wood, Redpath. Class III.—Haley ; Allen and Meighen, equal.

HISTORY.

First Year.—Class I.—Eadie and Lighthall, equal , McClure, Morrison , Cross and Howard, equal. Class II.—McConnell and Lane and Stevens and McKibbin, equal ; Shearer, Wood ; Redpath and Rutledge, equal. Class III.—Haley and Robertson, equal ; Allen and Houghton and McLean, equal.

LOGIC, AND MENTAL AND MORAL PHILOSOPHY.

Fourth Year—(Mental and Moral Philosophy)—Class I.—Pedley (Hugh) ; McGoun and Rexford, equal. Class II.—Duffy, Watson. Class III.—Kettlewell ; Cox and Matheson, equal ; Grey.

Occasional Students in Fourth Year—(Mental Philosophy alone). —Class I.—None Class II.—None. Class III —Hughes, Langford and McKillop, equal.

Third Year—(Moral Philosophy)—Class I.—Lafleur (prize) ; Warriner. Class II.—Gould ; Amaron and Scott, equal ; Newnham, McGregor, Meyers, Robertson. Class III.—Barltrop, Langford, Forneret, McGibbon, Anderson, Atwater.

Second Year.—(Logic) Class I.—Ross (James), (prize) ; Dawson, Blakely, Donald, Thornton, Ross (D. C). Class II.—Guerin, McFadyen ; Ewing and McKillop, equal ; Kettlewell, Torrance, McLaren. Class III.—Lyman (E. C.) ; Langford and Wright, equal ; Evans, Taylor, Sweeny.

ENGLISH LITERATURE.

B. A. Ordinary.—Class I.—Duffy, Graham, Watson

Third Year.—(Rhetoric).—Class I.—Lafleur and Gould, equal ;—Amaron, Scott. Class II.—McGibbon and Atwater, equal ,—Robertson Class III.—Chubb.

Second Year.—Class I.—Ross, (D. C) Prize ;—Ross (James) and Donald, equal ;—Dawson and McFadyen, equal. Class II—Ewing, Thornton, McLaren, McKillop, Blakely. Class III.—Guerin, Lyman (E. C.). Torrance, Sweeny.

First Year.—Class I.—Lighthall (prize) ;—McClure ;—Eadie (prize essay) ; Cross :—Morrison and Stevens, equal. Class II.—Houghton, (prize essay) ;—Rutledge and McKibbin, equal :—McLean :—Allen and Howard, equal :—Lane and Redpath, equal :—Robertson, Shearer. Class III.—Wood, McConnell, Haley :—Cochrane and Meighen, equal ;—Campbell, Wright.

ENGLISH AND HISTORY.

B. A. Ordinary.—Class I.—Watson, Duffy, Graham.

FRENCH.

Third Year.—Class I —None. Class II.—Chubb, Robertson. Class III.—None.

Second Year.—Class I.—Guerin (prize) ; Ross (James), Ross (D. C.) Donald. Class II.—Dawson, Blakely. Class III.—McLaren, Sweeny, McKillop, Taylor, Thornton, Torrance.

First Year.—Class I.—McClure (prize) ; Cross, Lighthall. Class II.—Eadie, Lane, Redpath, McConnell, Allen, Wood, Meyers, Cochrone. Class III.—Howard, Robertson, Morrison, Stevens :—Campbell and Meighen, Equal ; Haley.

GERMAN

Third Year.—Class I.—Gould (prize).

Second Year.—Classe I.—Ross (James), (prize).

First Year.—Class I.—Cross, Lane. Class II —None. Class III. —Lighthall.

HEBREW.

Stewart Prizeman.—W. H. Warriner.

Junior Class.—Class I.—Ewing (prize), Rutledge. Class II.—Shearer and Houghton equal ;—McLean. Class III.—McKibbin.

Senior Class.—Class I.—Mcgregor. Class II.—McFayden. Class III. None.

MATHEMATICAL PHYSICS.

B. A. Ordinary.—Class I.—None. Class II.—Watson, Pedley (H). Class III.—Matheson, Granham, Duffy, McGoun, Cox.

Third Year.—Class I.—Scott and Warriner, equal ; Lafleur. Class II.—None. Class III.—McGregor (A F.) and Newnham, equal ,—Robertson (R., Gould, Forneret, Amaron, Chubb, Atwater, McGibbon.

MATHEMATICS.

Second Year.—Class I.—Ross (James), Ross (Donald C.) Class II.—Donald, Dawson (R.), Thornton, McKillop, Lyman (C) Sweeny, McLaren, Ewing, Guerin, Taylor (E. T.).

First Year.—Class I.—Stevens McClure, Shearer, Eadie, Howard (R. J. B.). Class II.—McConnell, Morrisson, Lighthall, Cross. Class III.—Meighen, Cachrane, Redpath, Robertson (H.), Allen (F.), Haley, Rutledge, Houghton, McKibbin, Culp.

Honour Course.—Second Year.—Second Rank Honours—Ross (Donald C.), (Prize) ; Thornton.

First Year.—First Rank Honours —McClure, (Prize).

Second Rank Honours.—McConnell, (Prize)

EXPERIMENTAL PHYSICS.

B. A. Ordinary.—Class II.—Lyman, Rexford. Class III.—Watson.

Third Year.—Class I.—None. Class II.—Gould, Lafleur, Chubb, Robertson (R). Class III.—Amaron, Forneret, Scott, Atwater, McGibbon.

NATURAL SCIENCE.

B. A. Ordinary.—(Geology)—Clas I —Lyman, Pedley, Grothers. Class II.—Watson, Cox. Class III.—Grey, Matheson, Hudhes.

Third Year.—(Zoology)—Class I.—Newnham (prize) ; Foord, Scott Class II.—Atwater, Warriner, Amaron, Anderson. Class III.—McGregor, Forneret, Chubb, Livingstone.

Third Year Honors.—Scott (M. H.), First Rank Honors and Logan Prize.

Second Year.—(Botany)—Class I.—Thornton (prize) ; Dawson, Ross (J.) ; Donald and Ross, (D. C.) ; equal ; McFadyen, Guerin, Lyman, Torrance. Class II.—Ewing Barltrop, McKillop, Kettlewell, Blakely. Class III.—McLaren, Sweeney, Taylor.

First Year.—(Chemistry)—Class I.—McClure (prize) ; Eadie. Class II.—Lighthall, Cross, McConnell. Class III.—Morrison, Cochrane, Redpath, Howard, Rutledge, Shearer, Allen, Meighen, Houghton, Stevens, McKibbin, Robertsou, Guerin, Wood.

DEPARTMENT OF PRACTICAL AND APPLIED SCIENCE.

SURVEYING AND LEVELLING.

Middle Year.—Class I.—Sproule. Class II.—Walbank, Wardrop, Thompson. Class III.—Rogers, Jones.

First Year.—Class I.—O'Dwyer. Class II.—Swan, Morkill, Scriver, Adams and Ferguson, equal ; Hull. Class III.—(None.)

DRAWING.

Senior year—Class I.—Chipman. Class II.—(None.) Class III.—Hetheringtan, Hawley.

Middle Year.—Class I.—Sproule, Ross. Class II.—Wardrop, Jones, Thompson, Rogers, Howard. Class II. (None.)

Junior Year.—Class I.—(None.) Class II.—Swan ; O'Dwer and Ferguson, equal ; Adams and Morkill, equal ; Hull and Smith, equal. Class III.—Scriver.

CONSTRUCTION.

Senior Year.—Class I.—Chipman. Class II.—Hetherington, Hawley. Class III.—(None.)

Middle Year.—Class I.—Sproule and Wardrop, equal. Class II.—McNie and Rogers, equal ; Thompson, Walbank, Jones. Class III. Ross, Howard.

APPLIED MECHANICS.

Senior Year.—Class I—Chipman. Class II.—(None.) Class III.—Hawley, Hetherington.

PRINCIPLES OF MECHANICS.

Senior Year.—Class I.—Chipman. Class II.—Hawley. Class III.—Hetherigton.

DESIGNING AND ESTIMATES.

Senior Year.—Class I.—Chipman, Hetherington. Class II.—Hawley. Class III.—(None.)

MENSURATION.

Middle Year.—Class I—Sproule. Class II.—Jones ; Walbank and Howard equal. Class III.—Rogers, Wardrop, Thompson, Ross.

AGGREGATE CLASS LIST.

Professional Subjects.

Senior Year.—Class I.—Entitled to special certificate.—Chipman. Class II.—Hethrington, Hawley.

Middle Year.—Class I.—Sproule, prize. Class II.—Wardrop, Rogers, Jones, Thompson.
Junior Year.—Class I.—None. Class II—O'Dwyer, Swan. Class III—Ferguson, Adams, Morkill, Scriver and Hull, equal.

MATHEMATICAL PHYSICS.

Senior Year.—Class I.—Chipman. Class II.—None. Class III.—Hawley. Hethrington.
Middle Year.—Class I.—Sproule. Class II.—Jones. Class III.—Thompson, Wardrop, Rogers, Walbank.

MATHEMATICS.

Middle Year.—Class I. — Sproule, Wardrop. Class II.—None. Class III.—Jones, Ross (P.D.), Thompson.
Junior Year.—Class I.—Swan, O'Dwyer. Class II.—None. Class III.—Scriver. Adams.
Honor Course.—First Rank Honors, Swan, Prize.

EXPERIMENTAL PHYSICS.

Senior Year.—Class I.—Chipman. Class II.—Hethrington, Hawley.
Middle Year.—Class I —Sproule. Class II.—Thompson and Walbank, equal. Class III.—Jones, Ross P.D.), Rogers.

GEOLOGY.

Senior Year.—Class I.—Chipman. Class II.—Hayley, McNie, Hetherington. Class III.—Howard.

ZOOLOGY.

Middle Year.—Class I.—Sproule (prize), Thompson, Ross (P. D.), Class II.—Walbank, Wardrop, Jones. Class III.—McNie. Rogers, Howard.

BOTANY.

Junior Year.—Class I.—None. Class II.—Adams. Class III.—None.

CHEMISTRY.

Junior Year. — Class I.—Adams (prize). Class II.—O'Dwyer. Class III.—Jones, Ross (Philip), Swan, Wardrop, Scriver, Thompson, Walbank.

MINING COURSE.—ASSAYING AND BLOWPIPE ANALYSIS.

Middle Year.—Class I —None. Class II.—None. Class III.—McNie, Howard.

ENGLISH LANGUAGE AND LITERATURE.

Class II --O'Dwyer, Scriver, Swan. Class III.—Adams.

FRENCH.

Senior Year.—Class I.—None. Class II —None. Class III.--Chipman, Hawley.
Middle Year.—Class I.—None. Class II.—Sproule. Class III.—Jones, Walbank, Howard, Wardrop.
Junior Year.—Class I.—O'Dwyer prize). Class II.—Swan. Class III.—Adams and Smith, equal; Scriver.

GERMAN.

Senior Year.—Class I.—None. Class II.—None. Class III.—Hetherington.

PASSED FOR METEOROLOGICAL CERTIFICATES.

Class I.—Chipman, Lyman (H. H.). Class II.—Hetherington, Hawley. Class III.—Watson, Graham.

The degrees having been conferred if the usual manner, the valedictory was read by Mr. Hugh Pedly, who referred forcibly to the necessity for educated men in every department of education. He contended that there was room for all educated men, that while there were inefficient doctors, bad lawyers, business men who sacrificed principle for interest, and clergymen who did not do all their duty in Canada, there was room for educated men. He challenged any man to say his statements were unfounded, and contended that the coming educated men should push out the uneducated men from these professions. He alluded to Cornelia, who when her countrymen were vieing with each other in showing gems and precious stones begged to be allowed to show her pearls, and astonished the country by exhibiting the sons upon upon whom she had lavished so much care in educating, and trusted that like her, this Canada of Ours would be able to exhibit to the matrons of the earth sons equally worthy of the admiration of the world. In closing he drew the attention of his fellow students to the responsability which they incurred in going through a college course, deplored the practice of going through merely because they were sent, praised the Professors for their efforts, recommended to his fellow-students patience and perseverance, alluded to the sadness that clothed the parting hour, finishing his very good address by an exhortation to each student to be worthy of the Alma Mater and each other.

The Rev. Dr. Cornish, on behalf of the Faculty, delivered the address to the graduates, conveying some excellent suggestions to the young gentlemen about entering upon the world, and advised them to be true to themselves, their college, country and Creator.

The conferring of degrees upon Bachelors of Applied Science was then proceeded with, the Principal performing the ceremony, and Mr. Frederick Hetherington, on behalf of his fellow graduates, reading the valedictory. He spoke in high terms of the necessity for a greater degree of attention in the direction of Applied Science, reviewed the past history of the department, commented favorably upon the increase in the number of graduates, and in warm terms thanked the Principal and professors for the interest they had displayed in the class.

Dr. Johnson, on behalf of the Faculty, addressed the students, and placed before the audience the position in which students in the Department of Applied Science were placed; he defended Professor Tyndall from the charge of atheism brought against him, and contended that there was in applied Science as treated by such men as Darwin, Huxley and others, nothing impossible of reconciliation with the doctrine of Christianity. Science was not dangerous to religion, and its very importance in this respect was the strongest argument to be used in favor of its study by a greater number of theologians and others.

The Rev. Mr. J. F. Stevenson, having signed the necessary document, was admitted to the degree of B.A., and took his seat on the platform amid applause.

Mr. Kutusoff McFee, the successful candidate for the Earl of Dufferin's medal, was then introduced to the Vice-Chancellor, who presented the medal, accompanying the action with a few words of congratulation.

The customary statement of progress was then made by Principal Dawson.

The Principal said:

Mr. Chancellor, in the session of the University which closes to day, our number of students has been larger than in any previous year. It has reached to 352, in our three faculties of Law, Medicine and Arts, without reckoning the students in affiliated colleges and schools. If we include those in Morin College and in the McGill Normal School, the total reaches 492. Of this number 320 are persons not resident in Montreal, but attracted thither from all parts of the Dominion and from beyond its limits by the educational advantages which we offer. Our number of graduates in the present session has been 60 in all, not a large number in comparison with that of the students; but likely to be increased in future years, as the men of the present junior years come forward to be candidates for degrees. The Board of Governors have in the present year published a statement of our revenue and expenditure. This does not come within my department; but it suggests inevitably certain comparisons with educational results, and perhaps should make us apologize to our friends for attempting to do so much with so small means When we compare our modest income of less than $40,000 with the wealth of other Universities, we have reason to feel ashamed of our poverty, but not of our work in comparison with our ressources. A University which styles itself the youngest in America—that founded by John S. Hopkins of Baltimore. begins its operation this year with a revenue of $200,000, and hopes for additions to this. Harvard, the oldest American University, enjoys an annual income of about $380,000; but even those sums are small compared with the wealth of the old English Universities. In recent discussions in the House of Lords the available revenue of Oxford was stated at £200,000 sterling, so that each student may be held to cost the University annually $1,000, independently of fees and personal expenses. We do not think that any one can fairly charge us with giving our students too little to learn or a too limited range of study, but if any are disposed to do so, they may remember that our whole income gives us less than $100 per student. It will therefore readily be understood that we can have no serious objection to receive further benefactions and endowments; and I may add that, in our present stage of progress, the effect of these, for a long time to come, may lead to such extension of our staff, appliances and number of students that they may fail greatly to increase our wealth relatively to our work. The progress which, with our limited resources, we have been able to make in the development of our educational machinery in the past year has not been so great as I could wish; still, it has embraced some important changes. Improvement has been effected in the organization of the Faculties of Law and Arts by the appointment of Prof. Kerr as Acting Dean in the one, and of Professor Johnson as

Vice-Dean in the other, and new and eminent names have been added to the staff of medical professors, though we have to regret that Dr. Campbell has been obliged by the state of his health to be absent for a time from his post as Dean of the Faculty. Our Library, which now numbers about 12,000 volumes, has been rendered more accessible by the printing of a catalogue, in the preparation of which the Librarian has been aided by Drs. Cornish and Murray. Our examinations for schools have been re opened with some success and a prospect of permanent usefulness. (Applause.) We are looking forward to further improvements in the coming year. Additional provision will be made for the comfort and convenience of students in the college buildings. Important additions will be made to the teaching power of the Department of Practical and Applied Science by the appointment of another lecturer in aid more especially of the mathematical training of the students of that department, and by adding to the function of the present assistant to the Professor of Engineering that of Lecturer in Geometrical Drawing. We shall arrange in connection with these changes for courses fitting our Engineering graduates for the higher examinations now required for Dominion Land Surveyors, as well as for the ordinary work of the profession. A liberal gift from a lady of this city will add a collection o models in mining and metallurgy to our apparatus. Some of our graduates are beginning to perceive the advantages which would result from studying as post-graduate students some of the various subjects to which their attention could not be directed as undergraduates, and facilities will be given for this purpose. Dr. Carpenter, as lecturer in Malacology, will favor our students in Natural Science with a few museum lectures on the Mollusca. The institution of summer courses on a more extended scale than heretofore in the Faculty of Medicine is a new feature, and some of the subjects, as Practical Chemistry and Histology, are deserving of the attention of other than professional students. At our meeting in May last we had to deplore the loss of a member of our Board of Governors and an eminent benefactor of the University, Mr. William Molson. Death has since deprived us of another member of the Board, Mr. David Torrance, a man whose sound judgment and business capacity and earnest desire to husband the resources of the University, rendered him of the utmost value in all financial matters. (applause.) We have also lost a benefactor and a member of the corporation in Sir William Logan. Sir William was always a friend of the University and zealous sympathiser with our work, and especially with that part of it which related to Natural Science. He was the founder of the Logan Medal in Natural Science, and of the Logan Chair of Geology. In these foundations he has established a permanent means of aiding young men to attain to the knowledge and practice of the science to which he was himself devoted, and already men trained in our School of Geology are occupying important positions in connection with the Geological Survey and in educational institutions, and are doing original work in the promotion of science. (Applause.) Added to the other means of culture which this University possesses, such donations are sure to be fruitful of good. This is a truth which holds good of educational benefactions of other kinds as well. Any sum of money devoted to the promotion of culture in science, philosophy or literature is sure to be abundantly productive of good when grafted into an established and living institution, while if planted alone it may long remain comparatively unfruitful or it may wither and die. In our own case, we may safely affirm that the arrangements of this University are of such a character as to admit of healthy extension in all the directions demanded by the requirements of modern society; and our growth in those directions is limited only by the extent of our available resources. Finally, Mr. Chancellor, knowing that you are about to leave us for a time, permit me in behalf of all the members of the University, in common, I am sure, with all the friends of higher education in this Province, to express to you our sincere good wishes for your health and happiness and safe return. (Applause.)

The Hon. Judge Day, in rising, dit not propose to make any extended remarks, and would content himself with returning thanks to the Principal for the complimentary remarks he had used in reference to his (the Chancellor's) retirement. But he could not in looking back upon the career of the College, its success and the prominent part it had taken among the educational institutions of the continent, allow it to be said that the success achieved was due to his exertions in its behalf. He would not trust himself to go into the history of the prosperity of the College at any length, but he would say—and he spoke it with the greatest sincerity—that the man above all others to whom the credit of building up McGill College to its present position was Principal Dawson—he it was to whom all the credit really belonged. (Loud applause.) In concluding, he hoped the young gentlemen who from time to time graduated, would appreciate this fact also. To them he would say belonged the future progress and welfare of the University, and he trusted they would prove equal to the occasion. (Applause.) In conclusion, he wished all the students and graduates a happy and prosperous career, and declared the convocation closed.

His Lordship the Metropolitan pronounced the Benediction, and the meeting of the convocation was over.—(*Montreal Gazette.*

University Intelligence

The Corporation of McGill University have pleasure in acknowledging the following donations to the Faculty of Arts during the quarter ending April 26th, 1876.

TO THE LIBRARY:

From the Cobden Club, London, England.—Free Trade and the European Treaties of Commerce. Pam., 8vo.

From the same.—Well's Creed of Free Trade. Pam., 8vo.

From S. F. Dawson, Esq.—Indian Bibliography, 8vo.

From the Royal Society of London.—Philosophical Transactions. Parts 1 and 2 of Vol. 164, and Part 1 of Vol. 165. 3 vols, 4to, pap.

From the same.—Proceedings, Nos. 151-163. 13 pam., 8vo.

From the same.—List of Fellows of the Royal Society, 30th November, 1874. Pam., 4to.

From the same.—Klein's Anatomy of the Lymphatic System. II, 8vo.

From the Government of the Province of Quebec.—Statement of the Public Accounts of the Province of Quebec for the Fiscal Year ended 30th June, 1874. 8vo.

From the same.—Financial Statement of the Minister of Public Instruction for the Fiscal Year ended 30th June, 1885. Pam., 8vo.

From the University of Toronto.—Examination papers for 1875, 8vo.

From the American Philosophical Society.—Proceedings No 95 to vol. 14th pam., 8vo.

From Dr. F. V. Hayden.—Report of the U. S. Geological Survey of the Territories, vol. II., 4to.

From Principal Dawson, LL.D.—Revision of the Echini, by A. Agassiz, with plates, 2 vols., 4to.

From Mrs. G. H. Frothingham.—Picturesque America, or the Land we Live in, 48 parts, 8vo.

From the Superintendent of the U. S. Coast Survey.—Report os the U. S. Coast Survey for 1872, 4to.

From Harvard College, Cambridge, Mass.—Annual Report of the Trustees of the Museum of Comparative Zoology for 1875, pam. 8vo.

From Dr. J. Perrigo.—Mulcahy's Principles of Modern Geometry, 8vo.

From the Government of Washington.—Bulletin of the U. S. Geological and Geographical Survey of the Territories, Nos. 1 and 3 to vol. II., 2 pam., 8vo.

From the University of Oxford.—Catalogue of books added to the Radcliffe Library, Oxford University Museum during 1875, pam. 4to.

From J. S. Newberry, Esq.—Report of the Geological Survey of Ohio. Parts 1 and 2 of vol. II., 1874-75, 2 vols., with maps.

From the Board of Public School Commissioners, Baltimore, U. S.—Forty-seventh Annual Report for 1875, pam., 8vo.

From the Government of the Province of Quebec.—Statuts de Québec, 1875, 8vo.

From Prof. C. Roux.—Annual Reports (1875 and 1876) of the Evangelical Society of La Grande Ligne, P. Q, 2 pam., 8vo.

From the McGill College Book Club.—152 vols., comprising works in general literature, science, &c., &c.

TO THE MUSEUM.

From W. Robb, Esq., Montreal, Dendritic Crystallisation from Berthier (en haut.)

From Dr. Grant, Ottawa, specimen of Apatite and Ear-bone of Whale.

From J. T. Pennock, Esq., Ottawa, Specimens of Plumbago from Buckingham.

From Rev. A. Duff, M. A., Montreal, Specimens of Fossils from the Muschelkalk of Germany.

From D. Boyle, Esq., Elora, Ont., Specimens of Stromatopora, &c, from the Guelph Formation.

OFFICIAL NOTICES.

Ministry of Public Instruction.

SCHOOL COMMISSIONERS.

The Lieutenant-Governor has been pleased, by order in council, dated the 21st of April last, to make the following appointments, namely:

County of Pontiac, Onslow South.—Messrs. Daniel Milks, James Mohr, John Hammond, William Thompson and Charles Cane. Municipality newly established.

County of Pontiac, Onslow-North.—Messrs. Daniel Beehan, Nicholson Morissey and George Turner, *vice* Messrs. Manus Regan, A. Bolger and Hugh McCaughon, who have ceased to reside within the said municipality.

County of Beauharnois, Saint Timothée—Mr. Narcisse Papineau, *vice* the late Revd. Jos. Olivier Archambault. There was no election held within the time prescribed by law.

By order in council dated the 26th April.

County of Ottawa, Bouchette.—Messrs. Daniel Johnson, Théophile Malbœuf, François Carré, André Beauregard and Félix Courchaine.

County of Montmorency, "Les Crans," (new municipality.)—Messrs. Jean Paré, Paul Paré, Olivier Gravel, Onésime Giguère and Clément Goulet.

County of Nicolet, Sainte Eulalie.—MM. Jos. Hébert and Ludger Turcotte, *vice* Messrs. Honoré Désilets and Louis Desfossés, gone out of office and not replaced by election.

SCHOOL TRUSTEES.

County of Ottawa, Wakefield.—Revd. John Leaman, Revd. G. G. Huxtable and John Shouldice, esquire.

BOARDS OF EXAMINERS.

DISTRICT OF BEAUCE, (CATHOLICS.)

Tancrède Fortier, esquire, M. D., *vice* Mr. J. Bonneville, deceased.

QUEBEC CITY, (PROTESTANTS.)

Revd. Mr. William Wright, Revd. Mr. Christopher Rawson, Revd. Mathew, M. Fothergill, William Darling Campbell, esquire, and W. H. Carter, esquire, *vice* the Revd. Dr. Cook, Commander Edward Ashe, R. N., Revd. Henry Roe, Revd. Henry Purvis, and James Anderson, esquire, M. D., resigned.

ERECTION OF MUNICIPALITIES.

County of Pontiac, Onslow North.—Comprising the seventh, eighth, ninth, tenth, eleventh twelfth, and thirteenth ranges of township Onslow, and the first, second, third and fourth of Allleld.

County of Pontiac, Onslow South.—Comprising the first six ranges of Onslow, saving in both cases, the portions of said township Onslow which are already erected into a school municipality under the name of the village of Quyon and Pontiac.

FIXING LIMITS OF MUNICIPALITIES.

To assign to the school municipalities of Stukely South and Roxton, in the county of Shefford, the following limits, to wit: Stukely South shall comprise the first, second and third ranges, and that part of the fourth range which stretches from lot number fifteen to lot number twenty eight. inclusively, of township Stukeley so as to remove all doubts as to the legality of the erection of the said municipality.

Roxton.—To this municipality shall be annexed lots twenty four, twenty five, twenty six, twenty seven and twenty eight of the tenth and eleventh ranges of township Ely, whereof they already form part for religious purposes.

MISCELLANY.

The Founder of Eton College.—The Foundation of Eton College presents to us a touching historical picture, one of those which affect both the imagination and the heart. The bold and energetic Plantagenet kings were all more or less notable persons in their own right, likely to make a commotion in the world even had they not been royal, and doing so royally with all the added force of their kingship. The change which occurs in history when, after all these stirring personages, a timid, gentle figure, sadly out of place in the imperial mantle, comes stealing on the stage with downcast eyes and feeble step, is curiously pathetic. More entirely out of place than the sixth Henry was, it is impossible to conceive of any man being. "He was more fitted for a cowl than a crown," says the old chronicler; but he would have stood as poor a chance with the ambitious and enterprising churchmen of the time as with its princes. He was a retiring, gentle, student, a weakly, ailing, man, with the shadow of mildness hanging over him, and all the shrinkings of a timid nature to hold him back, and he fell upon an exceptionally difficult time, with long arrears of unsettled questions before him to be brought to a conclusion somehow—the matter of France, for instance, which his bold father had opened so brilliantly, and that matter of the succession which his sage and ambitious grand-father had vaulted over to gain the crown. How often does a strong man begin a course which he has to leave a feeble one to continue and fail in? The father who sets the mischief going, dies peaceably without being incommoded by it, and leaves it to fall upon the head of his innocent son. So it was with the weak young King left to undertake enterprises and to answer for wrongs which were none of his doing. But before he sank under the fatal burdens left to him he managed to get one piece of congenial work executed under his very eyes. He founded Eton, appropriating to it the little waterside village which he must have watched in the sunshine since he was old enough to know anything. Windsor was the centre of his youthful life and studies, and with a natural instinct he chose a place close at hand, where he could watch over every new course of stone and bit of carving that was put up, and every detail of order and discipline. There are plans still existing marked as being "the Kyng's own voyse" in respect to the erection of the college buildings; and he never gave over planning for it. In all his troubled and sorrowful reign it is the only thing apparent in which, on his own account, and as an individual man, Henry took pleasure, and this fact gives to the pious founder a pathetic interest. Had it only been given to him to be a peaceable schoolmaster, teaching "the art of grammar" to his poor scholars, or even the usher who assisted the master, how much happier might he have been! Instead of being dragged about by all those unruly nobles and by that headstrong heroine Margaret, how much pleasanter to have nestled in the new walls, with a chamber to himself, as was the privilege of the master? But Henry VI had to do as his birth compelled him, and could not take refuge in his school any more than Louis XVI, could in lock-making. Poor King! alas, he had to give up that, and toil horribly without any hope, at alien matters, and finish up the work of father and grand-father, which he tried to do trembling, with tools that were too big for him, paying for his feebleness and his failures the poor forfeit of his life; but founding Eton all the same, which was something—snatching a precarious pleasure out of his kingship so long as there remained to him any real power.—*Blackwood's Magazine.*

Tomb of the Æneid.—An interesting archæological discovery was made some time ago near the Porta Maggiore, Rome. It is the allegorical story of Rome painted in fresco around the inner walls of one of those tombs in which the ancients were accustomed to place the ashes of their dead. It has excited the utmost interest among the archæologists and artists of the city, who say that it is not only unique for its historical importance, but for the elegance and skill exhibited in the execution of the paintings. The two brothers Visconti, of the City Archæological Commission, are studying the subject in order to write an article upon it for the *Bulletin*, which is published every three months.

Several are copying the paintings, some of which are still perfect, although the story is partly lost from the fading of a portion of it through the falling of bits of plaster. Mildew is the great enemy of these frescoes, and it is not probable that they will long be left where they are. The private company to which the land belongs, and which is making the excavations, will try to sell them to the city or government but in case a sufficient price is refused it will form a museum of its own with these paintings and a number of inscriptions, tablets, sarcophaghi, vases of glass and terra cotta, gems and bronzes which have been found upon this spot.

THE PLACE WHERE THE FRESCOES WERE FOUND.

When the company began to excavate near the Porta Maggiore, which, with its arches and piers over which the Claudian Aqueduct was carried, was one of the finest monuments of Rome, it discovered that the ground was the site of an ancient Roman cemetery. The graves exhibit both methods of interment—burial and burning; but this tomb is a colombario, like those on the Appian Way and in the Villa Pamfili, and the ashes of the dead are arranged in terra-cotta vases with lids on shelves around the walls. These remarkable Frescoes, which have been restored to the light after being so many centuries covered by the earth (which in Rome continually accumulates, and has buried the old city thirty feet beneath the new), are about thirty feet from the original level of the floor of the tomb. It has been always thought that the Romans left no historical painting of the earliest settlement of the Latin territory and the foundation of a city there by Æneas. Virgil's Æneid, which may be called the national poem of the Latin race, as the Illiad is of the Greek, is the principal authority for the history of the Trojan hero who after the destruction of Troy by the Greeks, first founded a city in Thrace, then went to Sicily and then to Libya, where he met Dido. He then, returning to Sicily, founded another city there and finally came to the shores of the Tiber. He sent ambassadors to the King Latinus, who not only permitted him to found a city, but promised him his only daughter Lavinia in marriage. Æneas named his city Lavinium, in her honor, and the territory on the banks of the Tiber Latium, after the father of his wife. The Rutuli, a people in the vicinity, regarded the coming of Æneas with displeasure and made war upon him. According to mythology he was translated the night after a battle, and peace was concluded with the Rutili. His son founded the city of Alba Longa, and Romulus and Remus, who were his descendants, founded the city of Rome.

THE STORY OF THE PICTURES.

The exquisite paintings, which are not more than eight or ten inches high and executed with wonderful delicacy of color ing and knowledge of anatomy, represent the coming of Æneas into Latin territory, his wars and the peace made with the Rutuli, the construction of the city of Lavinum, the abandonment of Romulus and Remus in the Tiber, and their youth. One of these figures is especially beautiful. It represents Romulus in a pastoral dress during that period of his youth when he was thought to be the son of a shepherd. The broad-brimmed hat he wears shades a youthful face that is expressive of innocence and health His short dress and crook, as well as the two sheep at his side, indicate pastoral occupation. Other pictures represent workmen with great blocks of stone upon their shoulders, who are building the walls of a city. Another shows Lavinia, a most beautiful and graceful female figure, seated near the walls of the city named after her.

Twelve tombs, similar to this, have been excavated, in which were found a great variety of articles, chiefly women's ornaments, lamps and vases The next one to that containing the paintings is without a roof and very much injured, but it has a curious marble table with an aperture about as large as a man's arm, though which the libations of oil and wine were poured. These excavations were very courteously explained and shown to us by Engineer Panini, who is directing them.

—*N. Y. Evening Post*

The Mikado of Japan.—The term *mikado*, used to designate the Emperor of Japan, is of doubtful etymology. The word does not occur in the most ancient Japanese books, but is the one, out of many names given to the emperor, which has obtained the greatest currency. The derivation of mikado usually accepted by the Japanese is from *mi*, honorable, august, and *kado*, a gate, equivalent to the Turkish title of Sublime Porte. Tenno is the official designation now used for the emperor, and all Japanese ministers and consuls are accredited as representatives of "his imperial majesty the Tenno of Japan." The first mikado, Jimmu Tenno, who is usually regarded as an historical character, began to reign about 660 B. C., since which time one hundred and thirty-one emperors have occupied the throne. The reigning mikado (1875), is Mutsuhito, second son of the Emperor Komoi Tenno and the Empress Fujiwara Asako. He was born in 1850, succeeded to his father February 3, 1868, and married Haruko, daughter of Ichijo Tadaka, a noble of the second degree of the first rank, born in June, 1850. Abandoning the habits of seclusion practised by his ancestors, the mikado appears in public, and gives audience to the members of the diplomatic corps in Japan, to his own officers, and to the foreigners employed in the government service. He dresses, eats, rides and acts like a European sovereign.

—*Appleton's Cyclopedia.*

Schoolmasters.—The life of a schoolmaster has many draw backs. It is tedious, laborious, trying to the temper; and its routine may well produce, especially in the beginning, a certain state of stupefaction in the mind of the unfortunate whose life is spent in correcting the mistakes of small boys, and cutting channels of communication between them and the world of truth, wisdom, and genius, which is so hopelessly far apart from their opaque intelligence; but yet it is a worthy life, full of high objects of ambition, and more satisfactory possibilities of action and influence than most occupations hold out. Even in its smallest beginnings the conscientious worker may have the satisfaction of feeling that it is not mere daily bread he is earning, but that the material he works on is the highest and most important, and that more or less he is shaping the mind of the next generation while he toils through even his least attractive work. A great many of us have to work without this stimulant and support, to satisfy ourselves with simple exercise of honesty, turning out the skilfullest manufacture we can for life's most ordinary uses, as the sole equivalent which it is in us to give for all the comforts and loveliness with which we are enabled to sweeten our existence; but the schoolmaster may always have the consoling consciousness of worthy work to keep up his heart and courage. And his reward for his work is not of this etherial kind alone. He has few or no great prizes to reckon upon, but he has the chance at an early age of a good income, securing for him those easy conditions of life in which the essence of personal well-being lies. At five or six and twenty a young man of good ability and reputation at Eton, holding the position of a classical master and tutor, without a house, may find himself in receipt of an income of a thousand a year—a little less or a little more but rather more than less—thus beginning life in circumstances of comfort which many of his contemporaries only attain after the labours of years. He can marry, which so few men of that age, dependant on their own exertions, can hope to do; or he can surround himself with such æsthetic luxuries as suit the taste of his generation; or he can travel, and make himself familiar with everything throughout the Old World which it is most interesting to know; for this desirable life is made more desirable by the bright intervals of holidays which intersect it, nearly four months of the year being absolutely free of duty and responsibility, to be used as he pleases, for pleasure or for profit. Nothing could be more enviable or more perfect than these foundations of his life; but the youthful chapter is perhaps the brightest: there is no advance before him commensurate with the triumphant beginning. When he gets a little older, and succeeds to a boarding-house, greater facilities for money-making are indeed in his power; and in other times at least, modest but comfortable fortunes have accumulated in this way. But, to get his fair chance, he must have capital to invest in the house besides the capital of his education and elaborate training which he invests to start with. The house and furniture of one of the large houses which "pay" represents a considerable amount of money, and brings in a certain mercantile character into the profession; and it is not uncommon to hear the complaint made that almost any other profession would recompense better the junction of skilled labour and real capital, which is necessary in this second stage of the public schoolmaster's career; and he has nothing or next to nothing further to look for.—*Cornhill Magazine.*

Mothers should be educated.—The care of children's health during the school period devolves mainly upon the mother, and it makes an immense difference in the success of the school whether the children come in the morning bright and fresh from the long night's sleep, the morning bath and the simple breakfast, eaten leisurely and with the enjoyment that secures good digestion; or whether the child is always allowed to sit up late for exciting pleasure, to dress and eat its breakfast in a hurry of fear, lest it should be too late for school, and arrive there with jaded body and mind to undertake tasks which are trifles for its healthier comrades, while he or she breaks down under them, to add another to the long list of invalids accreditable to the public school system. To accomplish even this simple home duty towards the great national work of public education, a woman needs more than mere motherly love and good intention. She needs educated intelligence herself and a careful preparation for her work. She must have an acquaintance with school life, as well as home life, and a knowledge of their mutual relations.

It is often lamented that the female teachers in our public schools change so often because they leave school to be married; but I believe that this is far from being an unmixed evil, but that on the contrary this fresh young element has its value in the schools, if it work under competent direction and supervision, and that whatever evil arises is more than compensated by the knowledge of the schools which is thus gained by the future mothers of the community, who can exercise so powerful an influence upon education. Even the physical inheritance of children is improved by the education of the mother, and her three years of teaching, which is the average of a New-England school teacher's experience, and often the most valuable preparatory years of her life. An English writer on statistics shows that 24.87 per cent. of the children of the illiterate mothers die in the first year, while only 14 65 of the children of mothers having some education die during the same period. In considering these numbers we must allow for the fact that the illiterate class includes the pauper class, who actually suffer from physical want, yet still this large difference of ten per cent. is v ry suggestive.

—Professor Ferrier, of King's College, London, who has made the phenomena of sleep a special study, recently said in a lecture thereon that anything which has a tendency to extract blood from the brain favors sleep. Exercise does this, because the moment the weary muscles are at rest the blood rushes to them to repair their loss, and is absorbed by them. Digestion and hot drinks produce the same result by drawing the blood supply from the brain to the stomach. Conversely, anything that stimulates the brain, such as sights, sounds, thought, or anxiety, will keep a man awake. If we, therefore, wish for a refreshing slumber, we must begin by avoiding care and anxiety, and take sufficient bodily exercise to induce the necessary muscular exhustion. With regard to the length of sleep, Dr. Ferrier holds that the heart is not in a state of constant, but of rhythmical activity, a term of action being followed by a pause of rest, during which the heart is to all intents and purposes asleep. In fact, if the pause of the heart are all summed up, it will be found that it rests or sleep eight hours out of the twenty-four, the sleep being in the proportion of one-third as compared with the hours of action or work. Eight hours are consequently sufficient for the adult.

Blunders in Speech.—It was a Scotch woman who said that a butcher of her town only killed half a beast at a time. It was a Dutchman who said that a pig had no marks on his ears except a short tail. It was a British magistrate who, being told by a vagabond that he was not married, responded, "That's a good thing for your wife." It was an English reporter who stated at a meeting of the Ethnological Society, there were casts of the skull of an individual at different periods of adult life, to show the changes produced in ten years,' though Dean Swift certainly mentions two skulls preserved in Ireland, one of a person when he was angry and the other of the same when he grew to be a man. It was a Portuguese mayor who enumerated among the marks by which the body of a drowned man might be identified when found, "a marked impediment in his speech." It was a Frenchman, the famous Carlino, who, cont ntedly laying his head upon a large stone jar for a pillow, repl.ed to one who inquired if it was not rather hard, "Not at all for I have stuffed it with hay." It was an American lecturer who solemnly said one evening, "Parents you may have children; or, if not, your daughters may have."

In commenting upon the penetrating power of different colored lanterns, the *Popular Science Monthly* describes experiments recently made at Trieste. Half a dozen lanterns with carefully selected glass, and all furnished with oil and wicks of the same quality, were lighted on the beach, and then observations were made by a party in a boat. At the distance of half a league, the darkblue lantern was invisible, and the deep-blue one nearly so; hence it appears that blue lights are not adapted for use in lighthouses or as signals. Of all the colors the green was visible for the longest distance, with the exception of the red, which ranked next to the white in power of penetration. The conclusion is that only the green and the red are suitable for signals; and the green light the Trieste observers only recommend for use in conjunction with white and red lights, inasmuch as, when viewed from a short distance, an isolated green light begins to look like a white one.

Small conveniences.—It is quite astonishing how much comfort and satisfaction results from little causes. A box, bag, drawer, or basket for needles, thread, scissors, thimble, buttons of all sizes, tape, strings, wax, etc., saves a multitude of steps, and saves time, and a vast amount of patience, for men-folks dislike to wait while such articles are being hunted up. Neatly trimmed lamps are another convenience, though some prefer to trim them just before lighting, as they become dusty before evening This can be obviated by twisting a piece of paper funnel-shaped, so as to cover the chimney and burner, or if durability is preferred, covers made of fancy paper with strips of gilt to cover the seams and edges, are very pretty. The stocking bag or basket, with different coloured balls, and different sizes of needles, can be hung away under garments, and is always ready for use and not in the way. A place sacred to pens, ink, paper, envelopes, and pencils, where one can jot a thought without getting riled in spirit looking for material, thereby becoming debtor to our fellow-man for defrauding him of the useful idea that circumstances evolved for his benefit, comes under this head. Book-shelves are another really sensible article, and if never so cheap are an ornament. Any store-keeper would reserve for you the pieces upon which cloth is wound, for the shelves; a piece of strong twine filled with spools will complete it. Stand the books edgeways, so that the titles can be read without needless handling. Lamp-lighters saving the disagreable smell of matches; an old basin with a mop or brush for stove-blacking; a can or jug, with scissors, rags and kerosene, for lamp trimming, are convenient, and essential. Save everything. No matter if it be old-fashioned, or you are tired of it. Lay it away, and in a year or two it seems fresh and do a good service in another form, and save a few pennies, which put with other little savings will buy a nice book or pay the subscription for some desirable publication. I do not mean the inconvertible odds and ends that accumulate in a house, and fill it up needlessly, as some are, merely because they posses a passion for saving all things, but only such as taste and judgment can convert into useful and ornamental articles.—*Maine farmer.*

Be Kind to the Aged.—Age, when whitening for the tomb, is a worthy object of reverence. The passions have ceased—hopes of self have ceased The old linger with the young—and, oh, how careful should the young be to reward them with tender affection and with the warmest love, to diminish the chill of ebbing life. The Spartans looked on reverential respect for old age as a beautiful trait of character. Be kind to those who are in the autumn of life, for you know not what sufferings they may have endured, nor how much of it may still be their portion. Do they seem unreasonably to find fault or murmur? Allow not your anger to kindle against them; rebuke them not, for doubtless many have been the crosses and trials of earlier years, and perhaps their dispositions, while in the spring-time of life, were less flexible than your own. Do they require aid? Then render it cheerfully. Forget not that the time may come when you may desire the same assistance from others that you render them. Do all that is needful for the old, and do it with alacrity, and think not hard if much is required at your hands, lest when age sets its seal upon your brow, and fills your limbs with trembling, others may wait unwilling, and feel relieved when the coffin has covered you forever.

Birthdays.—Almost every schoolboy is familiar with the picture of Horace bustling about round his altar of turf with his little censer full of frankincense and his bottle of old wine, keeping high festival and holiday on the fated Calends of March. The exuberant geniality of the little poet led him to celebrate two birthdays every year, taking as an excuse for the second feast his miraculous escape from a falling tree. A more touching scene is that of Ovid in exile, struggling to do the orthodox honours of the birthday of his absent wife. But wherever the Roman might happen to be, the old customs appropriate to this occasion were religiously observed. In every household the fresh green altar was built up, loaded with its pile of fragrant oils and spices, and hung with garlands of sweet flowers. As the scented flame burnt up it was sprinkled with libations of the best wine that the cellar could produce—a propitiatory offering to the presiding deity of the occasion, the ever-present genius. A beautiful superstition, from which the modern doctrine of the guardian angel was undoubtedly borrowed, assigned to each Roman at his birth one of these attendant genii, and at each anniversary the unseen spirit was welcomed and worshipped with votive sacrifices. At the ceremony assisted only the most intimate friends, who offered vows for their entertainer's welfare, not as we do by drinking his health, but by an old and slightly similar custom. This was the eating of sweet cakes made of flour, honey and oil. The host partook first and alone of the auspicious food, clad in a snow-white robe, and invoking blessings on his own head. While he ate, the guest remained devoutly silent, inwardly echoing a similar prayer; and then took their turn at the festal cakes; so that though the health of their entertainer was not exactly drunk, it might be said to be eaten.

The imaginative and unæthestic Romans were not, of course, the first people to observe birthday festivals. The sons of Job "feasted in their houses, each one his day," and almost every country from that time to this has recognized more or less solemnly a yearly jubilee so obvious. The Egyptions from the earliest times attached a great importance to the day, and even the hour, of their birth, and the birthday of the King was honoured with extraordinary rejoicings, by the suspension of all business, and the giving of public banquets. It is expressly recorded that this was one of these occasions which Pharaoh celebrated by giving a great feast to all his servants, by reinstating the chief butler, and hanging the chief baker. When Herod's birthday was kept, it was as a matter of course; and curiously enough his hilarity, like that of the Egyptian despot, showed itself in an act of murderous caprice. In later times the Emperors of the world, to whom extravagant liberality was as necessary a policy as parsimony is to some of their successors, adopted with eagerness so excellent an excuse for a national *fête* day. The Natalitian Games, at which Adrian is said to have exhibited a thousand wild beasts, were rigorously expected at the hand of each succeeding Cæsar, and their celebration served not only as a direct bribe to the sordid populace, but for a display of personal devotion to the august entertainer.

There are thus precedents of respectable antiquity for a custom which the Western nations have adopted with a fair amount of enthusiasm. Christianity has suppressed the little altar of green turf, the incense, and the prayers; and the place of the departed genius has not been filled, as it might, by the airy and fantastic form of an attendant spirit. On a rather unkind soil, beneath a sullen sky, a nation little inclined to picturesque displays has discarded ruthlessly the garlands of flowers; and of all the tasteful paraphernalia of a classic birthday there remains little or nothing but the libations of wine, which, by an irreverant but, perhaps, practical perversion, we pour down our own throats instead of into the sacred flame. A people so dry and so demonstrative as the English could not, indeed, be expected to make much fuss over so sentimental an affair. On one occasion only is the anniversary honoured with anything like a *fête*—when the son and heir of a landed proprietor comes of age—and the only reason for this is to be found in the old feudal custom, which obliged the lord of the fee to knight his son on attaining twenty-one, and compelled the tenants to pay good round sums in the shape of aids to defray the consequent expense. It required no great spirit of liberality to feast the vassals and retainers when the haunches and sirloins, the new coats and suits of armour, were provided at the costs and charges of the invited guest. But in France every birthday of every householder is a sort of coming of age. The smallest farmer or retired shopkeeper is as well entitled to his *fête* day as the most aristocratic *rentier*, and the cakes and sugar-plums of the *bourgeois* are enjoyed with as much gusto in their humble way as the fireworks and champagne breakfast at the château. The Napoleons, with true Imperialistic instincts, adopted and adapted to modern habits the Natitianal Games, and during the Third Empire the birthdays of the Emperor and the Empress became national holidays, upon which the populace was studiously trained to shout for their modern "Panem et Circenses." On the fall of the Third Napoleon, and more especially after his death, it was only natural that the *fête* should be transferred to the birthday of him who might one day be Napoléon IV.; and the half-sad, half-hopeful homage which, in the shape of bouquets and addresses, will to-morrow be presented at Chislehurst, is a faint reflex of the spendid rej'cings which once marked the 15th. of August.

Birthdays are still celebrated in a lukewarm and half-hearted manner in many English families. As a rule this is little more than the formal and somewhat meaningless compliment of an after-dinner toast, for the purpose of which a choice bottle is produced, no matter exactly from what place. In order households it is the custom to present some more or less trifling gift. Generally the present is eminently ill chosen, and the utmost powers of hypocrisey boasted by the recipient are taxed to enable him to acknowledge it with becoming gratitude When then the family is large the pockets of the members of it are severely taxed, as well as their sentiments of affection, and almost the only birthday gifts which are given with good grace are those deposited as hostages with wealthy maiden aunts. Altogether, birthday generosity is a little too high a flight for our unromantic instincts, and the most successful style of natalitian festival in this practical new world is that in which the person principally interested, being of a sane body and mind, gives a select and genial dinner to the most friendly of his friends.

Give Your Girls an Allowance.—Where it is necessary to study economy in every way, and fathers complain of the frequent demands made upon their purses by their daughters, it is best for both parties that an allowance should be agreed on, and regularly paid every quarter. A Girl is thus taught the value of money, and she learns how to spend it; she is led to exercise her judgment and taste, and to restrict herself in one respect in order to indulge herself in another. Without an allowance, young persons cannot know the pleasure of denying themselves what might seem very reasonable and proper, for the sake of bestowing the sum thus saved in charity. There is no generosity in making presents to our friends, no benevolence in giving to the poor, if we are merely the distributors of another person's bounty, and have not one gratification the less ourselves. A feeling of responsibleness grows out of the disbursement of a certain sum which we regard as our own.—*Housekeeper.*

A Wife's Power.—A good wife is a man's wisdom, strength, and courage, a bad one is confusion, weakness and despair. No condition is hopeless to a man where the wife possesses firmness, decision and economy. There is no outward propriety which can counteract indolence, extravagance at home. No spirit can long endure bad influence. Man is strong; but his heart is not adamant. He needs a tranquil home, and especially if he is an intelligent man, with a whole head, he needs its moral force in the conflict of life. To recover his composure, home must be a place of peace and comfort. There his soul renews its strength and goes forth with renewed vigor, to encounter the labor and troubles of life. But if at home he finds no rest, and there is met with bad temper, jealou-y and gloom, or assailed with complaints and censure, hope vanishes, and he sinks into despair.

Truthfulness to Children.—A parent, unlike a poet, is not born—he is made. There are certain things which he has at once to learn, or he will have no more influence over his child than if he were a common stranger, To gain obedience you must first set yourself to deserve it. Whatever you promise the little one, however small the thing may seem to you, and whatever trouble it costs you, perform it. Never let the doubt once enter into that innocent mind that you say what you do not mean, or will not act up to what you say. Make as few prohibitory laws as you possibly can, but once made keep them. In what is granted, as in what is denied, compel yoursof, however weary, or worried, or impatient, to administer always even-handed justice.

—"Education does not commence with the alphabet. If begins with a mother's look, with a father's nod of approbation or a sign of reproof, with a sister's gentle pressure of the hand, or a brother's act of forbearance, with handfuls of flowers in green and daisy meadows, with birds' nests admired but not touched, with creeping ants and almost imperceptible emmets, with humming bees and glass beehives, with pleasant walks in shady lanes, and with thoughts directed in sweet and kindly tones, and words matured to acts of benevolence, to deeds of virtue, and to the source of all good, to God himself."

Books Received.

The Canadian Parliamentary Companion for 1876.—Edited by Henry J. Morgan, 11th Edition. This welcome directory comes to hand this year, with additions which will render it more useful than ever. It is compiled with great care from latest information. The book is now read in all parts of the Dominion, and in nearly every portion of the British Empire, and is everywhere regarded as an authority on Canadian affairs.

HOW TO WRITE LETTERS.—We have to thank Messrs. Sower, Potts & Co., 530, Market St., Philadelphia, for sending us this useful little volume. It is not the usual letter-writer's guide, offering silly and impossible models for beginners and others in epistolary difficulties, but shows how letters should be written, and addressed, and systematically presents such facts forms, laws, and usages as are supposed to be essential to good letter writing :—to use the words of the prospectus :

"HOW TO WRITE LETTERS" has a three-fold purpose ; first, to serve as a Text Book for the use of schools—auxiliary to the study of Language and Literature, and to a practical business course ; secondly, to assist private learners—those who are anxious to improve in letter writing but are unable or unwilling to avail themselves of the help of a living teacher ; thirdly, to supply an authoritative work to which persons of all classes, occupations, and professions may resort for information, in regard to the many perplexing questions concerning epistolary art and propriety, which are constantly occurring to every one in the exigencies of life.

In accordance with the *first part* of this design, the main subject, as well as each subordinate subject, has been developed from a central idea, carefully outlined and treated by the topical method, the whole being abundantly illustrated and utilized by appropriate models and exercises ; in accordance with the *second part* of the plan, every part of the subject has been explained so minutely as to leave no important point obscure or doubtful ; and according to the *third part*, the work has been made to cover a wide field—sometimes, perhaps, going beyond the strict requirements of the subject—and much supplemental matter of general interest has been added, concerning orthography, punctuation, titles, forms of address and salutation—American and English—, postal information, etc., constituting the whole of Parts II and III.

Sower, Potts & Co., have also recently published a work on *Child's Literature, Language Lessons, Object Lessons and Composition*, entitled—*Literature for little Folks*, by *Elizabeth Lloyd*. Price in Boards, 50 cents. Cloth, 75 cents.

This little volume is filled with sacred precepts and lessons in beauty, truth, refinement and culture, made so interesting and enticing that children and teachers will hail it with delight. Children in their Second Reader, whose time becomes tedious when not pleasantly occupied, will find this to just fit in and supply their needs. It contains the gems of sacred and child's literature, easy words and sentence lessons in composition, and object lessons from pictures. It instils literary taste, the use of correct and refined language, knowledge of authorship and habits of memory, observation and quick perception. The plan of the work is original and delightful.

FRŒBEL'S KINDERGARTEN OCCUPATIONS.—We have received from Mr. E. Steiger, 22 and 24 Franklin St., New-York. *Frœbel and the Kindergarten system of Elementary Education* by Joseph Payne. *Hoffman's Kindergarten Toys and how to use them*, several tracts, and foom numbers of *Kindergarten Occupations*. These last are among what are called gifts in this very natural system of education for very young children. The first number relates to *Sticks for Stick-laying*. This Gift consists of thin wooden Sticks, about 13 inches long, to be cut into various lengths by the teacher or pupil, as occasion may require. These Sticks, like most of the previous Gifts, are designed to teach numerical proportions and forms. Stick-laying is an excellent preparation for *drawing*. The Multiplication Table is *practically* taught by means of this Gift. Reading, according to the *phonetic* method, is taught by imitating with these Sticks the letters of the Alphabet. In the same way the Roman and Arabic numerals are taught previous to instruction in writing.

500 assorted Sticks, 1, 2, 3, 4, and 5 inches long, and 265 Designs on 12 plates, in a strong Paper Box, with chromolithographed Cover. 75 cents.

The second number relates to *Drawing on Slates and Paper*. The material used is, first, *Slates* grooved in squares, next, *Paper* ruled in squares. This method of beginning drawing is the most systematic and perfect ever invented for young children. It is interesting to note how rapidly, by it, even the youngest pupils advance.

1 Slate, 6½ by 8¼ inches, grooved in squares ¼ inch wide, on one side, with narrow frame, rounded corners ; 3 slate pencils, and 95 Designs on 12 plates, in a strong Paper Box, with chromo-lithographed Cover. 75 cents.

The third number furnishes the child with material for Perforating or Pricking designs on paper. The instruments are a pad or cushion made expressly, a perforating needle, which is furnished with a proper handle, dotted designs, and paper sheets. The paper is placed on the cushion, the design is placed over it and then the child is taught to prick it out with the needle by perforating the dotted lines of the design. The results are both instructive and amusing.

2 Perforating-Needles, 1 Perforating-Cushion, 1 Package of 20 leaves of paper, ruled in squares on one side, and 93 Designs on 12 plates, in a strong Paper Box, with chromo lithographed Cover. 75 cents.

The fourth number relates to *Weaving Paper*. Strips of colored paper are, by means of a steel, brass, or wooden needle of peculiar contruction, woven into another (differently-colored) leaf of paper, which is cut into strips throughout its entire surface, except that a margin is left at each end to keep the strips in their places. A very great variety of designs is thus produced, and the inventive powers of teacher and pupil are constantly stimulated.

1 Steel Weaving-Needle, 20 Mats of assorted colors and widths, with corresponding strips, and 60 Designs on 12 plates, in a strong Paper Box, with chromo-lithographed Cover, 75 cents.

These *Kindergarten Occupations* are a proper substitute for toys, dolls, and the like. They combine pleasure with instruction, engaging the attention of children when at home—during vacation, inclement weather, sickness, etc. While in an enchanting way keeping children to themselves, busy, contented, and quiet, these *Occupations* are invaluable as a first means of acquiring manual skill, artistic taste, and a love of study. We can recommend them to all schools where there are very young children, and for home use they will be found invaluable, combining as they do both instruction and amusement. Mr. Steiger will please accept our thanks for the same.

The Canada Educational Directory, by Alex. Marling LL. B., chief Clerk Education Dept. Ontario. Our thanks are due to the Publishers Messrs. Hunter, Rose & Co., for this book. It will be found a useful book of reference on educational matters in general throughout the Dominion, although very meagre information is given about some of the principal Educational Establishments of the Province of Quebec. The changes in the management of the Ministry of Public Instruction and in the Council of Public Instruction, Quebec, are not given ; this may be owing to their having been gazetted too late for insertion in the Directory.

We have also to acknowledge with thanks the receipt of the following documents.

Thirty first annual Report of the Commissioners of Public Schools Rhode Island.

Twenty sixth Report of the Commissioners of the Public Schools. State of Missouri.

Twenty ninth Report of the Commissioners of the Public Schools New Hampshire.

School Report of the Commissioners of the Public Schools, Virginia 1875.

Report of Supt. of Education. Alabama, 1875.

Thirty ninth Annual Report, Board of Education. Massachusetts.

Reports of State Board and Supt. of Public Instruction. New Jersey.

Circular of Information No. 5. Washington.

Annual Report, Supt. of Schools Burlington.

Biennial Report of Supt of Public Instruction. Colorado.

Annual Report Board of Education. Ithaca.

Annual Report Ontario Schools of Agriculture.

The Public Schools of Rochester.

Forty seventh Annual report on Public Schools of Baltimore

Semi Annual Circular, No. 2, from Chief Supt. Education. Fredericton N. B.

Twentieth Annual Report of the Board of St. Louis Public Schools.

Wanted

For School section No. 2, Municipality of Grand Grève, Gaspé Bay, a Teacher with an Elementary School Diploma, able to teach both French and English. Salary : One hundred and sixty dollars. For further particulars apply to

CHARLES ESNOUF,

Secty.-Treasurer,
Grand Grève, Co. Gaspé.

ABSTRACT FOR THE MONTH OF MARCH, 1876.

OF TRI-HOURLY METEOROLOGICAL OBSERVATIONS TAKEN AT McGILL COLLEGE OBSERVATORY. HEIGHT ABOVE SEA LEVEL, 187 FEET.

Day.	Thermometer. Mean.	Max.	Min.	Range.	* Barometer. Mean.	§ Max.	§ Min.	Range.	†Mean Pressure of Vapour.	‡ Mean Relative Humidity.	Wind. General direction	Mean Velocity in m. p. hour.	Sky Clouded in Tenths. Mean.	Max.	Min.	* Rain and Snow Melted.	Day.
1	23.26	26.0	21.1	4.9	30.1104	30.184	30.060	.124	.0965	78.0	W.	13.1	9.9	10	9	0.30	1
2	21.09	26.7	14.5	12.2	30.1320	29.212	30.064	.148	.0886	77.5	N. E.	6.9	8.6	10	0	Inapp.	2
3	16.47	25.1	9.0	16.1	30.2324	30.282	30.201	.081	.0566	60 6	W.	13.9	0.4	2	0		3
4	23.35	32.0	14.2	17.8	30.3082	30.354	30.266	.088	.0912	73.4	S. W.	15.0	4.1	10	0		4
Sunday 5		38.0	18.1	19.9							S. W.	13.7				0.01	5 Sunday
6	40.70	42.2	35 3	6.9	30.0691	30.165	29.970	.195	.2259	88 7	S. W.	18.5	10.0	10	10	0.02	6
7	41.31	52.0	32.5	19 5	29.8204	29.975	29.688	.287	.2142	82.9	S.	13.0	9.9	10	9	0.18	7
8	33.06	37.9	28.3	9.6	29.7520	29.993	29.620	.373	.1662	87.2	W.	15.0	10.0	10	10	0.24	8
9	23.62	30.0	20.3	9.7	30.1411	30.188	30.056	.132	.0926	73.2	N.	5.9	6.9	10	1		9
10	22.70	25.8	18.0	7.8	30.2497	30.324	30.185	.139	.0794	75.5	N. E.	11.2	8.9	10	1		10
11	30.91	37.0	22.1	14.9	30.2402	30.318	30.123	.195	.1509	74 4	E.	12.4	6.6	4	0		11
Sunday 12		38.5	32.9	5.6							S. E.	20.7					12 Sunday
13	24.21	36.8	4.3	32.3	29.8136	30.059	29.688	.371	.1320	86.9	S. W.	25.3	8.7	10	2	0.30	13
14	7.76	14.8	2.4	12.4	30.2792	30.380	30.150	.230	.0387	62.1	W.	26.2	1 0	10	0		14
15	12.42	23 0	1.8	21.2	30.4337	30.468	30.398	.070	.0495	62.5	N. W	19.0	0.0	10	0		15
16	12.85	20.0	5.5	14.5	30.1401	30.452	29.621	.831	.0549	67.0	N. E.	14.7	5.0	10	0	0.60	16
17	19.16	20.6	16.6	4.0	29.4177	29.543	29.355	.188	.0971	93.5	N. E.	14.0	10.0	10	10	0.80	17
18	8.87	17.5	3.0	14.5	29 8050	30.048	29.544	.504	.0435	66 1	N. W.	17.5	5.1	10	0	0.03	18
Sunday 19		21.0	3.6	24.6							W.	22.3					19 Sunday
20	13.71	21.8	3.3	18.5	30.3075	30.446	29.962	.484	.0577	69.9	E.	9.3	7.5	10	0	0.15	20
21	23.72	25 0	19.1	6.9	29.5126	29.791	29.358	.433	.1219	96.1	N. E.	17.7	10.0	10	10	1.76	21
22	25.67	29.4	22.0	7.4	29.7077	29.979	29.495	.484	.1142	82.3	W.	19.9	10.0	10	10	0.07	22
23	25.10	33.8	16.9	16 9	30.0327	30.063	30.008	.055	.0956	73.5	S. W.	16.1	2.5	10	0		23
24	26.67	34.8	19.1	15 7	30.2232	30.272	30.089	.183	.0977	67.7	W.	9.5	0.2	10	0		24
25	24.40	30.0	14.8	15.2	30.0490	30.245	29.756	.489	.1175	85.5	E.	14.2	9.7	1	8	0.28	25
Sunday 26		38.2	28.3	9.9								11.3				0.16	26 Sunday
27	34.95	39.0	31.1	7.9	29 7200	29.800	29.666	.134	.1705	84.1	W.	18.0	9.9	10	8	0.02	27
28	30.71	35.0	27.3	7.7	29.8529	29.927	29.659	.268	.1355	79.4		15.8	9.6	10	9	0.10	28
29	33.14	41.8	27.6	14.2	29.3057	29.450	29.190	.260	.1637	86.1		20.6	8.7	10	5	0.27	29
30	30.24	37.0	26.1	10.9	29.5195	29.620	29.455	.165	.1172	70.7	S. W.	9.6			3		30
31	33.15	42.6	25.0	17.6	29.7137	29 863	29.645	.318	.1371	72.9	W.	19.0	9.0	10	4	Inapp.	31
Means......	24.56	31.39	17.96	13.43	29.9641			.277	.1107	76.9		15.46	711				

* Barometer readings reduced to sea-level and temperature of 32° Fahr. † Pressure of vapor in inches mercury. ‡ Humidity relative saturation, 100. Observed. Ten inches of snow is taken as esqual to one inch of water.

Mean temperature of month, 24,56. Mean of maxima and minima temperature, 24.67. Greatest heat was 52.0 on the 7st; greatest cold was 3.6 below zero on the 19th,—giving a range of temperature for the month of 55.6 degrees. Greatest range of the thermometer in one day was 32.5, on the 16th; least range was 4.9 degrees on the 1st. Mean range for the month was 13.4 degrees. Mean height of the barometer for was 29.9611. Highest reading was 30.468 on the 15th, lowest reading was 29.199, on the 29th—giving a range of 1.278 inches. Mean elastic force of vapor in the atmosphere was equal to .1107 inches of mercury. Mean relative humidity was 76. Maximum relative humidity was 99 on the 21st. Minimum relative humidity was 42on the 3th. Mean velocity of the wind was 15.6 miles per hour; Greatest mileage in one hour was 49 on the 19th. Greatest velocity was 52 m. p. h. on the 13th. Mean direction of the wind, West. Mean of sky clouded was 71 per cent.

Rain fell on 5 days. Snow fell on 17 days Rain or snow fell on 19days. Rainfall, 0.74 inches. Snow fall 45.6 inches. Total precipitation in inches of water was 5.30.

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