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On Teaching Natural Science in Schools.

By J. M. Wilson, M. A., F. G. S., F. R. A. S.

(*Continued.*)

It is time now to make some remarks on the introduction of science into practical school work. Every schoolmaster, and every one who looks at the subject of this Essay on its practical side, will wish to know exactly what the advocates of instruction in science want. Is it desired that science should be taught as a necessary subject to all boys through their whole education? or as an optional subject? How many hours a week ought to be given up to it? How can we spare them? What subjects ought to be taught? and how?

I will take these questions in order, and answer them to the best of my judgment; disclaiming, of course, entirely the position of spokesman for others. I will at once say that I do not think that science should be taught through the whole of a boy's education; we do not, I think, make our teaching in schools sufficiently progressive as it is; there is no difference between the subjects of the lower and higher teaching: in the Lower School and in the Sixth form, precisely the same things are done, if we except Greek composition. This is contrary to the judgment of many who have thought on the working of the system, and is contrary also to the system of the French and German schools. And science is one of those subjects which I would, on many grounds, not introduce into the lower part of the school at all, or at least only in a modified form, which will be explained hereafter. There, more arithmetic, more French, and some geometrical drawing might be taught with great advantage. Science should be introduced into a school beginning at the top, and going downwards gradually, to a point which will be indicated by experience. At this point it should be compulsory, and be necessarily learnt by a boy until he reaches the higher part of the school. Here Science may be made alternative with something else, and here also some small portion of classical work may be allowed to be commuted for further scientific work, such as chemical analysis, or higher physics and mathematics; and *vice versâ*: any of these being remitted on the understanding that the time so given is really devoted to some other study.

Then as to the time to be devoted to science. Two hours a week, with the same for preparation out of school, is the time given at Rugby, and is as much as I would wish to see the subject started with. I do not doubt however that ultimately it will be thought better to increase this, in the upper part of the school, to three or four hours a week. This seems too little to ask, and the advocates of science outside schools will disallow so petty a claim. But there is very little experience of the working of scientific teaching in great schools; there is at present so slight a recognition of science in schools on the part of the Universities, that any public school which gave up much time to science, would be hopelessly out of the race at the Universities. And this would be suicidal. If the reform is on sound principles, let science gain a footing only, and a friendly struggle for existence will point out whether the foreigner can be naturalised, and flourish.

Next as to the part of science to be taught, and the methods of teaching; and the discussion of these must be given at some length.

It is important to distinguish at once, and clearly, between *scientific information* and *training in science.* "In other words," to quote from the Report of the Committee appointed by the Council of the British Association to consider the best means for promoting Scientific Education in Schools, " between general literary acquaintance with scientific facts, and the more minute and accurate knowledge that may be gained by studying the facts and methods at first hand, under the guidance of a competent teacher. Both of those are valuable; it is very desirable, for example, that boys should have some general information about the ordinary phenomena of nature, such as the simple facts of Astronomy, of Geology, of Physical Geography, and of elementary Physiology. On the other hand, the scientific habit of mind, which is the principal benefit resulting from scientific training, and which is of incalculable value, whatever be the pursuits of after life, can better be attained by a thorough knowledge of the facts and principles of one science, than by a general acquaintance with what has been said or written about many. Both of these should co-exist, we think, at any school which professes to offer the highest liberal education."

With these remarks I need hardly say that I most heartily concur.

There may be used in the lower part of the school, some work on Physical Geography, embracing the elements of the subjects above-named; and it will be found extremely convenient to introduce short courses of lectures on such subjects as these, even in the higher parts of the school. For since new boys are perpetually coming, and it is impossible that a new course of lectures on Botany, or on Mechanics, should be started in every division of the school at the beginning of every term, without requiring the number of natural science masters to be almost indefinitely increased, there must be some collecting place, a class in which the new boys shall accumulate until they are numerous enough to form a body to enter on the regular course. This must be a class in which physical Geography, including, if the master likes, the elements of Geology and Astronomy, is taught. In such classes as these the ideas of boys are expanded; fresh books are opened to them; and some will avail themselves of the opening, and learn a good deal about the subjects spoken of: but the value is more literary than scientific; and even after the most careful teaching will be found disappointing. In lecturing on such subjects as Geology, Astronomy, or Physical Geography, the master never can be sure that the ideas he has so clearly in his own mind are seized by all his boys. There seems to be a deficiency in powers of conception on the part of very many boys. Theorists may say what they please, but it is true that the act of the mind in forming a conception is difficult to excite. There is a marvellous, truly marvellous, want of imagination in many minds, a want of power to form and keep in view a distinct image of the thing reasoned or spoken about. It is not only want of attention, but there seems to be a total separation in some minds between words and things, perhaps the result, in part, of early teaching; so that the knowledge apparently gained is sometimes wholly unsound. I will instance what I mean. I once gave three lectures on coal, in such a course of Geology. During those three lectures, every individual in the class handled and examined some scores of specimens, to illustrate the vegetable origin of coal; no part of the subject was left unillustrated. One, however, in an examination paper, in reply to a question about coal, answered exactly as follows: "Coal is supposed by some persons to be a kind of inflammable substance, and must therefore be classed among the igneous rocks." And another once told me that nummulitic limestone (after handling and examining it), was made by little fishes, who lived in the limestone and carried limestone to the mountains from the sea; and answers that show the same total want of conception are common. So it will be seen that something else is meant when men of science and writers on education urge, that instruction in science should form part of all liberal education.

The mental training to be got from the study of science is the main reason for its introduction into schools. It is with reference to this that the subjects of instruction, and the methods of instruction, must be chosen. It is important, therefore, that what is meant by *mental training* should be distinctly understood. Training is the cultivation bestowed on any set of faculties with the object of developing them. It is possible to train the body, and to train the mind, for a great variety of purposes, some very foolish ones. But in all cases the training consists in *doing*. If you wish to swim, you must go into the water and swim as best you can: if you wish to box, there is no way of learning but by boxing: if you wish to study music or drawing, you must play and sing or draw: and thus in educating others you must make them *do* whatever you intend them to learn to do, and select subjects and circumstances in which *doing* is most facilitated. Now, laying aside out of consideration the mere accumulation of statistical information, and all kinds of education except intellectual, it is clear that this ultimately divides itself into the training of the artistic and logical faculties. And the logical faculties are of two kinds. It is by a logical faculty that we are able to understand other men's thoughts and apprehend new ideas. The cultivated, intelligent, imaginative mind is one in which this receptive faculty is strong. Nothing so marks the uneducated man as his dulness, his incapacity, in understanding what you say to him, if you depart in the slightest degree from the range of his daily thoughts. For the ordinary intercourse of men of education, for the spread and fertility of active thought, this facility of intelligence is invaluable. Again, it is by a logical faculty that the mind deals with things and the relations of things. The mind which is thoughtful rather than receptive or imaginative, which studies phenomena, be they in mental philosophy, in politics, or in natural science, with a view to elicit and establish the true relations that exist among these phenomena, is the type of the mind in which the logical faculty of investigation is well trained. Nothing so marks the imperfectly educated man as his helplessness when dealing with facts instead of men, and his insecurity both in arriving at truth from them, and in judging of the validity of the conclusions of others. For the advance of thought, on all subjects which require thought, this faculty of investigation is indispensable. Probably no study will cultivate one of these faculties and wholly neglect the others, but all studies aim principally at one or other of these. A study of the classical languages, for example, is an artistic exercise, and moreover it educates the receptive faculties in a manner in which no other study educates them. The study of a language and literature not our own is the best preparation for entering into the thoughts of others; but even when best taught and best learned it can only be a very imperfect exercise in logic, for it omits nearly the whole of the logic of induction. The study of science, on the other hand, while not without its influence on even the artistic powers, and exercising in a remarkable degree the powers of intelligence of a certain kind, deals mainly with the faculty of investigation, and trains the mind to ponder and reflect on the significance of facts. And the methods of these studies are in many respects precisely the same. Models and exercises are given by the one; models and exercises by the other. Thucydides must be read, and Latin prose must be written, by the student of form and style; and the man who would cultivate his powers of thought must read his Newton, and study Experimental Physics. And as the student of Thucydides and Plato is likely to gain in clearness and brilliance of expression, and an insight into history and humanity, in intelligent and ready apprehension of the thoughts of others, in versatility, and in polish; so the student of natural science is likely to bring with him to the study of philosophy, or politics, or business, or his profession, whatever it may be, a more active and original mind, a sounder judgment and a clearer head, in consequence of his study. A good style perhaps may be got by reading and writing; thinking is learnt by thinking. And therefore that method of giving scientific instruction is best which most stimulates *thought*; and those subjects which afford the best method ought to be selected for instruction in schools.

Now there are two different methods of teaching science: one, the method of investigation; the other, the method of authority. The first starts with the concrete and works up the abstract; starts with facts and ends with laws: begins with the known, and proceeds to the unknown; the second starts with what we call the principles of the science; announces laws and includes the facts under them: declares the unknown and applies it to the known. The first demands faith, the second criticism. Of the two, the latter is the easier, and the former by far the better. But the latter is seen in most text-books, and is the method on which many unscientific people ground their disposal of science. What this former method is, and why it is the better, will be seen by the following remarks.

In the first place, then, *knowledge must precede science:* for science is nothing else but systematized experience and knowledge. In its extreme applications this principle is obvious enough: it would be absurd to teach boys classification from minerals, or the power of experimental science by an investigation into the organic bases. A certain broad array of facts must pre-exist before scientific methods can applied. (1) This order cannot be reversed. And this is illustrated by the profound analogy that exists between the growth of scientific knowledge in an individual and in the world. Generation after generation of facts; and then there sprang up in the world the uncontrollable desire to ascertain the sequences in nature, and to penetrate to the deep-lying principles of natural philosophy. And the same desire is based in the individual on the same kind of experience. Where there is wide knowledge of facts, science of some kind is sure to spring up. After centuries of experience the *Philosophiæ naturalis principia* were published.

And, secondly, this knowledge must be homogeneous with pre-existing knowledge. It is of no use to supply purely foreign facts; they must be such as the learner already knows something of, or be so similar in kind that his knowledge of them is equally secure: such that he can piece them in with his own fragmentary but widening experience. It is to his existing knowledge, and to that alone, you must dig down to get a sure foundation. And the facts of your science must reach continuously down, and rest securely thereon. Hence the master's business is to take up the knowledge that already exists; to systematize and arrange it; to give it extension here, and accuracy there; to connect scraps of knowledge that seemed isolated; to point out where progress is stopped by ignorance of facts; and to show how to remedy the ignorance. Rapidly knowledge crystallizes round a solid nucleus: and anything the master gives that is suited to the existing knowledge is absorbed and assimilated into the growing mass: and if he is unwise and impatient enough (as I have been scores of times) to say something which is to him perhaps a truth most vivid and suggestive, but for which his boys are unripe, he will see them, if they are really well trained, reject it as the cock despised the diamond among the barley (and the cock was quite right), or still worse, less wise than the cock, swallow it whole as a dead and choking formula.

On these grounds then, in addition to other obvious ones, Botany and Experimental Physics claim to be the standard subjects for scientific teaching at schools. In both there pre-exists some solid and familiar knowledge. Both can so be taught as to make the learner advance from the known to the unknown—from his observations and experiments to his generalisations and laws, and ascend by continuous steps from induction to induction, and never once feel that he is carried away by a stream of words, and is reasoning about words rather than things. The logical processes they involve are admirable and complete illustrations of universal logic, and yet are not too difficult. These considerations mark the inferiority, in this respect, of Geology and Physiology, in which the doctrines must far outrun the facts at a boy's command, and which require so much knowledge before the doctrines can be seen to be well founded. And these considerations exclude Chemistry, as an elementary subject at least, since there is so little pre-existing knowledge in the learner's mind on which the foundations can be laid. On all grounds the teaching of chemistry should follow that of Experimental Physics. To this point, however, I shall have again occasion to refer.

Unless this method of investigation is followed, the teaching of science may degenerate, with an amazing rapidity, into cramming. To be crammed is to have words and formulæ given before the ideas and laws are realized. Geology and Chemistry are frightfully crammable. But Botany and Experimental Physics are by no means so easy to cram. What they might become with bad text-books and a bad teacher I cannot, indeed, say; but it is a very important consideration. For it is possible to teach even Botany and Experimental Physics with exquisite perverseness, so as to deprive them of all their singular advantages as subjects for elementary training in science. It is possible to compel the learning the names of the parts of a flower before the condition of existence of a name, viz. that it is seen to be wanted, is fulfilled: to cumber the learner with a terminology that is unspeakably repulsive when given too soon; given before the induction which justifies the name has been gone through; to give the principles of classification before a sufficient acquaintance with species has called out the ideas of resemblance and difference, and has shown the necessity of classification; to give theories of typical form when it seems a wild and grotesque romance; to teach, in fact, by the method of authority. And this may be done by truly scientific men, fully believing that this is the true and only method. Witness Adrien de Jussieu's "Botanique."

The true method is assuredly to begin by widening for your boys the basis of facts, and instantly to note uniformities of a low order, and let them hazard a few generalizations. The boys will far outrun their master. Their tendency to make the generalizations of the most astounding kind is both amusing and instructive; it constantly reminds me of the ancient Greek Philosophy; it is the proof that there is both the power to be trained, and a need of training. A theory is necessary to observation. Make them verify, and expurgate, and prune, and, if need be, reject their theories by a constant appeal to facts; sympathise with them in their search for truth, and so search for more facts and more accurate observation; and thus the crystal pyramid of their science grows, its base ever widening, its summit ever rising.

(*To be continued.*)

(1) This truth has been entirely lost sight of in teaching elementary geometry. The extreme repulsiveness of Euclid to almost every boy is a complete proof, if indeed other proofs were wanting, that the ordinary methods of studying geometry in use at preparatory and public schools are wholly erroneous. To this I can do no more than allude here, as being my conviction after considerable experience,—a conviction which has overcome every possible prejudice to the contrary. It is much to be hoped that before long the teaching of practical geometry will precede the teaching of the science of geometry.

Prize Essay on Teaching Elementary Geography.

(*Continued.*)

First Lesson.—The picture before you is a map of the whole world. The reason it is in two parts is: the earth is round and we can see but one half of a round ball at a time. *This* half, (pointing to the map,) is a drawing of one view of the round world, then we turn it, as it were, to see the other half, and draw it out too.

The half to the right is called the Eastern Hemisphere, the other the Western Hemisphere. The map shows us how the land and water are spread over the surface of the globe, and the shapes they are of. The coloured parts are the land and the parts without colour the water. It is quite evident that much more of the surface of the globe is covered with water than with land. The printed words across the map are the names by which different parts of the land and water are known. The names in the largest print are those of the continents and oceans. Europe, Asia, Africa, and America are the continents. The first three are together and are called the Old World; America is by itself and is called the new world; called new, because not much known till some years ago.

In one of the islands of Europe we live. Europe is the smallest of the continents, but it contains the greatest nations in the world—nations which hold in subjection the people of many distant lands. In this continent live the British, French, Russian, and other mighty nations you may have heard of.

Asia is joined to Europe and is the largest of the continents. It is the place where Adam and Eve lived, where Noah was saved in the flood, and where Abraham lived and died. On its right hand side is the oldest nation in the world, China, where we get tea; and on its left hand side lived the Jews in a small country, around their sacred city Jerusalem.

Africa, the continent next to Europe as you travel downwards, is very little known to us from the great heat of the sun there, and the great extent of it away from the reach of ships. In Africa live the Blacks, with the flat noses and thick lips, you sometimes see. Over a large part of it rain never falls. It is there covered with sand and can only be traversed by the camel. It is still so little known that several travellers have gone there from these countries to find out what sort of a place the middle of it is, and what sort of people inhabit it.

America was found out by the great Christopher Columbus nearly 400 years ago. It is the place where most people go who emigrate from Ireland. There are few people in this country who have not relatives there. America, for its size, has not many people. Good land my be had in many parts for almost nothing. America supplies Europe with many things: cotton, Indian corn, and other products.

Geographical Terms.—Continents are the largest divisions of land, and *contain* several countries. They are Europe, Asia, Africa, and America.

Islands are lands surrounded by water; as Ireland, Newfoundland, Ceylon.

Peninsulas are lands *almost* surrounded by water; as the Mullet in Mayo, Denmark, South America.

Isthmuses are *necks* of land joining peninsulas to mainlands; as Corinth, Suez, Darien.

Capes are points of land, generally the ends of countries or islands, stretching into the sea; Mizen Head, Land's End, Cape of Good Hope.

Shore or Coast is land bordering on the sea, often waste sand and rocks.

Mountains are portions of land suddenly rising above the level country. If not much elevated they are called *hills*. Mountains are generally found together in ranges for many miles; as the Wicklow mountains, the Alps, the Andes. Volcanoes are mountains which throw out smoke, flames, and melted matter from the interior of the earth, through an opening at top.

Plains are portions of countries flat, or nearly so; as the Curragh of Kildare, the Steppes of Russia, the Prairies of America.

Valleys are lands lying between mountains or hills; as Glendalough in Wicklow.

Deserts are barren plains or wastes generally covered with sand; as the Sahara in Africa.

Oases are fertiles spots in a desert; as Fezzan.

Prominent Facts.—Three fourths of the land on the surface of the earth are in the northern hemisphere, and one-fourth in the southern.

The great continents taper towards the south, and are wide on the north.

Three-fifths of the Old World consist of high table lands. The New World is for the most part covered by low-lying plains and valleys.

It may by said that the chains of mountains in the Old World extend from east to west, with *short* slope to south, and *long* slope to north. In the New World great chains run generally north and south, with short slope to west, and long to east.

Mountains are not so high in appearance as they are tabulated. Their height is given from the level of the sea, thereby including the elevated levels from which they in almost all cases rise.

Highest mountain in the world, Mount Everest, five miles high nearly.

Greatest depth of the ocean, about nine (?) miles.

WATER.

Oceans are the largest divisions of water; as the Pacific, Atlantic.

Seas are smaller than oceans but still large, and are more confined by land; as the Irish Sea, the Black Sea. (1)

Lakes are portions of water, generally fresh, entirely surrounded by land; as Lough Neagh, Lake Superior. Some lakes are salt and generally take the name of sea.

Straits are narrow passages of water which join other bodies of water together; as the Straits of Dover, connecting the German Ocean with the British Channel.

If a strait is wide it is called a channel.

Rivers are waters flowing over the land, and forming its natural drainage; as the Shannon, the Liffey.

Where a river begins is called its *source*; where it ends its *mouth*; its *course* is its entire length. A river flowing into another is called a *tributary*; where they meet their *confluence*; the *channel*, the hollow formed in the earth by the rush of its waters.

Basin, extent of country drained by a river.

Watershed high land or ridge separating two *basins*.

Interesting Facts.—The terms *ocean* and *sea* are used in reference to the whole body of water on the earth's surface. The bed of the ocean consists of mountains, valleys, and vast plains. In many places it is so deep it cannot be sounded.

The Pacific (*peaceful*) is the largest ocean. It is 9,000 miles long, and 12,000 miles wide.

The Atlantic (Mount *Atlas*) is the same length as the Pacific, but only one-third of its width.

The Indian Ocean lies about *India*. It is 6,000 miles each way.

The Arctic is *said* to extend to the North Pole, and the Antarctic to the South Pole. Not much is known of their dimensions.

(The pupil is directed to the observation of the river, hill, or mountain, lake, or valley, in his locality, in the manner laid down in the introduction.)

ARTIFICIAL DIVISIONS.—(This lesson may be omitted at present.)

The Equator is a circle round the middle of the earth, half way between the poles. All places on the world are north of this circle, south of it, or on it. Latitude a distance north or south from the Equator. There are 90° from the Equator to the poles. No place can have more than 90° of latitude. A degree is $69\frac{1}{16}$ miles.

Meridians are lines drawn through any place from pole to pole, (meridian is a word meaning mid-day). The meridian of any place intersecting the line showing its latitude marks the position of that place.

One meridian must be fixed on, to measure from. That chosen by us is the meridian of London (Greenwich). (2)

As the earth turns round towards the east, places in that direction have the sun over their heads sooner than we: that is, they have sunrise and mid-day earlier. 15 degrees of longitude make a difference of one hour in time. In our latitude *ten miles* make a difference of one minute.

The sun is overhead to all countries of the world as far as $23\frac{1}{2}$ degrees north, and to the same distance south, from the equator. Circles through these points are called tropics, (Cancer north, Capricorn south); and circles at same distance from the poles are called polar circles. These are the four great circles of latitude.

(1) A cluster of islands in a sea or ocean, is often called an archipelago.

(2) An idea of longitude may be obtained from an umbrella when opened out: the widest part of the umbrella representing the middle of the earth, or the place of the Equator, the ribs the lines of longitude.

ZONES.

These four circles divide the earth into five zones: one torrid, two temperate, and two frigid.

The torrid zone, about 3,200 miles across, reaches from the tropic of Cancer north, to the tropic of Capricorn south. For some part of the year the sun is directly over the inhabitants of every part of this zone; the heat is intense. There is no winter here. The days and nights are nearly equal all the year round.

The north temperate zone, 3,000 miles in breadth, extends from the tropic of Cancer to the Arctic Circle. The sun is never directly overhead, and the heat is not so great as in the torrid zone. Nearly all Europe is in this zone.

The north frigid zone extends from the Arctic circle to the north pole, 1,600 miles. For a great part of the year the sun is hid from view: the cold is very great; snow and ice cover land and sea.

The south temperate zone, 3,000 miles across, extending from the tropic of Capricorn to the Antarctic circle, is for the most part similar in climate to the north temperate zone.

The south frigid zone is the remainder of the southern hemisphere. It corresponds in size and climate to the north frigid zone.

TEMPERATURE—(This lesson may be deferred.)

The equator is round the hottest part of the earth, as the sun is directly over it. The sun being the source of heat, climates become colder as they approach the poles, because the sun's rays do not fall *directly* outside the torrid zone, but in a *slanting* direction.

Temperature also depends on the *height* of a place above the sea level. A mountain three miles high brings us, even at the equator, to the regions of perpetual snow. The snow line gradually lowers till it meets the earth at the poles. In the latitude of Dublin a mountain scarcely a mile-and-a-half high, would have its summit crowned all the year with snow.

Currents in the ocean and currents in the air affect, in no slight degree, the climate of countries. Thus the hotter sea water of the torrid zone flows in a great current towards the west of Europe, and raises the temperature of these countries, by means of the heated air passing over them, and blowing in the prevailing direction westerly. Ireland is peculiarly favoured by the ocean current called the *Gulf Stream.*

In the torrid zone the east or trade wind blows all the year. The eastern sides of continents there are wet, the western dry. A south-west wind prevails in the north temperate zone, and a north-west wind in the south temperate, and consequently the west sides of continents and islands in these zones are wet.

The more equal temperature of the sea makes islands less variable as to heat and cold than large continents.

EUROPE.

Area $3\frac{3}{4}$ millions of square miles, $\frac{1}{11}$ of the land on the earth's surface.

Boundaries.—North by the Arctic Ocean, south by the Mediterranean and Black Seas, east by the Caspian Sea, Ural river and Ural mountains.

Europe has for its size the longest sea coast, 20,000 miles: much longer in proportion than the other continents. Only in East Russia are there any places more than 500 miles from the sea.

Seas.—White Sea, North Sea, Baltic Sea,—(very shallow, and as more fresh water enters it by rivers than is taken away by evaporation, it is not so salt as the ocean. In the Gulf of Bothnia the water is often used for domestic purposes. It is for this reason (its freshness) often frozen in the winter),—Irish Sea, English Channel, Mediterranean Sea (ten times the size of Great Britain. It receives a current from the Atlantic Ocean. It is salter than the ocean, as the fresh water poured into it by rivers is less than the quantity evaporated. It is a deep sea), Black Sea (sends a current into the Mediterranean, as it receives more fresh water than is evaporated. It is *fresher* than the ocean, and consequently often frozen in its northern parts during winter.

Gulfs.—Finland, Bothnia, and Riga in the Baltic, Cattegat and Skager Rack, Bay of Biscay, ("Biscay's Sleepless Bay," *Lord Byron* in allusion to the great swell of the Atlantic felt in it), Gulf of Genoa, Gulf of Corinth, (the town of Corinth near the gulf gave name to the fruit called currants.)

Straits.—Dover (chalk formation underneath), Gibraltar (inlet to the Mediterranean), Bonifacio, Messina, Dardanelles, Constantinople.

Peninsulas.—Spain and Portugal, (called the Iberian Peninsula), Italy, Turkey and Greece, Norway and Sweden, (called the Scandinavian Peninsula), Denmark.

Islands.—In the Atlantic the British Isles, in the Arctic Ocean, Spitzbergen and Nova Sembla; in the Baltic, Zealand, Funen, Gottland and Aland Isles; in the Mediterranean, Balearic Islands, Corsica (remarkable as the birth place of Napoleon I), Sardinia, Sicily, (formerly called the Granary of Europe.)

Mountains.—Alps, (highest point, Mont Blanc, 15,700 feet): Appennines in Italy; Balkan in Turkey; Dovrefield in Scandinavia; Caucasus, (highest point, Mount Elburz.) (1)

Capes.—North Capes, Nordkun (most northerly point of Europe), Nase, south of Norway, Land's End, west of England, Finisterre (end of the earth), Rosa, St. Vincent, Tarifa (most southerly point of Europe), Passaro in Sicily, Matapan in Greece.

Rivers.—Dvina into the Arctic Ocean; Neva, Dura, Vistula and Oder into the Baltic; Elbe and Rhine into the German Ocean; Seine, Loire, Garonne, Douro and Tagus into the Atlantic, (these all drain the north-west slope.) On the south-east slope, Ebro, Rhone, Po, into the Mediterranean; Danube and Dniester into the Black Sea; Don into the Sea of Azov; Volga into the Caspian Sea. (2)

Lakes.—The chief lakes of Europe are, near the Baltic, Ladoga, Onega, Wenner, Wetter, Malar. In the south, Geneva (Leman), Constance, Neuchatel in Switzerland; Maggiore, (greater), Como, Gardo in Italy.

Climate.—Europe, with the exception of a small portion, lies in the north temperate zone, and enjoys a climate free from the extremes of heat and cold. The western countries are warmer than the eastern, owing to the prevalence of westerly winds blowing from the equatorial regions, and felt in this latitude as coming from the west. There are three climates in Europe. The *southern* includes Spain, Portugal, South France, Italy, Turkey and Greece; these have a short winter and a long summer. The Middle countries have the four seasons distinct. The northern countries, in which the inhabitants have a short summer and a long winter.

Productions.—South; the sugar cane, cotton, orange, fig, vine, tobacco, rice, wheat, oak, chestnut.

Central; corn-fields and meadows, apples, pears, walnuts, and in some places the vine, oak, beech, fir.

Northern; wheat will not grow higher than the middle of Norway, and in the extreme north even the most hardy trees become stunted.

Minerals.—Iron, lead, copper, tin, gold and silver in small quantities, coal (abundantly in Great Britain and Belgium.)

Population 280,000,000, or one fourth of the human race. The most populous countries are Belgium and England.

Religions.—*Greek-Latins* in the south are chiefly Catholics. *Germans* in middle and west chiefly Protestants. Slavonians in the east and south chiefly Greek Church. (3)

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(1) A line from the Elbe to the Dniester divides the mountain regions of Europe from the great plain to the north-east.

(2) The Volga and Danube discharge nearly as much water into the sea as all the other rivers of Europe.

(3) A portion of the people of Turkey are Mahomedans. The people of Ireland and Scotland are Celtic for the most part.

COUNTRIES AND CAPITAL CITIES OF EUROPE.

British Isles.	*Sq. miles.*	*Chief town.*	*Built on.*
England	58,000	London	Thames
Scotland	30,000	Edinburgh	Frith of Forth
Ireland	32,000	Dublin	Liffey
Norway	Size of British Isles	Christiana	Christiana Bay
Sweden	5 times Ireland	Stockholm	Lake Malar
Denmark	⅜ of Ireland	Copenhagen	Sound
Russia	66 times Ireland	St. Petersburg	Neva
Prussia and North Germany		Berlin	Spree
Holland	Over ⅓ of Ireland	Amsterdam	Mouth of Rhine
Belgium	⅓ of Ireland	Brussels	
France	6½ times Ireland	Paris	Seine
Switzerland	½ of Ireland	Berne	Aar
South Germany			
Austria	9 times Ireland	Vienna	Danube
Spain	5½ times Ireland	Madrid	Manzanares
Portugal	1¼ times Ireland	Lisbon	Tagus
Italy	3½ times Ireland	Florence	Arno
Greece	⅝ of Ireland	Athens	Gulf of Egina
Turkey	6½ times Ireland	Constantinople	Bosphorus

(To be continued.)

The Angel and the Child.

TRANSLATED BY LONGFELLOW.

AN angel with a radiant face,
Above a cradle bent to look,
Seemed his own image there to trace,
As in the waters of a brook.

" Dear child ! who me resemblest so, "
It whispered, " Come, O come with me !
Happy together let us go,
The earth unworthy is of thee !

Here none to perfect bliss attain ;
The soul in pleasure suffering lies :
Joy hath an undertone of pain,
And even the happiest hours their sighs.

Fear doth at every portal knock ;
Never a day serene and pure
From the o'ershadowing tempest's shock
Hath made the morrow's dawn secure.

What, then, shall sorrows and shall fears
Come to disturb so pure a brow ?
And with the bitterness of tears
These eyes of azure troubled grow ?

Ah, no ! into the fields of space,
Away shalt thou escape with me ;
And Providence will grant thee grace
Of all the days that were to be.

Let no one in thy dwelling cower
In sombre vestments draped and veiled ;
But let them welcome thy last hour,
As thy first moments once they hailed.

Without a cloud be there each brow ;
There let the grave no shadow cast :
When one is pure as thou art now,
The fairest day is still the last."

Winter the Season for the Exercise of Charity.

BY ELIZA COOKE.

We know 'tis good that old winter should come,
Roving a while from his Lapland home ;
'Tis fitting that we should hear the sound
Of his reindeer sledge on the slippery ground.

For his wide and glittering cloak of snow
Protects the seeds of life below :
Beneath his mantle are nurtured and born,
The roots of the flowers—the germs of the corn.

The whistling tone of his pure strong breath
Rides purging the vapours of pestilent death ;
I love him, I say, and avow it again,
For God's wisdom and might show well in his train.

But the naked—the poor ! I know they quail,
With crouching limbs from the biting gale :
They pine and starve by the fireless hearth,
And weep as they gaze on the frost-bound earth.

Stand nobly, forth, ye rich of the land,
With kindly heart and bounteous hand ;
Remember 'tis now their season of need,
And a prayer for help is a call you must heed.

A few of thy blessings, a tithe of thy gold,
Will save the young and cherish the old ;
'Tis a glorious task to work such good ;
Do it, ye great ones ! Ye can and ye should.

He is not worthy to hold from heaven—
The trust reposed, the talents given,
Who will not add to the portion that's scant,
In the pinching hours of cold and want.

Oh ! listen in mercy ye sons of wealth,
Basking in comfort and glowing with health ;
Give whate'er ye can spare, and be sure,
He serveth his Maker who aideth the poor.

François-Xavier Garneau, Historian. (1)

As in some lofty mountain range there stands
One towering peak above surrounding forms,
Serene and grand, beyond the range of storms,
Which admiration from all eyes commands ;—
Whose sky-crowned summit, girt with shifting bands
Of light and shade, the gorgeous sunrise warms,
While on the heavens it carries its outline clear,
No rival owning, owning no compeer :—
So Garneau's name, among the many names,
By thee Canadia held so justly dear,
Conspicuous stands, and place of honour claims,
Exemplar fitting of exalted arms
And nobler purposes ; a household word
That long shall in our peaceful homes be heard.

The Solar Eclipse of 1870.

Astronomers are about to invite the government to assist those men of science who may wish to take part in observing the total solar eclipse of December next. It will be remembered that in 1860 the Himalaya was fitted out by government for use of the astronomers who observed the important total eclipse visible in that year in Spain, and the results which rewarded the expedition were among the most important which have ever been obtained from observations of eclipses. The eclipse of the present year wll also be visible in Spain, though the path of the sun's shadow lies farther south than in 1860. in fact, the shadow's southern limit passes beyond Cape St. Vincent thence to Cape Spartel, and so across Algeria, afterwards passing northwards past Sicily towards Constantinople. The totality will not last so long as in the case of the Indian eclipse of 1868, nor even so long as in the case of last year's eclipse. For about two minutes and a quarter, on the line of central eclipse in Spain, the the sun will be totally hidden from view, and whatever is to be learned by the observers must be the result of the rapid scrutiny to which the neigbourhood of the eclipsed sun will be subjected during that brief interval. It might well be thought that observation lasting so short a time could scarcely be worth the expense and trouble which the proposed expedition will undoubtedly involve ; but in reality the most valuable result of recent researches into solar physics have been obtained from observations which may almost be described as momentary. The subject of solar physics has also become so full of interest of late, and the discussions in progress among men of science have reached so critical a stage, that astronomers may well be permitted to lay great stress on the results which they hope to obtain from observations to be made on the approaching occasion.

The great problem which they hope to solve is that suggested by the strange appearance called the solar corona. A glory of light surrounds the sun when totally eclipsed, which is, if some astronomers are right, a mere optical phenomenon, or if the views of others are correct, one of the most imposing of all the features presented by the solar system. Mr. Lockyer, adopting the opinion of Faye, who is supported, we believe, by our own Astronomer Royal, believes the corcna to be simply due to the solar glare which illumininates

(1) In Stewart's Quarterly for October last, under the title of " Distinguished Canadians," by Mr. Arthur Calnek, we find the foregoing stanza on one of Canada's Historians.

(according to this theory) our own atmosphere. Viewed in this way, the phenomenon is altogether unimportant and even uninteresting. The bright rays of light which are seen to stretch across a large part of the heavens when the sun is shining through clouds, might be as reasonably made the subject of careful study and scrutiny as the crown of light which surrounds the dark body of the moon in a total solar eclipse. But if the view be correct, if the corona be indeed a solar appendage, the mind is lost in contemplating the magnificent proportion of this object. We know that its light is often seen to extend several degrees from the eclipsed sun; and seldom has a less extent than the sun's own diameter. But the sun's diameter, is fully 850,000 miles, and therefore we must believe that at the very least the corona's diameter is two and a half millions of miles. If the corona be assumed, for convenience of computation, to be globe-shaped, its outer boundary would thus enclose a volume no less than 22 million times as large as this earth on which we live.

It is respecting the physical latitudes of this imposing object that astronomers wish to obtain information next December. The eclipse of 1868 gave certain results respecting the corona which were almost directly contradicted by those obtained by the American observers in 1869, and what astronomers have now to do, is not merely to determine which series of results may be the more correct, but to ascertain how and why it is that contradictory results should have been obtained. If they shall be able to determine what the corona really is, undoubtedly the discovery will take rank as among the most important of the many important discoveries which have been made respecting the sun during the past few years.—*London News.*

OFFICIAL NOTICES.

Ministry of Public Instruction.

APPOINTMENTS.

The Lieutenant-Governor, by an Order in Council, dated the 29th of October last, was pleased to appoint

M. l'Abbé Joseph Godin, Ordinary Professor, and

M. l'Abbé Napoléon Lemoyne, Prefect of Studies, in the Jacques-Cartier Normal School, Montreal.

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The Lieutenant-Governor,—in and by virtue of the powers conferred on him by 45th and 136th clauses of Chapter 15, Consolidated Statutes for Lower Canada,—by an Order in Council dated the 29th ult., was pleased to make the following appointments:—

SCHOOL COMMISSIONERS.

Ste. Dorothée (Haut du Bord de l'Eau), Co. of Laval.—M. Benjamin Lecavalier in the room and stead of M. Pierre Plouffe, and M. Joseph Bibau in the room and stead of himself;

Ile-aux-Grues, County of Montmagny.—MM. Louis Painchaud and Calixte Vézina in the room and stead of MM. Charles Vézina and Charles Thibault;

Ste. Catherine, County of Portneuf.—MM. Lawrence O'Connor and Charles L'Hérault in the room and stead of MM. Anthony Maher and Michel Quentin;

St Laurent, County of Montmorency.—M. Pierre Laprise, in the room and stead of M. Isidore Plante.

Métis, County of Rimouski.—Mr. William John Campbell in the room and stead of Mr. John McGugan, and Mr. George Simms in the room and stead of Mr. Gaven Crawford;—

SCHOOL TRUSTEES.

St. Urbain Premier, County of Chateauguay.—Mr. John B. McCuaig in the room and stead of Mr. John B. McLellan.

St. Octave de Métis, County of Rimouski.—Mr. Francis McNider in the room and stead of Mr. James Smith, and Mr. John Crawford in the room and stead of Mr. Alexander Craig.

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ANNEXATION TO SCHOOL MUNICIPALITY.

The Lieutenant-Governor,—in and by virtue of the powers conferred on him by the 30th clause of Chapter 15, Consolidated Statutes for Lower Canada,—by an Order in Council dated the 29th ult., was pleased

To annex, to the School Municipality of St. Epiphane, Co. of Témiscouata, the tract of land heretofore known under the name of the "Indian Reserve of Viger" (la Réserve des Sauvages de Viger), comprising lots 34 to 43 inclusive in Range A,—lots 34 to 49 inclusive in the First Range, and lots 34 to 50 inclusive in the Second Range.

DIPLOMAS GRANTED BY BOARDS OF EXAMINERS.

SHERBROOKE.

Session of November 1st, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Misses Hannah S. Hill, Frances E. Johnson, Messrs. Findlay McLellan and Alex. McDonald.

2nd Class.—Miss Maria E. Wood.

S. A. HURD, Secretary.

—

BEAUCE.

Session of November 3rd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E. and F.), *1st Class.*—Miss Agnès Labbé.

2nd Class (F).—Misses Eugénie Arcand and Catherine Vachon.

J. T. P. PROULX, Secretary.

—

MONTREAL (PROTESTANT).

Session of November 3rd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Misses Margaret A. Beattie, Jane Ann Brown, Jemima Cleland, Messrs. Alexander Tipping Hunter and John McArthur.

T. A. GIBSON, Secretary.

—

PONTIAC.

Session of August 2nd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Misses Elizabeth Anderson, Jeannie Sinclair, Messrs. Charles McKillup and Bernard E. McIver.

2nd Class.—Miss Elizabeth E. Fletcher.

Session of November 1st, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Miss Sarah Ann Jewell and Mr. Robert McDiarmid.

OVIDE LEBLANC, Secretary.

—

GASPÉ.

Session of November 3rd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Miss Jane Elizabeth Esnouf.

2nd Class.—Miss Alice Harriett Hamon.

PHILIP VIBERT, Jr., Secretary.

—

WATERLOO AND SWEETSBURG (PROTESTANT).

Session of November 2nd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class*—Messrs. George A. Davidson, John Wilkins, Misses Alice E. Hale and Mary J. Vipond.

2nd Class:—Misses Emily J. Armstrong, Ellen E. Baird, Mary A. Hurlbut, Lizzie Latimer, Emma Laraway, Marilla A. Teel, Lucy M. Teel.

WM. GIBSON, Secretary.

—

RICHMOND (PROTESTANT).

ELEMENTARY SCHOOL DIPLOMA (E), *1st Class.*—Misses Abbie A. Burbank, Alice Bothwell, and Mary E. Leith.

2nd Class:—Misses Mary J. Beard, Julia A. Beard, and Clementina Magar.

C. P. CLEVELAND, Secretary.

—

AYLMER.

Session of November 2nd, 1870.

ELEMENTARY SCHOOL DIPLOMA (E) *1st Class:*—Misses Margaret Lennon, Mary Robertson, Emma Sowter, and Mr. J. Thompson Morphy.

JOHN R. WOODS, Secretary.

THE JOURNAL OF EDUCATION.

QUEBEC, (PROVINCE OF QUEBEC) NOVEMBER, 1870.

Meteorological Returns.

Our readers will this month miss the presence of the customary meteorological returns for Quebec. Since March, 1868, these have been regularly contributed by Sergeant John Thurling, formerly of the Army Hospital Corps stationed at Quebec, but who now, we regret to say, has taken his departure from this Province in consequence of the recall of the troops. We considered his returns valuable as affording the means of comparison of the climate of Quebec with that of other parts of which records are published, and on other grounds to which it is needless to make special reference. Our readers will, we are sure, concur in our expression of regret and in our thanks for the past services as well as our good wishes in behalf of the future of Mr. Thurling.

Report of the Minister of Public Instruction for the Province of Quebec for the year 1868 and in part for 1869.

To His Excellency

SIR NARCISSE FORTUNAT BELLEAU, Knight,

Lieutenant-Governor of the Province of Quebec,—

I have the honour to submit to your Excellency my report on the state of Public Instruction for the year 1868 and in part for 1869.

In conformity with a recommendation of the Committee of both Houses, charged (previous to confederation) with the superintendence of printing, the report of last year was a *triennial* one,—containing the statistics of Schools by Municipalities, and the details of all the information collected respecting the Schools for Superior Education, as well as the reports of the School Inspectors,—that of this year will therefore present only a summary of the statistics.

The general statistics for the year 1868 shew an increase of 201 in the number of institutions, 4798 in the number of pupils, and $64,325 in the contributions, as may be seen from the following :—

TABLE of the Progress of Public Instruction in the Province of Quebec, since the year 1853.

—	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863
Institutions	2352	2795	2868	2919	2946	2995	3199	3264	3345	3501	3552
Scholars	108284	119733	127058	143141	148798	156872	168148	172155	180845	188635	193131
Contributions	$165848	$238032	$249136	$406764	$424208	$459396	$498436	$503859	$526219	$542728	$564810

TABLE of the Progress of Public Instruction in the Province of Quebec, &c.—*Continued.*

—	1864	1865	1866	1867	1868	Increase over 1853.	Increase over 1858.	Increase over 1866.	Increase over 1867.
Institutions	3604	3706	3826	3712	3913	1561	928	87	201
Scholars	196739	202648	206820	208030	212838	104544	55956	6008	4798
Contributions	$593964	$597448	$647067	$728494	$792819	$626971	$333423	$145752	$64325

The figures representing the number of pupils studying each branch comprised under Elementary Instruction, differ but slightly from those of the preceding year.

Comparative Table of the number of Scholars learning the most Essential Branches of Elementary Instruction.

	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	Increase over 1853.	Increase over 1858.	Increase over 1864.	Decrease compared with 1864.	Increase over 1867.
Scholars Reading well	27367	32861	43407	46940	48833	52099	64362	67753	75236	77108	77676	75555	96491	98706	101166	101212	73845	49113	25657	......	46
Do Writing	50072	47014	58033	60086	61943	65404	80152	81244	87115	92572	97086	99351	107161	111703	112191	112221	62149	46817	2870	......	30
Do learning Simple Rules of Arihtmetic	18281	22897	30631	48359	52845	55847	63514	63341	69519	74518	75719	14197	83930	84201	84544	85209	66928	29362	71012	......	665
Do learning Compound Rules	12428	18073	22586	23431	26643	28196	30919	31758	41812	44357	45727	46529	52892	53720	54660	54737	42309	26541	8208	......	77
Do learning Book-Keeping	....	799	1976	5012	5500	6689	7135	7319	9347	9614	9630	9615	10381	10430	10825	10852	10852	4163	1237	......	27
Do learning Geography	12185	13326	17700	30134	33606	37847	45393	49162	55071	56392	60585	66412	64718	64998	65616	65633	53448	27786	....	779	17
Do learning History	6738	11486	15520	17580	26147	42316	45997	46324	51095	54461	59024	66884	71153	71453	71965	71972	65234	29656	5078	......	7
Do learning French-Grammar	15353	17852	23260	29328	39067	43307	53452	54214	50426	61312	63913	68564	76097	66264	76996	77011	61658	33704	8447	......	15
Do learning English Grammar	7066	7097	9004	11824	12074	15348	19773	25073	27904	28464	27358	29428	30453	30648	31748	31808	24742	16460	2380	......	60
Do learning Grammatical Analysis	4412	9283	16439	26310	34064	40733	44466	46872	49460	50893	52244	60311	66237	66341	68172	68288	63816	27555	7977	......	116

The amount of scholastic contributions for 1868, as compared with 1867, shews a decrease of $17,924 in special and supplementary assessments, and $119 in ordinary assessment. It is to be remarked, however, that 1867 shewed a very considerable increase over 1866 in these two items, and that the amount for the year 1868 is still much larger than that for 1866.

TABLE of the sums levied for Public Instruction in the Province of Quebec, from 1856 to 1868.

Years.	Assessment to equal Grant.	Assessment over and above amount of Grant and special assessments.	Monthly fees.	Assessment for the erection of buildings.	Total levied.
	$ cts.	$ cts.	$ cts	$ cts.	$ cts.
1856....	113884 87	93897 90	173488 98	25493 80	406765 55
1857....	113887 08	78791 17	208602 37	22928 63	424209 25
1858....	115485 09	38372 69	231192 65	24646 22	450396 65
1859....	115792 51	109151 96	251408 44	22083 57	498436 48
1860....	114424 76	123939 64	249717 10	15778 23	503859 73
1861....	113969 29	130560 92	264089 11	17000 00	526219 82
1862....	110966 75	134083 15	281930 23	15798 84	542728 97
1863....	110534 25	134888 50	307638 14	11749 76	564810 65
1864....	112158 34	144515 61	321037 30	15553 12	597264 37
1865....	112447 09	147158 23	324801 87	13041 57	597448 76
1866....	113657 35	153732 98	356691 53	22985 32	637067 18
1867....	113909 64	196098 58	394068 37	24417 46	728494 05
1868....	113790 64	178174 02	452868 69	47986 17	792819 52

TABLE shewing the sources whence comes the difference of increase or decrease between 1. 1864 and 63; 2. 1865 and 1864; 3. 1866 and 1865; 4. 1867 and 1866; 5. 1868 and 1867:

—	—	—	—	—	Total increase.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Increase of 1864 over 1863............	1654 09	9127 11	13399 16	3803 36	28453 72
Increase of 1865 over 1864	288 75	2642 62	3768 17	....	....
Decrease of 1865 from 1864......... ...	....	....	....	2511 55	4144 39
Increase of 1866 over 1865............	1210 26	6574 70	31733 36	9943 75	49618 40
Increase of 1867 over 1866............	252 29	42365 84	37376 84	1434 14	81426 87
Increase of 1868 over 1867............	....	....	58800 32	23568 71	64325 47
Decrease of 1868 from 1867............	119 00	17924 56	....	....	....

The reports of the Principals of the Normal Schools for the scholastic year 1868-69 will be found immediately after my own. The progress of these institutions during the year, and since their first establishment, is exhibited in the following tables, the first shewing the number of Pupil-Teachers who have attended them, the second that of Diplomas granted. The number (1215) of the latter represents a larger figure than the actual number of Pupil-Teachers who received them, inasmuch as the same student, in many cases, studied for, and obtained, the Diplomas of the different classes.

TABLE of the number of Pupil-Teachers who have attended the Normal Schools.

Session.	Jacques-Cartier.	McGill.			Laval.			Total Males	Total Females	Total of both.
	Males	Males	Females	Total.	Males	Females	Total.			
1st Sess. 1857.	18	5	25	30	22	....	22	45	25	70
Sess. 1857-58.	46	7	63	70	36	40	76	89	103	192
Sess. 1858-59.	50	7	76	83	34	52	86	91	128	219
Sess. 1859-60.	53	9	72	81	40	54	94	102	126	228
Sess. 1860-61.	52	5	56	61	41	53	94	98	109	207
Sess. 1861-62	41	10	58	68	39	52	91	90	110	200
Sess. 1862-63.	57	8	72	80	39	52	91	104	124	228
Sess. 1863-64.	56	7	67	74	34	49	83	97	116	213
Sess. 1864-65.	56	5	60	65	43	55	98	104	115	219
Sess. 1865-66.	43	2	73	75	39	57	96	84	130	214
Sess. 1866-67.	35	2	73	75	43	55	98	80	128	208
Sess. 1867-68.	35	5	57	62	49	73	122	89	130	219
Sess. 1868-69.	36	4	70	74	64	73	137	104	143	247

(Concluded in next.)

Quebec Literary and Historical Society.

The opening of the session of 1870-71 took place, yesterday evening (16 inst.) in the apartments rented by the Society from the Morrin College. A large number of members and ladies attended. Prior to the delivery of the annual address by the President, Dr. Anderson, F. R. S., the company assembled in the Society's Library and Museum. The well arranged collection of specimens of Natural History was inspected with interest, conspicuous among them being the albatross recently presented to the Society by Dr Bligh. of London, a nephew of Dr. Marsden, one of the Vice-Presidents. This magnificent object was stuffed and mounted by Mr. L'Heureux. Its measurement across the back and extended wings is stated to be about eleven feet. Dr. Anderson's address was given in the Lecture Hall. Its chief purpose seemed to be to present a comprehensive review of the principal incidents of the past year, especially those of scientific and literary interest, and particularizing those in which the Society, through its members, had been concerned. In the introduction, the Royal Society of Great Britain was referred to, and the signal services of that body in promoting the advancement of useful knowledge and the best interests of humanity were happily illustrated. Allusion was made to the causes and circumstances attendant upon lamentable events in the past, such as the great plague and fire of 1666, and a comparison was instituted between the state of knowledge in those days and in the present time, when the means of averting or remedying appalling evils are so much more available. The learned President shewed that such results were mainly attributable to the beneficial operation and influence flowing from intercourse and interchange of thought, and experience between enlightened men belonging to associations like that cited above. Adverting to local events, the Doctor claimed for the Literary and Historical

Society of Quebec, in modest but appropriate terms, its just meed of commendation, for serving to encourage, sustain, and keep alive amongst ourselves, that same spirit which in a more widely extended sphere, had, during the past two hundred years, and with so much benefit to humanity, been cultivated by the Royal Society of Great Britain.

Allusion was made to the cholera in 1832 and 1834, the conflagrations at Quebec in 1845, the ship fever in 1847 and 1857, the Fenian raids of 1866 and 1870, the astronomical expedition under Captain Ashe, and the late march to the Red River Settlement accomplished by our troops and volunteers so successfully, in spite of extraordinary obstacles, without the loss of a man through disease, intemperance, or any other preventible cause; with all these, the direct or indirect connection of the Society, through its members, in a beneficial manner, was made clear.

In the course of his remarks the President alluded to the great changes which had occurred in men's views respecting matters affecting their social comfort and happiness, owing to the diffusion of useful knowledge and the now more prevalent recourse to the dictates of common sense. This, in part, he happily illus trated by referring to the past history of royal matrimonial alliances, and to the contemplated marriage of a young British nobleman with a daughter of Queen Victoria.

The discourse, which was enlivened by occasional quotations from the poets, was listened to throughout with marked attention.

At the close of the address, the chairman, Captain Ashe, made a few remarks, and took occasion to advert to the astronomical expedition of which the President had made mention. He also invited discussion and questions upon any of the topics which had been introduced in the address, setting the example himself by making an inquiry about the real nature of the plague of 1666. Dr. Anderson having replied, the Rev. Dr. Cook came forward and expressed his regret that he had not been present during the whole of the address, having been delayed by his official duties at a wedding celebrated the same evening. Dr. Cook's observations appeared to afford great pleasure, and much amusement was occasioned by his stating that he had just met a gentleman who had lately, (in Canada, we understood him to say) been present at seventeen marriages, which all took place at once, owing to a silly rumor that all unmarried young men were about to be summoned to the field in consequence of a war which had suddenly broken out between Great Britain and the United States.

A motion was made by Dr. Miles, seconded by H. S. Scott, Esq., for a vote of thanks to Dr. Anderson, for his able, instructive and interesting address. This was passed unanimously.

The chairmain announced that the next assembly would take place on Wednesday evening, the 23rd instant, when a paper would be read by the Rev. James Douglas. The audience then dispersed, evidently much gratified by the incidents of one of the most instructive and pleasant inaugural meetings of the Quebec Literary and Historical Society which it has ever been our lot to attend.

We take this opportunity of alluding to the fact that Dr. Anderson's presidency has hitherto been eminently successful. If it has proved so in a higher degree than that of some of his distinguished predecessors, it is because he has not looked upon his office as one of a merely or chiefly honorary nature, having at heart the substantial practical objects of the Society. Let us hope that he and his co-adjutors, the Vice-Presidents and Council, will find, during the coming winter, an encouraging appreciation, on the part of the community, of their endeavours to promote the fulfilment of the Society's proper functions; for the public at large is invited to attend these evening readings and meetings, free of charge, except on occasions when a paid lecturer's services are employed.—*Quebec Mercury.*

Want of space this month excludes acknowledgement of our usual exchanges.

The Province of Quebec and European Emigration.

This is a very useful pamphlet, (Published by order of the Government of Quebec) containing much information valuable to intending emigrants regarding the Province of Quebec. The number of acres available for the settlement in each of the different districts, the rate per acre at which the public lands may be bought, and the best mode which the emigrant can adopt when first taking up his abode in the Province, are all clearly stated. The pamphlet likewise contains a great deal of interesting matter regarding the social and public institutions of Quebec. The chapter relating to education is, of course, peculiarly interesting to us. It appears there are in the Province 3,468 primary schools, in which elementary education is given to 173,294 pupils, and 227 secondary and model schools, attended by 33,428 pupils. The annual cost of these schools is 114,952 dollars from the public funds, and 728,494 dollars from local sources. But local sources do not mean the same in Quebec as in Ireland. There is an education rate imposed on all property in each school district, and in addition, every father of a family pays a certain monthly sum for each of his children between 7 and 14 years of age, whether they attend school or not. Besides the elementary and model schools, there are ample facilities for superior education in lyceums, colleges, special schools, and universities. Altogether education seems to be in a flourishing condition in the Province of Quebec. The arrangements for promoting and supervising the educational institutions of the Province are excellent, and seem to be perfectly satisfactory to the inhabitants. Besides a central board, there are municipal boards throughout the country, which manage the affairs of the schools in their respective localities. Teachers are trained in institutions provided for the purpose, and no one is allowed to teach in schools aided by the government who has not obtained a diploma from one of these institutions, or who has not been approved of by a board of examiners appointed by the lieutenant-governor. We can safely recommend this pamphlet to all wishing to acquire information relating to the Province of Quebec.—*Irish Teacher's Journal, Dublin.*

OBITUARY.

DEATH OF CHANCELLOR BLAKE.

We extract the following from a lengthy obituary in the *Weekly Globe* (Toronto) of the 18th inst:

The Honourable William Hume Blake, one of the most distinguished Jurists of Upper Canada, died yesterday, at the residence of his son-in-law, in this city.

Chancellor Blake was born at Kiltegan, in the County of Wicklow, Ireland, on the 10th March, 1809. He was the second son of the Rev. Dominick Edward Blake, Rector of Kiltegan and of Loughbrickland and Rural Dean.

Chancellor Blake was educated at Trinity College, Dublin, where he took honours. He studied surgery for some time under Sir Philip Crampton, and afterwards studied for the Church. In 1832, he married his cousin Catherine Hume, grand-daughter of William Hume, of Humewood, M. P. for Wicklow.

Immediately after his marriage, Mr. Blake emigrated to Canada where his brother the late Rev. D. E. Blake, (Rector of Adelaide and afterwards of Thornhill) his brother-in-law, the Rev. C. C. Brough (Archdeacon of London) his brother-in-law, the late Rev. Mr. Flood (Rector of Delaware) and other members of the family, also settled. His first residence was on a farm in the Township of Adelaide, then in " the backwoods;" but in 1834 he removed to Toronto, and commenced his studies for the Bar under the late Mr. Washburn.

Mr. Blake was called to the Bar in the year 1838, and from the first took up a commanding position as an Advocate in the Law and Equity Courts. His tall, handsome person and fine open face, his felicitous language and bold manly utterance gained him at once the full attention of Court and Jury; and his vigorous grasp of the whole case under discussion, his acute, logical, dissection of the evidence, and the thorough earnestness with which he threw himself into his client's cause, swept everything before it. In the days when Draper, and Sullivan, and Baldwin, and Eccles were at the Bar, it was something to stand beyond compare the foremost. Mr. Blake became associated in business, with Mr. Joseph C. Morrison—now one of the Judges of the Court of Queen's Bench—and some years later, his relative the late Dr. Connor, who in 1843 became one of the Judges of the Court of Commons Pleas entered the firm—and for ten years a flood of business poured in upon them.

On the 30th of September, 1849, Mr. Blake accepted the Chancellorship of Upper Canada which he continued to fill until 1862 when failing health compelled him to retire.

Mr. Blake, while at the Bar, held for a number of years the position of Professor of Law, in the University of Toronto, but resigned when he became Solicitor-General. He took a deep interest in all in the affairs of the University, of which he was for a long time the able and popular Chancellor.

Afflicted with gout in its most distressing form, Mr. Blake, since his retirement from the Bench, sought relief from his sufferings in milder climes. He returned to Canada some months since, and yesterday sank to his rest, surrounded by his deeply attached and sorowing family.

THE LATE EDWARD HARTLEY.

We announce with deep regret the death of Edward Hartley, Esq., of the Canadian Geological Survey, of inflammation of the bowels, at Pictou, N. S., recently, aged 26. Mr. Hartley, son of Mr. W. Hartley, formerly of Montreal, and now of New-York, was a young man of extraordinary attainments and promise. He studied at the Yale Scientific School and went thence into the Union army. After the war he was engaged professionally among the Pensylvania coal mines and North Carolina gold fields where he so distinguished himself as to attract the attention of Professor Sterry Hunt, who secured his services for the Canadian Geological Survey. He was for two years occupied in examining, mapping and describing the Nova Scotia coal fields, including those of Cape Breton, and did splendid work, the report of which is nearly ready for publication. His experiments on the heating value of the different kinds of Nova Scotia coal, will, it is said, save a large amount to the railways which use them, and, he being a practical engineer as well as surveyor and geologist, acted as engine driver himself whilst making them. His early death is a loss to the Dominion and to science.—*Witness.*

DEATH OF A HIGHLAND VETERAN.

We (*Court Journal*) record the death of one of our best-known citizens, Mr. John Fraser, familiarly called by old Invernessians "The Black Sodger." He came of a rare old fighting race of Highlanders, and was no unworthy descendant. During successive generations his ancestors had fought at Killiecrankie, Sheriffmuir, Prestonpans, Culloden and Quebec, and John himself accompanied the Gordon Highlanders through all the Peninsular war and subsequent campaigns from 1808 to Quatre Bras, while one of his sons took part in the Crimean war and in the Indian Mutiny with the 72nd Highlanders. His father obtained a commission, in consideration of his gallantry at Quebec, and four brothers who received commissions, died in action. John was the first son of a second marriage, and was not so fortunate as to enter the service with an epaulette on his shoulder, but the military spirit of his race prompted him to enlist, and he saw very much service. In his latter years Fraser lived in Inverness (where he was born in 1793), and was well known to every habitué of the river side as a keen sportsmen, and most intelligent and gentlemanly attendant.—*Ibid.*

English Emigration to Canada.

The following letter has been sent to the press of Canada by the Rev. A. S. Herring, on the occasion of his departure after making a tour through the Provinces of Quebec and Ontario. The Rev. gentleman has been actively and officially concerned in promoting emigration to Canada, chiefly from Middlesex, England. Our readers will be interested in reading the account he gives of the advantages which Canada offers to emigrants from Great Britain, as well as his useful suggestions to the new settlers:—

SIR:—My object in visiting your hospitable shores was to ascertain for myself whether my emigrant friends were progressing satisfactorily. Most glad am I to be able to report favorably.

Some few have undoubtedly signally failed, but its through their own misconduct or by unforeseen circumstances, but to the honest, deserving, and *above all* to the sober, Canada affords ample opportunities for advancement. I am informed 40,000 emigrants have settled in the Dominion during the past two years.

Great Britain has thousands of good charactered persons, able and willing to work, but cannot now obtain it. Why not induce them to move here, and thereby add strength to the Dominion?

I am encouraged to entertain strong hopes that the Government will liberally respond to the almost universal voice of public opinion and put forth more powerful means of attracting, and perhaps aiding, the honest, industrious, and sober to locate within this favored Dominion.

Population and wealth generally go hand in hand, and Canada greatly requires the one, and the other will speedily follow.

Canada was never so prosperous as at the present moment. Let the Government of the Dominion: the Ontario and Quebec Governments; the municipal authorities and private individuals, each nobly and liberally forward on this movement, which must inevitably lead to most beneficial results to the whole community.

A word to my emigrant friends,—After having travelled from Quebec to Sarnia, from Parry Sound to Niagara, visited many emigrants at the home, the *free grant districts* (100,000 acres of which have been taken up for settlement since April last) and Eastern Townships. I am more and more convinced of the blessings of Emigration. I find those who care for your souls are zealous, the school system excellent, land and the necessaries of life cheap, and labor good. To all of you I say "Go forward, (Exodus 14-15). Do not look back too much on the gloomy past, but look hopefully forward to the future: Avoid murmuring—(1) Keep to your churches. (2) Keep from the whiskey, the curse of this land and woe be to any Legislature which encourages the multiplication of liquor shops. (3) Take care of your cents and dollars. Establish "*Emigrant Aid Societies*" which aim at giving advice to those newly arrived from the Old Country, a saving bank, a labor mart for hirers and those requiring work—sick and medical clubs—getting out relatives by weekly payments, &c. The Ottawa Society is flourishing. J. Johnson, Esq., Department of Agriculture, Ottawa, will gladly forward their prospectus).

I beg publicly to express my gratitude to the Messrs. Allan [Montreal-Steamship Co.] for their considerate and liberal treatment of my emigrants.

I shall carry home (whither I proceed in a few days, after 12,000 miles of travel) the happy feeling that many who in the old country were in poverty and misery are now, by the blessing of God, *comparatively* in a state of happiness, contentment, and comfort.

I tender my most heartfelt thanks to all parties for the many acts of kindness and hospitality I have received from many dear and valued friends, and I shall ever pray that God may abundantly bless and prosper the people of this country.

I remain, Sir,
Your obedient servant.

A. STYLEMAN HERRING.
St. Paul's Clerkenwell, London.

Ottawa, Oct. 25, 1870.

The Royal Marriage.

The marriage of British royalty with a subject, says an English journal, though common enough in some previous centuries, has been illegal during the last 100 years, except the royal personage intending to contract such marriage has received for it the special sanction of the sovereign.

This was stringently laid down in what is known as the Royal Marriage Act. (12 George III., cap., 11), which was passed in 1772, at the marriage of his brother, William Henry, Duke of Gloucester, in 1766, with the widow of Earl Waldegrave, an illegitimate daughter of Sir Edward Walpole. His brother, Henry Frederick, Duke of Cumberland, in like manner had offended the King by his marriage in 1771, with Lady Anne Luttrell, daughter of the Earl of Carhampton, and widow of Mr. Christopher Horton, of Cattonhall, Derbyshire. It is well known that the late Duke of Sussex braved his father's displeasure, and, in defiance of that enactment, went through the ceremony of marriage with the late Lady Augusta Murray, second daughter of John, fourth Earl of Dunmore, first at Rome in April, 1793, and again at St. George's, Hanover Square, after the publication of banns on the 5th December following. His Royal Highness, having been left a widower, married, secondly, Lady Cecilia Letitia Buggin, a daughter of Arthur, second Earl of Arran, now Duchess of Inverness. In like manner George IV., while Prince of Wales, is said to have contracted a secret marriage with the celebrated Mrs. Fitzherbert; but in none of the above cases was the royal sanction given to the union. In the previous century King James II. had married as his first wife Lady Anne Hyde, daughter of the Lord Chancellor Clarendon, but previously to that time no member of the royal family of England, strictly speaking, had contracted a marriage with a subject since the reign of Henry VIII. Princesses have been instinctively obedient to family law, and we do not find an instance of a daughter of a living crowned head marrying a subject later than the reign of Edward III., five centuries since.

Marriages between princesses and subjects have occurred since, but at most in five cases, and all under peculiar circumstances. The Princess Elizabeth, daughter of James I. and widow of the King of Bohemia, is understood to have privately married Lord Craven, at whose house, in Drury lane, she died a few months after her return from exile with her nephew, Charles II.; but the circumstances of the marriage are extremely obscure, and the Queen was entirely released from royal control. The Princess Mary, sister of Henry VIII., took the opportunity, much to the indignation of her brother, of marrying Charles Brandon, who was sent to fetch her back from France on the death of her husband, Louis XII.; but the peculiarity of the case is obvious. Henry VII. permitted three of the daughters of Edward IV. and sisters of his own Queen, to marry the heads of the families of Courtenay and the now extinct Welles; but Henry VII. never fully recognized the legality of the royal title of his father-in law. We must go back to Edward III. to find an instance of an occupant of the throne bestowing a daughter upon a subject.

Sketches of the Princess Louise and the Marquis of Lorne.

The Princess Louise, says a London journal, whose full baptismal name is Louise Caroline Alberta, sixth child and fourth daughter of her Majesty, was born on the 13th of March, 1848, so that she is now in her twenty-third year.

John George Edward Henry Douglas Sutherland, Marquis of Lorne, is the eldest son of George, eighth Duke of Argyle. He was born in 1845 and was educated at Eton and Trinity College, Cambridge. In 1766, immediately after attaining his majority, he visited the West Indies and the Spanish Main, and upon his return published the result of his journey in a volume entitled "A Trip to the Tropics," which was very favourably received at the time by the critics and the public. In 1868 he was returned to Parliament for Argyleshire, in the liberal interest, and in the same year he was appointed private secretary, without salary, to his father, the Secretary of State for India. He still, we believe, holds that post, and in addition to the performance of the duties connected with it he is a regular attendant at the sittings of the House of Commons during the session. Lord Lorne possesses in a very marked degree the striking personal characteristics of the Campbells, and the peculiar yellow tinge of his hair, which tradition has long associated with his family, and his singularly open and handsome face, make him conspicuous in any assemblage in which he may be present. He has not hitherto appeared prominently in public, and has seldom spoken in the House of Commons. He has, however, given evidence, in the few speeches which he has made, of an ability far above the average. Hitherto he has resided with his father at Inverary and Argyle Lodge, Campden Hill. As chief of the most powerful of the clans "the MacCallum More" he enjoys honors among his own people not inferior to those bestowed upon royalty. The present Duchess of Argyle, the mother of Lord Lorne, is the daughter of the late Duchess of Sutherland, who was for many years one of the Queen's warmest personal friends. On his mother's side Lord Lorne is nearly related to the Duke of Sutherland, the Marquis of Westminster, Lord Blantyre and the Marquis of Kildare, eldest son of the Duke of Leinster. His sister is the wife of Lord Percy, eldest son of the Duke of Northumberland.

McGill University.

The Corporation of McGill University have pleasure in acknowledging the following donations to the Faculty of Arts during the quarter ending Oct. 26th, 1870:—

1. TO THE LIBRARY.

From the Government of the Dominion of Canada: Sessional Papers; Nos 1—6 to Vol. II. Journals of the Senate of Canada; Vol. III. 8vo. Journals of the House of Commons of Canada; Vol. IIe. 3vo. Statutes of Canada for 1870. English and French; 2 vols., 8 vo.

From the Smithsonian Institution: Smithsonian Contribution to Knowledge; Vol. 16th, 4to. Smithsonian Miscellaneous Collections; Vols. 8 and 9, 8vo.

From J. Tennant, Esq.: 49 Pamphlets, containing publications on Gold Minning, and on subjects having reference to Mineralogy, Geology, Architecture, &c., &c.

From the Committee of Council of Education, Science and Art Department South Kensington, England: II Pamphlets relating to the Department of Science and Arts.

From the Rev. B. Davies, LL.D.: Roediger's Gesenius, or The Students Hebrew Grammar, 7vo.

From J. Harris, Esq.: Kuklos, an Experimental Investigation into the Relationship of Certain Lines, 4to.

From the Delegates of the Clarendon Press, Oxford; English Poems by J. Milton; 2 vols., 8vo.

From the Royal Society of London: Philosophical Transactions, 1869; part 2nd of vol. 159, 4to. Proceedings; Nos. 116 to 120; 5 pam., 8vo. List of Fellows: November 30th, 1864; pam. 4to.

From the American Philosophical Society, Philadelphia: Proceedings of the A. P. Society; Nos. 81 and 83, vol. 11th; 2 pam. 8vo.

From the American Academy of Arts and Sciences: Proceedings, May 28, 1868, to June 8, 1869; pam, 8vo.

From G. Barnston, Esq.: Smithsonian Contributions to Knowledge; 9 pam. 4to.

From the Edinburgh University: Edinburgh University Calendar for 1870-71, 8vo.

From John Robson, Esq.. M.D., of Warrington, England: A collection of 2597 bound volumes and 327 unbound volumes and pamphlets, in Archæology, Science, and general Literature.

2. TO THE MUSEUM.

From T. J. Claxton, Esq., Montreal: Skeletons of Ichthyosaurus and other fossils of the Lias, from the quarries of Street, Somersetshire, England; purchased with his donation of £50 stg.

From Henry Chapman, Esq., Montreal: A collection of copies of ivory carvings, prepared for the Arundel Society.

From Mr. J. Hillier Bailey, F.G.S., Dublin: A collection of fossil plants from the Devonian of Ireland.

From Dr. Wyville Thomson, Belfast: Specimen of a new sponge, Holtenia Carpenterii, from the North Atlantic.

From Professor Tennant, London: Models of two gold nuggets.

The following resolutions were adopted:

1. Resolved—That the thanks of the University are due to John Robson, Esq., M. D., for the donation of his large valuable library; and that in accordance with the desire of the donor, the same shall constitute a separate collection, to be designated the Robson Collection in Antiquities and General Literature.

2. Resolved—That the thanks of this corporation be conveyed to Henry Chapman, Esq., for his liberal donation of the rare and beautiful collection of casts of ancient ivory carvings, prepared for the Arundel Society.

4. Resolved—That the thanks of the University are due, and are hereby given to those churches in the city which have kindly renewed for the present session the grant of free sittings to students.

Natural History Society, Montreal.

The first monthly meeting of this Association, for the Winter season, was held at its rooms, on Monday evening, 31st, ult.

After the announcement and exhibition of several donations to the Library and Museum, came the business of the evening.

Mr. A. S. Ritchie read a paper entitled "Aquarian Studies," part 2. In a previous paper the author had described the habits of some of the larger inhabitants of his aquarium. In the present sketch an attempt was made to illustrate the peculiarities of the microscopic denizens of the same. The structure of some of the lowest forms of vegetable life was first illustrated, and some points in their physiology described. The first example of the animal kingdom selected was the Amœba or Proteus. In this animal we see a creature devoid of muscular or nervous system, with no head, no stomach, or alimentary canal. Its body consists of a jelly like substance, of irregular shape, from any part of which finger like processes are at times protruded. It lives by absorption, and can improvise a stomach from any part of the exterior of its body. The Amœba is one of the very lowest forms of animal life. The lecturer then proceeded to explain the structure and habits of microscopic animals, a little more complex than the preceding. Among these were the blue Stentor, the bell animalcule (Vorticella), the glutton (Lurco) Rotifers, or "wheel bearers," Paramœcium, the four-horned Cyclops, and other microscopic animals. He stated that he had frozen water, containing Rotifers, solid, and upon melting the ice the Rotifers were as lively as ever, also that they could endure a considerable degree of heat. A large diagram, with figures of the several plants and animals spoken of, materially helped to illustrate the paper, which will shortly appear *in extenso* in the next number of the "Canadian Naturalist."

Principal Dawson made some remarks upon this paper, and stated that it had lately been ascertained that some of the lowest microscopic animals were found to be uninjured by a temperature even higher than that of boiling water.

Mr. Billings then made a communication on the bones of a Whale lately discovered at Cornwall, Ont., of which the following is an abstract, kindly furnished by the author :—

"Several months ago, Mr. Charles Poole, of Cornwall, wrote to the Secretary of the Society that a large skeleton, resembling that of an Icthyosaurus, had been found in that neigborhood, by the men engaged in excavating clay for brick. In another letter he stated that Mr. T. S. Scott, architect, of this city had procured the lower jaws. On receipt of this information, Mr. Billings called upon Mr. Scott, who very liberally presented the jaws to the Geological Museum. Mr. Billings then went up to Cornwall, and obtained from Mr. Poole the bones which were in his possession. These were discovered in the post-pliocene clay formation, about sixteen feet below the surface. They are those of a small Whale closely allied to the White Whale (*Beluga Cucas*) which lives in the Northern seas, and at certain seasons abounds in the Gulf and lower part of the St. Lawrence. The lower jaws are nearly perfect. The skull and upper jaws are much damaged, and some of the parts lost. Thirty-five of the vertebræ, the two shoulder blades, most of the ribs, and a number of small bones were collected. The length of the animal was probably about fifteen feet. The lower jaw has the sockets of eight teeth upon the right side and of seven on the left. The number of teeth in the upper jaw could not be assertained. In the head of a White Whale belonging to the cabinet of McGill College, there are nine teeth in the right lower jaw and eight in the left. The teeth of the fossil, judging from the size of the sockets, were longer than those of the White Whale. In 1849 a small whale was discovered in Vermont, about twelve miles south of Burlington, in a railway cutting through a deposit of clay of the same formation as that of Cornwall. Judging from the figures and description published in *Silliman's Journal* by the late Professor Thompson, there can be little doubt that ours is of the same species. Another specimen consisting of about half of the back bone was discovered several years ago near the city of Montreal, and is now in the Museum of the Geological Survey. The locality at Cornwall is about half a mile from the railway station, sixty feet above the St. Lawrence, and over two hundred feet above the level of the sea."

A paper on Canadian Diatomaceæ, by W. Osler, was then read by the Recording Secretary. This will be found, by those interested in the study of these microscopic plants, in the next number of the Society's journal.

The President, in inviting a discussion on the phenomena observed during the recent earthquake, said that there were records published or preserved of the appearances observed during 83 earthquakes on this continent. A severe shock was felt in Canada in 1860, an account of which might be found in the "Canadian Naturalist" for that year. Many of the phenomena noticed in 1870 were observed in the shock of 1860. Judging from the facts on record, there would seem to be a *periodicity* in earthquakes. They seem to occur much oftener in autumn and winter than in spring or summer and generally in the 60th or 70th year of a century. If this last circumstance be uniformly true, then the shock in 1860 might prove to be the beginning of a series, if the law of periodicity holds good. A slight shock was however felt in Canada in the *spring* of 1864. The President next referring to the causes which produce earthquakes, said that here there are no centres of active igneous agencies as Vesuvius and elsewhere. He suggested the idea, that larger masses of sediment are drained off by rivers from this continent and deposited on the Atlantic coast, and when, in addition to this, a pressure amounting to many millions of tons of atmospheric air is removed from the denuded portion, vibrations occur from long continued tension of the earth's crust, and finally a break takes place. It was found that during the last earthquake, the mercury in the barometer was an inch lower than the average.

Dr. Smallwood gave a description of peculiar phenomena observed in the heavens, before and after the earthquake. Among these were noticed several clusters of spots on the sun's disc in connection with peculiar auroral displays. He exhibited diagrams shewing the barometrical and thermometrical appearances presented before and during the shock. During the continuance of the vibration the descent of the mercury was most marked in this respect, confirming Dr. Dawson's view. From telegrams received by the courtesy of Mr. Dakers it would appear that the first shock was observed at Owen Sound, at 10.52 a.m., local time, and the latest at St. John, N. B., at 11.45 a.m., local time. Accounts vere received also from Toronto, Montreal, Quebec, and intermediate places. Judging from the telegrams received, the extent of the vibration thus recorded would appear to have been from S. W. to N.E., and the shock to have occupied three minutes of time in traversing the 840 miles, without calculating for the difference of longitude between the places. This would give a rate of 16 miles per minute, but if the differences of longitude were calculated, the rate would be about thirty-two miles per minute. This last estimate would agree nearly with that given by Humboldt and Mallet. After some remarks by Dr. J. B. Edwards and others, the meeting adjourned.

J. F. Whiteaves, F.G.S., &c.
Rec. Sec. N. H. S.

MISCELLANY.

Education.

—*Waste Power.*—The season of the year has come when the higher institutions of learning are opened for a new year of work. Many a young man and young woman in city, village, and rural district, have prepared for this work. Most of them, perhaps, looked forward to it with large ambitions, with high hopes, with noble purposes. We do not know their names, but very many of their names are destined to become known. Religion, civil government, literature, science, commerce, agriculture—all departments of human thought and achievement, are to be enriched by their future labors. God has given them, by birth, capability of large growth and attainments; opportunity of development is also furnished in the appliances of modern culture; and the aid of friends, joined with their own efforts, is taking them along the ascending way of success. True, not they only are to be heroes who have the helps of schools; but among those who have not such helps are many who must make their way alone, without the guiding hand of the skilful teacher. Against disadvantage, over obstacles, through difficulties innumerable, many a brave-hearted boy and girl of to-day will fight it out thus single-handed from obscurity to eminence. Yet the seminary of learning is the friend and ally of inspiring minds, and there have been none more keenly appreciative of this than they who have mourned the lack of such friendly alliance. And while some, by inherent energy and power, have gained the victory without the school, there are thousands on thousands in every generation, who, merely for the want of the culture of schools, live in comparatively contracted spheres, neither receiving nor giving more than a fraction of the power otherwise possible.

There is *waste*—waste of mental power—more sad than the desolation of fields capable of enrichment, or the neglect of water-fall needed to drive machinery, or the missing of opportunities to acquire money. The world's wealth is its men; it is in mind, intellect thoroughly cultivated, with character purified. Who now would not delight to contribute to prevent the waste of mind? The season suggests one way in which this can be done. It is to set young persons of native capacity in a way to acquire a thorough education, to bring some influence to bear upon their minds, inclining them to such course, or to remove some obstacle that alone hinders them.

Parents, have you done what you ought in this regard for your own child? Have you not a son or a daughter, or perhaps sons and daughters, whom a thorough education would, in all probability, fit for large usefulness? If so, look about you, and see what can be done. What are you willing to do? How much will you sacrifice? Decide, and then talk with the child. Education of the very highest order is near at hand, is easy of attainment. It does not require large wealth to secure its advantages. If in this matter there be on the part of both parent and child "a will," there will be also "a way."

And who of us has not an opportunity to do something in this line? Some friendly word may issue in a harvest of cultured intellect. The thought that has lain half-latent in another's mind, we way bring out, and his half-shaped ambition to be and to do we may change to actual realization. So shall we prevent the wast of mental power, and enrich the world.—*Catholic Standard.*

—*New Convent at Sillery, Quebec.*—A few days ago we paid a visit to the New convent erected for the ladies of the religious order of Jesus-Marie, on the Lindsay Estate situated between the Cap Rouge road and the church of St. Columba de Sillery. This spacious and elegant structure is situated in the middle of a fine park, which extends from Cap-Rouge road to the brow of the Sillery heights, and commands a view of the St. Lawrence unsurpassed for beauty and magnificence by any other site on our noble river. It is constructed according to the latest and most approved models for boarding-schools, and one of its finest features is the ample and lofty size of every apartment. It is intended to have accommodation for several hundred pupils, each of whom will have a separate and distinct sleeping apartment, than which nothing can be more conducive to health and comfort. The charges are exceedingly moderate, while the course of instruction includes the study of the principal modern languages of Europe, in addition to all the usual branches which combine to perfect the most accomplished female education. Unusual facilities have been provided for the reception of half-boarders, for whose convenience omnibuses run daily, leaving the city in the morning and returning at evening. Similar facilities have also been provided for parents and visitors. Already about sixty pupils have entered this fine institution, which promises to become one of our most popular houses of education. The Convent was built by the Messrs Breton, after plans drawn by the Rev. O. Audet, Chaplain to the Community, and Mr. Peachy, Architect, under whose able supervision the plans were carried out; the plaster work being executed by Mr. Blouin, is well finished in every particular. And we congratulate those interested on having added to the attractions of our environs an edifice as imposing as it is sure to be useful and successful.—*Quebec Mercury.*.

Literature.

—*Mark Twain—How the Nom de Plume Originated.*—We have lately noticed several paragraphs concerning this gentleman. It is very true he was once a river character about this port. Mrs. Clemens, the aged mother of the humorist, we understand, is still a resident of this city. "Mark Twain" learned the river on the old steamer John S. Roe, and used to write up steamboat memoranda and occasional squibs for the Republican. Captain Sellers, one of the first victims of Mark Twain's humor, was an excellent pilot, but devoid of any literary culture whatever; but withal had quite an opinion of his own mental abilities. Mark sketched the captain in good style. After he had written the article, he inquired of John Morris, now the Steward of the Belle Memphis, what name he should sign to it. One of the deck hands at the time happened to be heaving the lead and hallooed out "Mark Twain," meaning the depth of water, when Clemens exclaimed, "that's it, Mark Twain's my name." This sketch, with his new name, "Mark Twain," at the bottom of it, was subsequently placed in the hands of Mr. T. E. Garrett, who was at that time river editor of this journal, and it found a place in the river department of the Republican. It proved to be a decided hit, and was extensively copied by Western journals. Mr. Clemens continued for some time to contribute to the columns of this paper, and his productions began to attract great attention throughout the West. It was now manifest that his destiny was not in the pilot house. He soon left the river, and his subsequent literary career is well known.—*St. Louis Republican.*

—*Recompense of Literary Works.*—An enterprising literary gossip on the staff of the London *Daily News*, mentions a few particulars illustrating the benefit which English and foreign authors have derived from the international copyright convention between Great Britain and some of the continental states Mr. Hugo received £1,000 for the right of translating his latest novel into English. The well-known Tauchnitz editions are protected by copyright, but it does not appear that the German publisher has made very liberal payments to the English authors whom he reprints. Mr. Carlyle for four volumes of his "Frederick the Great," received from Baron Tauchnitz only £225; Mr. Dickens, for his last novel, "Our Mutual Friend," £150; Miss Mülloch or her publishers, for "A Noble Life," £50; Mr. Wood, for "Oswald Gray," £60; Miss Clark, for "Christian's Mistake," £50; Miss Kavanagh, for "Beatrice," £30; Mrs. Biddell, for "George Goith," £25; Miss Annie Thomas, for "On Guard," £25; Miss Edwards, for "Half a Million of Money." £10; Mr. Hepworth Dixon, for his "Holy Land," £40; Mrs. Oliphant, for "Agnes," £20; Florence Marryat, for Love's Conflict," £25, and Mr. Charles Lever, for "Luttrell of Arran," £30. The payments do not cover the right of translation, but only republication in the original language. Still the sales must be very large, for the books are highly popular not only on the continent of Europe, but also in the United States.

—*Marvels of Memory.*—The following examples of the marvels of memory would seem entirely incredible had they not been given to us upon the highest authority.

Cyrus knew the name of each soldier in his army. It is also related of Themistocles that he could name every citizen of Athens although the number amounted to 20 000. Mithridates, king of Pontus, knew all his 80,000 soldiers by their right names Scipio knew all the inhabitants of Rome. Seneca complained of old age because he could not as formerly repeat 2000 names in the order in which they were read to him; and he stated that on one occasion, when at his studies, 200 unconnected verses having been recited by the different pupils of his preceptor, he repeated them in a reversed order, proceeding from the last to the first.

Lord Granville could repeat, from beginning to end, the New Testament in the original Greek. Cooke, the tragedian, is said to have committed to memory all the contents of a large daily newspaper. Racine could recite all the tragedies of Euripides.

It is said that George III. never forgot a face he had once seen nor a name he had ever heard. Mirandola would commit to memory the contents of a book by reading it three times, and could frequently repeat the words backward as well as foward. Thomas Cranmer committed to memory in three months an entire translation of the Bible. Euler, the mathematician, could repeat the Æneid; and Leibnitz, when an old man, could recite the whole of Virgil word for word.

It is said that Bossuet could repeat not only the whole Bible, but all Homer, Virgil and Horace, besides many other works.

Mozart had a wonderful memory of musical sounds. When only fourteen years of age he went to Rome to assist in the solemnities of Holy Week. Immediatly after his arrival he went to the Sistine Chapel to hear the famous *miserere* of Allegri. Being aware that it was forbidden to take or give a copy of this renowned piece of music, Mozart placed himself in a corner, and gave the strictest attention to the music, and on leaving the church noted down the entire piece. A few days afterward he heard it a second time, and following the music with his own copy in his hand, satisfied himself of the fidelity of his memory. The next day he sung the *Miserere* at a concert, accompanying himself on the harpsichod; and the performance produced such a sensation in Rome, that Pope Clement XIV. requested that this musical prodigy should be presented to him at once.

Science.

—*Hydrophobia.*—The cure of that terrible disease known as hydrophobia is a very simple one—one within the reach of all, that the poor man, as well as the rich, may easily obtain. It is of itself a powerful vegetable poison. But it possesses those counteracting properties necessary to annul the poison that exists in the disease, hydrophobia. This remedy you know as the herb lobelia—nothing more. Use the leaves wet with warm water applied to the wound, if there be any, and give of the tea, made very strong till the patient experiences that the whole muscular system has come under the influence of the remedy. Medical men inform us, that it will not produce vomiting, when the disease hydrophobia is upon the system, but it will act as a powerful agent in neutralizing the poison, which is of an opposite character to itself, and will, they tell us, in nine cases out of ten, prove thoroughly effectual when given before the second spasm seizes the patient. After that it is not so sure. But before that, it is always, they tell us, a sure remedy. Now treasure this little bit of knowledge, every one of you, for you do not know how soon you may have need of it.

—*The Human Heart.*—It is stated that Professor Haughton, of Dublin has calculated that the ventricles alone of the human heart perform the total daily work of 124,208 foot tons. For every ounce of weight of the heart, that organ, it is asserted, performs 50,576 foot pounds of work per minute, and on supposing that it were to expend its entire force in lifting its own weight vertically, it is calculated that the heart would raise itself 19,754 feet in an hour, that is 328¼ feet in a minute. In comparing these figures with the more familiar standards, it may be interesting to remember that a "horse power," according to Watt's calculation, consists in the force that working eight hours a day raises 33,000 pounds one foot high in one minute. From Professor Haughton's statement, it will be seen that the heart exercises a force that would raise 193,212 pounds one foot high in a minute.

—*Singular Surgical Operations.*—A paper by Mr. Coleman, read at a meeting of the Odontological society, describes a novel method of curing that kind of toothache known professionally as "chronic periodontitis." In this malady, the tooth is commonly somewhat loose, and painful to bite on, with swelling of the gum, and suppuration. The remedy is called "replantation." The tooth is taken out; all the decayed parts are scraped from the roots, and it is well washed and disinfected in carbolic acid but those portions of mucous membrane which are commonly attached to the neck of the tooth, and appear healthy, are not scraped away. The socket from which the tooth was drawn is also properly cleaned, and the tooth is put back into its former place and in a number of cases it takes root and firmly fixes itself in the course of a fortnight, and then becomes as serviceable as the other teeth. This is a remarkable instance of vital force. By the small portion of living tissue left adherent to the tooth attached to the jaws is renewed and though failures occur there is reason to believe that in other surgical operations, they will become fewer as the operators acquire experience. The teeth are so important to life and health that whatever tends to preserve them should be encouraged.

—*Valuable discovery in Medicine.*—The cancer has long been a disease beyond the power of the physician. Its treatment has been empirical and unreliable. The remedies employed have been painful, dangerous and almost always unsuccessful--Under these circumstances, the discovery of a new method of treating the cancer will be hailed with great satisfaction by patients and physicians. At the recent annual meeting of the New York Medical University, Prof. Scott read a paper in which he stated that repeated experiments had demonstrated the marvellous efficacy of the chloride of chromium, a new salt of this rare metal, incorporated into stramonium ointment. This preparation, in a few hours, converts the tumor into perfect carbon, causes no pain, and is not poisonous. It promises to alleviate much human misery, and we call the attention of the entire profession to the fact of its discovery.

—*Death of Prof. Lacordaire.*—The death is announced of M. J. S. Lacordaire, elder brother of the famous Pere Lacordaire. M. Lacordaire was professor of Comparative Anathomy at Liege. He was highly distinguished as an entomologist, and was engaged on a history of insects, of which the eighth volume appeared in 1868.

—*Death of Professor Palmstedt.*—The death of this distinguished Chemist, the friend and contemporary of Berzelius, occurred at Stockholm, on the 6th of April, 1870, at the advanced age of 85 years. He devoted his long life to the good of his country. For 24 years he was director of the Polytechnic School at Gothenburgh, and was thus enabled to introduce into Sweeden the inventions and improvements of other countries. Technology and Agriculture were his principal studies. He was the leading spirit in the organisation of new schools and public exhibitions, and at the time of his death was actively engaged on a committee for the arrangement of a permanent exhibition of the products of Sweedish industry, in Berlin. He made numerous journeys into foreign countries, the results of which have been published in Sweeden—and among his papers have been found an extensive correspondence with nearly every chemist of note of the present century; among his letters, are 208 from Berzelius, which will be published by his executors, and doubtless throw much light on the history of chemistry. He was a true patriot, an unselfish scholar, a useful man, and his death will be severely felt in Sweeden.

—*Death of Professor Miller.*—English papers record the death of William Allen Miller, M. D., F. R. S., Professor of chemistry in King's College, London, an accomplished scientist, author, investigator and effective teacher. Dr. Miller died of apoplexy on the 30th Sept. last, at Liverpool, whither he had gone to take part in the proceedings of the British Association. Born at Ipswich, on the 17th December, 1817, in his twenty-fourth year he became assistant to the late Mr. Daniell, Professor of chemistry in King's College, London. He was the author of a celebrated and highly esteemed treatise on Chemistry, and has contributed in various ways to the progress of science.

Art.

—*Statue of the Queen for Liverpool.*—Shortly after the erection of the statue of the late Prince Consort, which stands in the open space in front of St. George's Hall, Liverpool, the Corporation resolved to erect a companion statue of her Majesty, at a cost of £5,000, to be also erected in front of the hall; and the work was entrusted to Mr. Thornycroft, the well-known sculptor, under the approval of her Majesty. The statue, which is an equestrian one, and corresponds in size to that of the late Prince Consort, has now been completed, and is expected to arrive in Liverpool in a few days from the bronze foundry of Messrs. Elkington & Co., of Birmingham, where the work has been executed. The granite pedestal on which the figure will stand has been finished some time and the necessary scaffolding for raising the statue is in readiness. No arrangement has yet been made or time been fixed for the formal ceremony of uncovering the statue.

— *Toul Cathedral* has been damaged by the Prussian batteries; in Strasbourg the valuable public library, which comprised many precious MSS. and printed books, and works of art in general, besides churches and other structures, have been ruined by the besiegers, who bombarded the city as well as the fortress. If Herr Gregorovius, instead of writing silly verses about the flames fusing Germany into unity, had tried to induce his countrymen, to spare the town, he would have done a service.

—*Monument to Daniel Defoe.*—After remaining for over a century in a somewhat neglected state, the resting place of Daniel Defoe, in the dissenting burial-ground at Bunhill-Fields, has been crowned with an artistic tribute of the admiration of young England for the author of "Robinson Crusoe, and on the afternoon of the 6th ult., the monument was formally uncovered in the presence of nearly 1,000 people. The monument is an obelisk of Sicilian marble in the "Cleopatra's Needle" form. The base is semi-cruciform, four feet by eight, and the whole is carved out of two blocks. The total height is seventeen feet, and the cost £200. Upon the front of the plinth is inscribed: "Daniel Defoe, born 1661, died 1731. Author of 'Robinson Crusoe,' This monument is the result of an appeal in the *Christian World* newspaper to the boys and girls of England for funds to place a suitable memorial upon the grave of Daniel Defoe. It represents the united contributions of seventeen hundred persons." The work has been executed by Mr Samuel Horner, of Bournemouth, from a design by Mr. Creke, architect, of the same town.—Mr. Charles Reed, M.P. for Hackney, who was mainly instrumental in preserving the burial-ground from desecration, performed the ceremony of uncovering the monument.

—*The French Crown Jewels.*—The Crown jewels of France were deposited at the Garde Meuble down to 1791, when a very detailed inventory was drawn up by MM. Bion, Christin, and Delattre, Deputies to the National Constituent Assembly, appointed as a special commission for the purpose, in accordance with the decrees of the 26th and 27th May and the second of June of that year. The list was printed, at the National Office, in two parts, and distributed to the members of the Chamber. The first portion concerns the precious stones under the name of "Crown diamonds," with an estimate of their value. The first chapter—diamonds—gives 16,730,403 fr.; the second—pearls—996,700 fr.; third—colored stones—360,604 fr.; the forth—suites of ornaments—5,834,490 fr.; making a total of 23,922,197 fr. The *Régent* alone is calculated at twelve millions. The worth of these precious objects has at least tripled since the period. The collection contains 8,547 diamonds, 513 pearls, 250 rubies, 71 topazes, 150 emeralds, 134 sapphires, 3 amethysts, 8 Syrian garnets, and 8 other coloured stones. The second part comprises ornaments of rock crystal, engraved stones, gems, and other monuments of the arts and sciences. These treasures were handed over to the National Museum, and they form at present one of the most interesting galleries of the Louvre.—*Galignani.*

Statistical.

—*Population of the City of Paris.*—The population of Paris, according to a census taken in 1868, amounted to 2,150,916 souls, of whom 2,028,736 were born in France: that is 733,478 in the Department of the Seine, and 1,295,252 in other departments. Of the 122,180 remaining persons, 3,055 were naturalized citizens, 34,273 Germans, 33,088 Belgians, 10,687 Swiss, 9,100 English, 7,903 Italians, 6,254 Hollanders, 4,400 Americans, 4,294 Poles, 2,536 Spaniards, 1,356 Russians, 541 Scandinavians, 329 Moldo-Wallachians, 313 Turks, 290 Greeks, and 3,766 foreigners of all other nations. This census, it will be observed, gives 34,273 as the number of Germans in Paris, and hence the recent report that the Prussians in that city were over 80,000 must have been greatly exaggerated. Adding the Belgians and Hollanders, the number, it is true, is raised to 73,615, but natives of these countries cannot be rated among the citizens who were so objectionable to the French.

—*Size of our Great Lakes.*—The latest measurements of our fresh water seas are these :

The greatest length of Lake Superior is 335 miles; its greatest breadth is 160 miles; mean depth, 688 feet; elevation, 627 feet; area, 42,000 square miles.

The greatest length of Lake Michigan is 390 miles; its greatest breadth, 108 miles; mean depth, 900 feet; elevation, 507 feet; area, 23,000 square miles.

The greatest length of Lake Huron is 200 miles; its greatest breadth is 160 miles; mean depth, 600 feet; elevation, 274 feet; area 20,000 square miles.

The greatest length of Lake Erie is 250 miles; its greatest breadth is 90 miles; its mean depth is 84 feet; elevation, 555 feet; area, 6,000 square miles.

The greatest length of Lake Ontario is 180 miles; its greatest breadth, 45 miles; its mean depth is 500 feet; area, 6,000 square miles.

—*The Cost of Drink.*—The Rev. Canon Jenkins, at the Aniversary of the Church of England Temperance Reformation Society, last month, said among other things:

"Put an end to the drinking customs of the country, and there would be abundant funds for all the religious societies of the land. Abolish them throughout the world, and there would be no complaint of want of success abroad. The cost of drink was immense, besides the destruction of food it produced. Drink destroyed food enough in a year to maintain seven millions of people for the same space of time. Drinking and smoking taxes made up more than half the entire taxation of the country, more than twelve times as much as the poor-rate; indeed, it has been calculated by the Government that drink costs 88½ millions sterling per annum. Nor was that all. We had 700,000 paupers, costing £7,000,000 a year; 100,000 criminals costing £4,000,000; 22,000 police costing £1,500,000; 24,000 lunatics costing £650,000; 1,200 hospitals costing £300,000; 4,000 suicides and executions costing £15,000; 20,000 beggars costing £260,000; with 300,000 fallen women, and 600,000 habitual drunkards. Put all these figures together, adding £20,000,000, as the value of labor lost to society, and it resulted that the cost of this poison was the enormous sum of 100 millions, for it was drink that was the mainspring expenditure. All our national vices, pauperism, lunacy, &c, flowed from it; and lamentable it was to think that the poison cost ninety times as much as the whole collections for all the societies engaged in promoting religion and morality. The working classes in the United Kingdom spent every week in drink a sum of £1,100,000 sufficient to banish pauperism and supply a copy of God's Holy Word, not only to every family, but to every man, woman, and child in the empire."—*Ex.*

Meteorology.

—From the Records of the Montreal Observatory, Lat. 45°31 North; Long., 4h. 51m. 11 sec. West of Greenwich, and 182 feet above mean sea level,—for October, 1870,—by Chas. Smallwood, M.D., LL.D., D.C.L.

DAYS.	Barometer corrected at 32°			Temperature of the Air.			Direction of Wind.			Miles in 24 hours.
	7 a m.	2 p.m.	9 p.m.	7 a.m	2 p.m.	9 p.m.	7 a.m	2 p.m.	9 p.m.	
1	29 843	29 961	30 098	55.1	70.6	60.2	N E	N E	N E	214 00
2	30.213	30 251	.163	53.7	75.0	62.2	N E	W S W	N E	123.12
3	0.24	20.906	29 850	55 6	58 0	53.0	N E	S W	S W	87.20
4	29.811	.744	.910	50.1	51.4	49.7	N E	N E	N	110.00
5	30.102	30 200	30.299	48.0	59.7	52 0	N E	N E	N E	212.44
6	.426	.434	.499	43.7	67 0	47.8	N E	N E	N E	300 11
7	.500	.422	.400	40.1	70.1	48.7	N E	N E	N E	107 24
8	.349	.342	.261	44.6	75.2	56.7	N E	N E	W S W	94 29
9	.223	.201	.170	52.1	75.2	58.1	W	W	W	104.12
10	152	.149	.000	52.3	73.6	57 4	W	W	N E	211.10
11	29.989	29.917	29.710	56.7	76.4	57.1	N E	N E	S W	97.21
12	.711	.704	.680	58.0	76 2	60 2	S W	W	W	104.00
13	.675	.669	.670	54.1	70.4	52 2	S W	S W	S W	191 10
14	.862	.947	30.000	46 0	68.2	48.4	W	W	W	204 21
15	30 048	30.097	.160	48 0	64.7	50.7	W	S W	S W	77 60
16	.215	.130	.100	52.4	77.4	62.0	S W	S W	S W	90.00
17	.100	.098	.000	60 2	58.1	52.8	S W	W	W	144.12
18	29.361	29.614	29 948	53.2	42.3	36.1	W	W	W	191.10
19	30.070	.979	.925	34.0	52.1	44.0	W	W	W	516.17
20	29.499	.299	.341	42 0	44.8	42 2	S W	S W	S W	241.11
21	.625	.744	.801	40 7	58.6	47.4	W	W	W	69.74
22	.950	30.031	30.175	45.1	62.2	48.0	W	W	W	104.17
23	30 600	.581	.571	36.0	59.7	44.0	W	W	W	197.41
24	362	.2[illegible]9	.075	44.0	71.1	52 2	W	S W	S W	90 20
25	29 861	29 924	.094	59.6	53.4	44 0	S W	S W	N	101.00
26	30 400	30 462	30.500	32.1	53.0	35.0	N	N E	N E	97.44
27	.301	29.750	29 674	30.7	36.2	37.1	W	S W	S W	84 10
28	29 847	940	30 000	3[illegible] 4	54 2	36.3	W	W by N	W by N	226.41
29	30 000	30 174	.231	35 7	44 2	35 0	W by N	N	N	97.12
30	.300	.211	000	33.7	46.0	37.9	N	N	S by E	84 70
31	29.461	29.522	29 601	35.7	45.0	35.2	S by E	W	W	101.11

The highest reading of the Barometer was on the 23rd day, 30.600 inches, and the lowest was on the 20th day, and was 29.299 inches, giving a monthly range of 1.301 inches. The highest temperature was on the 16th day, and was 77°4. The mean temperature of the month was 52° 18. Rain fell on 13 days, amounting to 5.853 inches. Snow fell on 2 days amounting to 1.32 inches. The first snow of Autumn fell on the 29th day in inappreciable quantity.

Snow-birds were seen on the 30th day. A smart shock of an earthquake took place at 11.17 a. m., on the morning of the 20th day. Aurora Borealis was very fine. A very heavy gale of wind occurred on the 10th day, causing considerable damage to the shipping in the river.

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