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The Canadian Journal.

TORONTO, NOVEMBER, 1855.

## Meeting of the British Association at Glasgow.

### THE PRESIDENT'S ADDRESS.

Gentlemen of the British Association,—I know, that the duty of presiding over this Meeting of the British Association for the Advancement of Science, has been assigned to me mainly in consequence of my local connexion with the district and city in which we are now assembled. It cannot therefore be departing from the special duty of that position if I address you in the first place as one of those who are receiving the honour of your visit. I am sure I cannot express in terms too warm the feelings of this great community. It would be strange, indeed, if Glasgow did not hold out to you a cordial reception. Here, *if anywhere*, we have reason to honour Science, and to welcome the men whose lives are devoted to its pursuit. The West of Scotland has itself contributed not a few illustrious names to the number of those who have enlarged the boundaries of knowledge, or have given fruitful application to principles already known. I need not dwell on the fact that it was in this valley of the Clyde that the patient genius of Watt perfected the mechanism which first gave complete control over the powers of steam; and that it was on these waters too that those powers were first applied in a manner which has given new wings to commerce, and is now affecting not less decisively the terrible operations of war. These are but single examples, more striking and palpable than others of the dependence of the Arts upon the advance of Science. This, however, is a dependence which I am sure the citizens of Glasgow would be the first to acknowledge, and which no doubt, with them as with all men, must be an important element in the value which they set upon physical research. But I am sure I should deeply wrong the intelligence of the people of Glasgow, if I were to represent them as measuring the value of science by no other standard than its immediate applicability to commercial purposes. They seek to honour science for its own sake, and to encourage the desire of knowledge as in itself one of the noblest instincts of our nature.

It is my duty also, Gentlemen, to speak on behalf of a special body—one of which Glasgow has so much reason to be proud—I mean its ancient and venerable University. If the mechanical arts owe to this district of Scotland, the greatest impulse they have ever yet received, it is not less true that our knowledge of the laws which regulate the pursuits of industry, and determine the distribution of the "wealth of nations," has been almost founded on the researches of one whose name is indissolubly associated with this seat of learning. Here again we have an illustrious example of the mutual relations between science and politics in its best and highest definition. But, indeed, our convictions are independent of such examples. It is impossible to appreciate too highly the influence which science is evidently destined to have on the prospects of education; and we look for the time when its methods, as well as its results, will form the subject of teaching, not only as partially it has long done in our colleges, but also in the humblest of our schools. I feel it to be no small privilege arising out of the academical office which this year I have the honour of holding, to be able to assure you, on behalf of the University of Glasgow, of the deep interest with which we regard your visit, and of our high appreciation of the ends which it is your object to promote.

It is now fifteen years since the last Meeting of the British Association here. There are probably few, even annual, meetings of any considerable body of men, which are not marked by some melancholy recollections. Still more must this be the case after the lapse of so long an interval,—one which measures, as is usually reckoned, full half a generation in the life of man. Among the many vacancies in your ranks which that period has occasioned there are some which, from local association or from other causes, are naturally impressed more deeply on the mind than others. I am sure that one venerable name will rise to the memory of all who took any interest in the proceedings of 1840;—of one whose early tastes for natural science had only yielded before his devotion to a yet higher service; but whose powerful mind still sought to found all his efforts in the cause of religion and humanity on obedience to the eternal laws, which are as sure and steady in their operation over the minds of men, and over the progress of society, as are other laws over the subjects of material change. Who can forget the zeal and more than youthful eagerness with which Dr. Chalmers entered into the discussions of the Statistical Section; and how he saw in those discussions the means of spreading the knowledge of principles which are of vital interest to the welfare of the State!

But that name, though the lapse of years has not carried it beyond the region of regret, is one with which we have at least become familiar as belonging to the number of the departed great. Such is not the case with other vacancies, and especially with one which is still affecting us with almost bewildered sorrow, and an abiding sense of irreparable loss. Who shall take up the torch which has fallen from the hand of Edward Forbes? Who shall hold it as he held it to those dark places in the history of life which science is striving, perhaps in vain, to penetrate, but which seemed already opening their treasures to his fine and advancing genius?

But whilst sad recollections are thus forced upon us as regards the life of individual men, we have every reason to be satisfied with the inheritance they have left. Many labourers are gone, but the cause in which they laboured has been steadily gaining ground. Long as fifteen years may be as a period in human life, it is generally but a fraction in the history of mental progress. Yet since the last Meeting of the British Association here, I am greatly mistaken if we cannot mark great strides in the advance of science. I wish, Gentlemen, you had a President more competent than I am to chronicle that advance, and direct the retrospect to a practical and useful end. There are, however, some features so remarkable that I cannot omit referring to them, as well calculated to raise our hopes and stimulate our exertions. In that science which is the oldest and most venerable of all, I mean Astronomy, if there had been nothing else to mark the progress of discovery, the construction and application of Lord Rosse's Great Reflector would have been enough to constitute an important epoch. Its systematic operations may be said to be still only in the first stages of their progress; yet already how often do we see reference had to the mysterious revelations it has made in discussions on the principles of that science, and in not a few of the speculations to which they are giving birth! My distinguished friend Sir D. Brewster, in his recent Life of Newton, has designated that telescope as "one of the most wonderful combinations of art and science which the world has yet seen."

All who are interested in the devotion of abilities, of means and of leisure to the noblest pursuits, must earnestly wish to see Lord Rosse rewarded by that which he will value most, the steady progress of discovery. It must always be remembered, however, that Astronomy is a science of which hitherto at least it might almost be said that one great genius had left us no more worlds to conquer; that is to say, he carried our knowledge at a bound to one grand, and apparently universal law, to which all worlds were subject, and of which every new discovery had been but an additional illustration. The reign of that law, whether universal or not, was at least so wide, that we had never pierced beyond the boundary of its vast domain. For the first time since the days of Newton a suspicion has arisen in the minds of astronomers that we have passed into the reign of other laws, and that the nebular phenomena revealed to us by Lord Rosse's telescope must be governed by forces different from those of which we have any knowledge. Whether this opinion be or be not well founded—whether it be or be not probable that our limited command over time and space can ever yield to our research any other law of interest or importance comparable with that which has already been determined—still, inside that vast horizon there are fillings-in and fillings-up which will ever furnish infinite reward to labour. Of these, not a few have been secured since our last meeting here. Besides the patient work of our professed astronomers, and the good service rendered by such men as Mr. Lassell and Mr. Nasmyth, who have so well relieved the business of commercial industry by their devotion to the pursuits of science, we have had one event so remarkable, that in the whole history of astronomy it stands alone. If in looking at the wonderful objects revealed to us in Lord Rosse's telescope we turn instinctively sometimes from the thing shown to the thing which shows— from the Spiral Nebulæ to the knowledge and resources which have collected their feeble light, and brought their mysterious forms under the cognizance of the human eye,— how much more curiously do we turn from the single planet Neptune, to that other instrument which has *felt*, as it were, and found its obscure and distant orbit! So long as our species remains, that body will be associated with one of the most glorious proofs ever given of the reach of the human intellect; —of the sweep and certainty of that noble science which now honours with enduring memory the twin names of Adams and Leverrier.

In Geology, the youngest, but not the least vigorous of the sciences, every year has been adding to the breadth of its foundation—to the depth and meaning of its results. Probably no science has ever advanced with more rapid steps. In 1840 the then recent publication of the "Silurian System" had just established those landmarks of the Palæozoic world which all subsequent discovery has only tended so confirm. The great horizons which were first defined by the labours of Murchison and Sedgwick have since disclosed the same phenomena which they so accurately described, in every quarter of the globe; and the generalisations founded thereupon have been definitely established. The same period has sufficed, partly by the labours of the same distinguished men, to clear up the relative position of the strata which represent the closing epochs of ancient life, and those which form the base of the secondary age. But above all, the last few years have seen immense progress made in our knowledge of that vast series of deposits which usher in the dawn of existing forms, and carry us on to those changes, which, though the most recent, are not the least obscure of any which have affected the surface of the globe. The investigations of Edward Forbes on the laws which determined the conditions of Marine Zoology have supplied us with data altogether new on some of the highest conclusions of the science; whilst his profound speculations on the centres of creation and areas of distribution have pointed out paths of inquiry which are themselves of inexhaustible interest, and hold out the promise of great results. Another branch of investigation, which, if not entirely new, is as least pursued on a new system, and with new resources, has been opened up in Dynamical Geology by the learning and ingenuity of Mr. Hopkins; whilst the thorough elucidation of the conditions of Glacier Motion, which we owe to Prof. James Forbes, of Edinburgh, has given us clear and definite ideas in one, and that not the least important of the agents in geological change. The observations accumulated during the recent Arctic voyages have materially added to our knowledge of the operation of the same agency under different conditions—conditions which we know must once have extended widely over the firths and estuaries near where we are now assembled—leaving behind them those enduring records of the glacial epoch which were first explored by my friend, Mr. Smith, of Jordan Hill. We owe many important observations on the same phenomena, and on the various changes of sea level, to Mr. Robert Chambers. And if the thanks of science are due to those who advance her interests, both directly by adding to her store of facts or of her discovered laws, and also indirectly by investing them with popular interest, and thus enlarging the circle of observers, we must mention with special gratitude the classical works of Mr. Hugh Miller; and those writings of Sir Charles Lyell, which his indefatigable industry is ever bringing up abreast with the progress of discovery—a progress stimulated in no small degree by his own exertions,—and which are alike remarkable for completeness of knowledge, for fertility of suggestion, and for sound philosophical reasoning. I think we cannot mistake the general tendency of Geological research, whether Stratigraphical or Zoological. It has been to prolong periods which had been considered short; to divide others which were classed together; to fill up spaces which were imagined blank, and to connect more and more in one unbroken chain the course of physical change and the progress of organic life.

We pass from geology by a natural transition to another science which stands to it in close alliance If all our most sure conclusions respecting the superficial covering of the globe have been founded on the classification of its animal remains, it is not less true that our knowledge and understanding of organic structure have been infinitely extended by the means which geology has afforded of studying that structure in relation to its history in past time. In the hands of our great countryman, Prof. Owen, Physiology has assumed a new rank in science, leading us up to the very threshold of the deepest mysteries of Nature. If the last few years had been marked by no other event in the advancement of science, there would have been enough to signalize them in the publication of his treatise on the "Homologies of the Vertebrate Skeleton:" and we may recollect with pride the fact of that high argument having been first opened at a Meeting of the British Association.

A sad interest, indeed, attaches, in one direction at least, to the progress of our knowledge in Geography. All serious doubt seems to have closed now over the grave of Franklin. Even in a year during which war has been claiming the noblest victims by thousands and tens of thousands, it would ill become this Association not to mark with an expression of our sorrow and admiration the self-sacrifice of that gallant band which has perished in the cause of science. But their devotion has been

emulated, under a still higher stimulus, in the more successful career of others; and at last, in the discovery of the North-West Passage (still so-called in spite of its having been found impassable), the courage and endurance of Capt. M'Clure and his associates have ascertained with certainty a most remarkable fact in the physical conformation of the globe. Results of still larger, and certainly of more immediate interest, are being arrived at by the rapid march of African exploration,—not, surely, before the time. Every part of the *circumference* of that vast continent has been either known or accessible to us for centuries. On its soil has flourished some of the most ancient and famous monarchies; and one of its great valleys is the fatherland of science. Yet up to comparatively recent times our horizon there has been bounded by the same sands or mountains which bounded the knowledge of antiquity, and we had almost as little acquaintance with its interior as had the Tyrian merchant when his eye rested of old on the peaks of Atlas. Nothing but familiarity with the fact could have reconciled us to the ignorance in which we have so long remained of one of the largest and most interesting regions of the world. That ignorance is at last being cleared away; and the exertions of many individuals, amongst whom the names of Mr. Galton, of Mr. Anderson, Dr. Livingston, Dr. Baikie, and Dr. Barth stand conspicuous, have contributed results of the deepest interest and importance. No man who values science can fail to appreciate the extension of our knowledge respecting geography even where, as in the Arctic regions, that knowledge is pursued simply for its own sake. But it becomes invested with tenfold interest when it brings with it the largest influence on the destinies of millions of the human race; and adds, as we may confidently hope it will ultimately do in the case of Africa, an inexhaustible field for manufacturing and commercial enterprise.

In connexion with the diffusion of geographical knowledge I cannot omit to mention the magnificent publications of Mr. Alexander Keith Johnston of Edinburgh, in his "Atlas of Physical Geography.' It is seldom that such a mass of information has been presented in a form so beautiful and attractive; or one which tends so much to place the study of geography on a truly scientific basis—that is to say, on the basis of its relation to the other natural sciences, and those grand cosmical views of terrestrial phenomena which have found their most distinguished interpreter in Baron Humboldt.

The kindred science of Ethnology has received of late years great development; not only by its increasing store of facts, *but by the more scientific use which is being made of facts* which have been long familiar. The investigation of the laws which regulate the growth of language, promise to cast the most important lights on the history of our race; but the conclusions to which that investigation may lead are still matters of keen and anxious controversy, and are exposed to all that suspicion which has been directed against almost every science at some stage or other of its growth; and which, we must allow, every science has, at some stage or other, justified by hasty generalisation and premature deduction.

Of all the sciences Chemistry is that which least requires to have its triumphs recorded here. The immediate applicability of so many of its results to the useful arts has secured for it the watchful interest of the world; and every day is adding some new proof of its inexhaustible fertility. There is one department of inquiry, and that perhaps the most interesting of all, I mean Organic Chemistry, which has received an especial impulse during the last few years, an impulse mainly due to the genius of one distinguished man whom we have the honour of numbering among our guests upon this occasion. I think Baron Liebig will find in Scotland that kind of welcome which a man of science values most,—a readiness to profit by his instructions, and an enlightened appreciation among the farmers of the country of the practical value of studying in their husbandry the laws which have been revealed by his research. I am reminded, through the kindness of Dr. Lyon Playfair, of some facts which give yet a more special interest to this subject in connexion with our meeting here. It was to the British Association at Glasgow in 1840 that Baron Liebig first communicated his work on the Application of Chemistry to Vegetable Physiology. The philosophical explanation there given of the principles of manuring and cropping gave an immediate impulse to agriculture, and direct attention to the manures which are valuable for their ammonia and mineral ingredients; and especially to guano, of which in 1840 only a few specimens had appeared in this country. The consequence was that in the next year, 1841, no less than 2,881 tons were imported; and during the succeeding years the total quantity imported into this country has exceeded the enormous amount of 1,500,000 tons. Nor has this been all: Chemistry has come in with her aid to do the work of Nature, and as the supply of guano becomes exhausted, limited as its production must be to a few rainless regions of the world, the importance of artificial mineral manures will increase. Already considerable capital is invested in the manufacture of superphosphates of lime, formed by the solution of bones in sulphuric acid, the use of which was first recommended at the last Glasgow Meeting. Of these artificial manures not less than 60,000 tons are annually sold in England alone; and it is a curious example of the endless interchange of service between the various sciences that Geology has contributed her quota to the same important end; and the exuviæ and bones of extinct animals, found in a fossil state, are now, to the extent of from 12,000 to 15,000 tons, used to supply annually the same fertilizing materials to the soil. The exertions of Prof. Daubeny of Oxford on the same important subject, and the continued attention which he has devoted to it, have done much for the cause of agricultural chemistry in England; whilst the thanks both of practical and of scientific men are due to Dr. Lyon Playfair and Prof. Gregory of Edinburgh, for those admirable translations of Baron Liebig's works, which have rendered them accessible to every English reader; and have thereby had no unimportant influence in extending the knowledge of the laws affecting both vegetable and animal physiology.

*I am indebted to the same quarter for the mention of one* remarkable instance of the manner in which—to use Dr. Playfair's words—"the overflowings of Abstract Science pass into and fertilize the field of Industry." One of the newest and most obscure subjects of chemical research has been the discovery of certain conditions under which bodies, like in their composition, are nevertheless endowed with unlike properties, and thereby become convertible to new purposes. It is in the application of this principle that a gentleman of this city, Mr. James Young, has succeeded in obtaining the illuminating principle of coal gas either in a solid or liquid state; and it has proved to be a substance of immense value for the lubrication of machinery, vast quantities of it being now manufactured and sold for that purpose.

I hardly know whether it is strictly in connexion with the advance of chemical knowledge that I ought to remind you of one great discovery made long after we last assembled here;—I refer to the discovery of the effects of chloroform on the animal system; one which claims for my friend Dr. Simpson of

Edinburgh a high place indeed among the benefactors of mankind. Chloroform as a mere chemical composition had indeed been known before, and had been made the subject of elaborate research by the distinguished French chemist, M. Dumas, whom we have here the honour of receiving as a guest. But the discovery of its application is not the less a triumph of science, and of the best and highest scientific faculties. Seldom indeed has that disposition of mind which is ever ready to receive a chance suggestion, and to pursue it believing what great things we have yet to learn, been crowned with a more brilliant and direct reward.

It marks the growing sense entertained of the value of Statistical research, that, during the late session of Parliament, a committee of the House of Lords sat for a considerable time on the best means of securing a complete system of Agricultural Returns. We owe much in this matter to the exertions of the Highland Society of Scotland, and, as has been specially recorded by the committee, to the zeal and activity of their able secretary, Mr. Hall Maxwell. We owe not less, also, to the high intelligence of the farmers of Scotland generally, who have rendered every assistance in their power, and that with a willingness which can only arise from an enlightened appreciation of the great object to be gained by the inquiry.

No one has rendered more important service to Statistical science, in one of its most interesting departments, than the able Chamberlain of this city, Dr. Strang. His periodical Reports on the Growth and Progress of Glasgow are among the most curious and useful records of the kind which have been published in any part of the United Kingdom. I need hardly say that they supply materials for much reflection on many questions connected with the social welfare of the people. I believe Dr. Strang has lately visited Paris, with a view to communicate to this Meeting of the Association various facts connected with the great improvements which are in the course of progress in that city. Should his investigations cast any light on the best means of improving the dwellings of the labouring classes in the great centres of population, and on the possibility of doing so on a large scale, by public authority, he will have rendered no small service to his country in a matter of vital interest and of much difficulty.

Closely connected with the subject of Statistics, as applied to Agricultural returns, I am happy to say that, mainly owing to the exertions of Sir J. Forbes of Fettercairn, and of Mr. Milne Home, a Meteorological Society for Scotland has been established, warmly seconded by the Highland Society. The wonderful results on a great scale which have been obtained in this department of science by Lieut. Maury, of the United States, give us ground to hope that even on the small areas of individual countries, where of course, from the crossing of local influences, the general result is infinitely complicated, some approach may be made towards ascertaining the laws which regulate the seasons.

The admirable agency which is now afforded by the Kew Committee of this Association, for the verification of instruments, and by the new meteorological department of the Board of Trade under Capt. Fitz-Roy, for the deduction of local observations, will, I trust, be taken advantage of by the new Scottish Society. I cannot help congratulating the Association on the position which has been secured by science in connexion with both of these establishments. The thanks of the commercial as well as of the scientific world are due to Colonel Sabine and the other members of the Kew Committee, whose assistance is now highly appreciated by practical men, and eagerly sought for by the best instrument-makers; whilst Capt. Fitz Roy's office and duties are in themselves an acknowledgment of no small importance of the public value of systematic observation.

The increasing employment of iron in ship-building has brought into corresponding notice the uncertainty which attends the action of the compass on board vessels of that construction. This important and intricate subject has been treated of by Mr. Archibald Smith, of Jordan Hill, with all the resources of his high mathematical and scientific attainments, in publications which have appeared under the sanction and with the recommendation of the Admiralty. It will not fail to interest this great commercial city, whose freights are on every sea, that this question was taken up at the last Liverpool Meeting by Dr. Scoresby, that it has continued to occupy his close attention, and that he intends to communicate to this Meeting of the Association some of the valuable results of his investigation.

Feeling deeply, as I do, my own inability to give anything like an adequate sketch—even in outline—of the progress of science during the last few years, I remember at the same time with some satisfaction, that it is less the business of this Association to boast of the achievements which have already been effected, than to devise means of facilitating those which are yet to come. You have appointed a Parliamentary Committee for the consideration of one important branch of this inquiry. We shall doubtless hear from my noble friend Lord Wrottesley those recommendations which have been the result of its recent labours, and which will be found to owe much to his enlightened zeal, to his great knowledge and his sound judgment. In the mean time, I trust I may be allowed to make a few general observations on what appear to me to be some of the best means of promoting in this country the advancement of physical science.

It will readily be understood that, in referring for a moment here to the aid which may be afforded by the State to the advancement of science, I divest myself entirely of any official character other than that which belongs to me as your President, and that I seek to give expression to my own opinions only.

I am not one of those who are disposed to look to public authority as the primary or the best supporter of abstract science. In the main it must depend for its advancement on its own inexhaustible attractions,—on the delight which it affords us to study the constitution of the world around us, and to endeavour to understand, though it be but darkly, how the rein of its government are held. Nor am I disposed to indulge in any complaint on a matter which has lately attracted some attention among scientific men. In a great manufacturing country like ours, the disposition of whose people is eminently practical, it is perfectly natural that greater attention should be bestowed on the arts than on the abstract sciences. This, indeed, is but adhering to what has been hitherto, at least, the natural historical order of precedence; for it is a just observation of Prof. Whewell, in his lecture "On the Results of the Great Exhibition of 1851," that practice has generally gone before theory—results have been arrived at, before the laws on which they depend have been defined or understood. Art, in short, has preceded Science. But it is equally important to observe, that in recent times this order has been in numberless instances reversed. Abstract science has gone ahead of the arts, and the conduct of the workshop is now perpetually receiving its direction from the experiments of the laboratory. Perhaps the most wonderful discovery of modern days—that of the Electric Telegraph—was thought out and perfected, so far as its principle was concerned, in the closet and the lecture-

room, and flashed ready-made on the astonishment of the world. In chemistry, the lead taken by abstract science in re-acting on the arts is manifest and constant; and in greater or less degree the same result is appearing in connexion with every branch of physical research. The interest, therefore, of the State, even if it be considered merely in this economic point of view, in the encouragement of abstract science, is obvious and immediate. And there is this additional motive to be remembered: the moment any result of science becomes applicable to the arts, the unfailing enterprise of the commercial and manufacturing classes takes it up and exhausts every resource of capital and of skill in giving to that application the largest possible development. But so long as science is still purely abstract, it has often to be prosecuted with slender resources, and specially requires fostering care and a helping hand. But I rejoice to believe that the conviction of this truth is sensibly gaining ground. The foundation of the geological museums both in England and in Scotland, and the carrying out of a complete geological, concurrently with a geographical Survey, by public authority and at the public expense, were great steps in the right direction. Another such step was the investment of 1,000*l.* annually in aiding experimental research, through the agency of the Royal Society, which undertook the trouble of its special allocation. It is the intention of my noble friend, Lord Palmerston, to bring the principal of some expenditure in this direction specially under the notice of Parliament for the future; and it is worthy of remark, as illustrating how far a small sum may go in aid of abstract science, and how cheaply the largest and most fruitful results may thereby be attained, that, as I have been informed on very high authority, this apparently trivial sum has been felt as a most important help in numberless instances, sometimes in the conduct of experiments, sometimes in the publication of their results, and sometimes in securing accurate artistic delineations.

The relations now established between the Board of Trade and various branches of scientific investigation are such as lay the foundation for further progress in the same direction. I am happy to say that, in connexion with the new National Museum which is being organized for Scotland, there is to be a special branch devoted to the industrial applications of science; and that a new Professorship—one which has long existed in almost all the Continental Universities—that of Technology—has just been instituted by the Government. I am not less happy in being able to announce that to that chair Dr. George Wilson has been appointed. The writings which we owe to the pen of Dr. Wilson, and especially his beautiful Memoirs of Cavendish, and of Dr. Reid, are among the happiest productions of the Literature of Science.

I trust also that the aid of the State may be secured in providing a house and home for the scientific bodies in the metropolis. I am disposed to agree with those who attach no small importance to this consummation. When the Royal Society alone adequately represented all or nearly all who were engaged in physical science, that great body fulfilled all the necessary conditions of a scientific council. But now, when almost every separate division of science has a separate Society of its own, it has become almost indispensable that some new arrangement should be come to, in order that abstract science may have that degree of organization without which its interests will never receive the public attention which they ought to have.

The influence, if not the authority of the State, may also, I think, be most beneficially exerted on behalf of Science, through the educational rules and principles of administration of the Privy Council. But the Committee of Council, in the adoption of those rules, is necessarily governed to a certain extent by the feelings and opinions of the various churches and bodies which are the primary supporters of our existing educational system. In the last Report of the Council of the Geographical Society, they announce a communication from the Committee of the Privy Council, requesting the Society to appoint an Examiner in Geography, to be associated with other examiners on other branches of education. It may be well worthy of consideration, whether the same expedient might not be usefully adopted in reference to other branches of science, which have hitherto formed a less admitted part of ordinary instruction.

And this, Gentlemen, brings me to say, that the Advancement of Science depends, above all things, on securing for it a better and more acknowledged place in the education of the young. There are many signs that the time is coming when our wishes in this respect will be fulfilled. They would be fulfilled, perhaps, still more rapidly, but for the operation of obstructing causes, some of which we should do well to notice. How often do we find it assumed, that those who urge the claims of science are desirous of depreciating some one or more of the older and more sacred branches of education! In respect to elementary schools we are generally opposed, as aiming at the displacement of religious teaching; whilst in respect to the higher schools and colleges, the cudgels are taken up in behalf of classical attainments. A remarkable example of the influence of these feelings will be found in a speech delivered by Lord Lyndhurst during the late session of Parliament. With all the power of his dignified and commanding eloquence, he asserted the right of the elder studies to their time-honoured pre-eminence; and in the keen pursuit of this argument even he was almost tempted to speak in a tone of some depreciation of those noble pursuits in which the University of which he is a distinguished ornament has won no small portion of her fame. But surely no enlightened friend of the natural sciences would seek to challenge this imaginary competition. Perhaps, indeed, like other zealous advocates, we may have sometimes overstrained our language, and have thereby given such vantage-ground to prejudice, that it has been enabled to assume the form of just objection. We cannot too earnestly disclaim the idea that the knowledge of physical laws can ever of itself form the groundwork of any active influence in morals or religion. Any such idea would only betray our ignorance of some of the deepest principles of our nature. But this does not affect the estimate which we may justly put on an early training in the principles of physical research. That estimate may be not the less a high one, because it does not assign to science what belongs to other things.

There is one aspect in which we do not require to plead the cause of science as an element in education, and on that, therefore, I shall not dwell. I mean that in which certain applied sciences are recognized as the essential bases of professional training; as, for example, when the engineer is trained in the principles of mechanics and hydrostatics, or the physician in those of chemistry. Of course, with every new application of the sciences to the arts of life this direct influence will extend. But what we desire, and ought to aim at, is something more. It is, that abstract science, without special reference to its departmental application, should be more recognized as an essential element in every liberal education. We desire this on two grounds mainly: first, that it will contribute more than anything else to the further advancement of science itself; and, secondly, because we believe that it would be an instrument of vital benefit in the culture and strengthening of the mental powers.

But, as regards both of these great objects, we must remember that much will depend on the manner in which elementary instruction in science is conducted; on the conception, in fact, which we entertain of what science really is. Nothing can be easier than so to teach science as to feed every mental vice or weakness which obstructs the progress of knowledge, or blinds men to every evidence of new truths, in self-satisfied contemplation of the few they have already ascertained. May we not illustrate this by the effect which has not seldom been produced by the scientific education of professions? It is true, indeed, that professional men have often enlarged the field of science by the discovery of new and important truths. Some of the strongest-armed pioneers of science have been of this class. But how have their discoveries been too often received by their professional brethren! How many of them have been assailed by every weapon in the extensive armoury of prejudice and bigotry! How many of them have had their name recognized only after it had been written on the grave; and over whom we might well repeat the noble lines—

> .....Now thy brows are cold
> We see thee, what thou art, and know
> Thy likeness to the wise below,
> Thy kindred with the great of old!

What we want in the teaching of the young is, not so much the mere results, as the *methods*, and, above all, the *history* of science. How, and by what steps it has advanced; with what large admixture of error every new truth has been at first surrounded; by what patient watchings and careful reasonings; by what chance suggestions and happy thoughts; by what docility of mind, and faith in the fulness of Nature's meanings; in short, by what kinds of power and virtue, the great men, aye, and the lesser men of science have each contributed their quota to her progress: this is what we ought to teach, if we desire to see education well conducted to the great ends in view. It is not merely for the sake of investing the abstractions of science with something of a living and human interest, that we should recall and revive these passages in her history: nor is it merely to impress her results better on the memory, as we fill up from biographies and other sources of information, the meagre page of the general historian. It is for something more than this. It is both that they may be more encouraged to observe nature, and that they may better understand how to do so with effect. It is that they may cultivate that temper of mind to which she most loves to reveal her secrets. And as regards those whose own opportunities of observation may be small, it is that they may better appreciate the labours of others: and may be enabled to recognize, in the midst, perhaps, of much extravagance, the tokens of real genius, and in the midst of much error the golden sands of truth.

It is one of the many observations of Sir C. Lyell which have a much wider application than that to which they were specially directed, that the mistake of looking too exclusively to the grand results of geological change, and of referring them too readily to sudden agencies of tremendous activity and power, tended to check the advance of that science, by discouraging habits of watchfulness over those operations which are contemporary with ourselves, and the secret of whose power is to be found in the lapse of time. An effect precisely analogous is produced on the progress of science as a whole by a similar method of regarding it. And even when the history of that progress is attended to at all, there is a natural disposition to look back to a few great names among the number of its chief promoters, as beings who, by dint only of some unapproachable superiority of intellect, have taught us all we know. It is true, indeed, there have been a few such men; just as there have been periods of sudden geological operations, which have upheaved at once stupendous and enduring monuments. But even in respect to those great men, it will often be found that at least one great secret of their power has lain in virtues which might be more common than unfortunately they are found to be. That openness and simplicity of mind which is ever ready to entertain a new idea, and not the less willing that it may be suggested by some common and familiar thing, is one of the surest accompaniments of genius. But it is clearly separable from extraordinary intellectual power, although, where both are found together, the great results produced are too often attributed to the more brilliant faculty alone. Prof. Whewell, in his most interesting "History of the Inductive Sciences,' whilst deprecating the degree of attention which has been paid to the well-known story respecting the origin of Newton's thought on gravitation, has nevertheless stated, with his usual clearness and precision, the essential truth which the traditions of science have done well to cherish. Those who have been competent to judge of the calibre of Newton's mind, of its powers of pure abstract reasoning, have with one voice assigned it the highest place in the records of human intellect. Doubtless, it was those powers which enabled him to *prove* what otherwise would have remained conjectured. But it is not the less important to observe, that the suggestion on which these powers were called to work was one eminently characteristic of a mind where simplicity and greatness were indeed synonymous. That the celestial motions, about which so many wonderful facts were then already known, and which had been referred to so many mysterious and imaginary forces, should be indeed identical in kind with the motions which took place close beside him, and that the same rules should be applicable to each, this was an idea in which, to use Dr. Whewell's words, "Newton had no forerunner." We do not need to compare the relative importance of those qualities of mind which are indicated in the first conception of such an idea, and of those other qualities which could alone crown it with demonstration and add it to the number of established truths. For the attainment, by a single individual, of results so grand and so complete as those which were reached by Newton, each was necessary to the other. But characteristics, which were in him united, have not the less had their separate value when divided in other men; and it cannot be too often repeated, that habits of wakeful observation on the commonest phenomena of nature are often alone enough to yield a rich harvest to the man of science, and to crown his labours with an immortal name. This has been a result of continual recurrence in the progress of knowledge. It is the expression and evidence of a truth of equal importance in the moral and the physical world, that the common things which surround us in our daily life, and many of which we do not really see, only because we see them too often and too familiarly, are governed by principles of infinite interest and value, and whose range of application is wide as the universe of God.

And this brings me to say a word on the value of instruction in Physical Science, not merely with a view to its own advancement, but as in itself a means of mental training and an instrument for the highest purposes of education. It is in this latter point of view that its claims seem to be least admitted or understood. We may bear an exception made in favour of the exact sciences, which involve the application of mathematical knowledge, since this has been long recognized as requiring the highest intellectual exertion; but with regard to other sciences, how often do we hear them condemned as afford-

ing "mere information," and as tending in no sensible degree to strengthen and invigorate the mental powers! But, again I say, this would entirely depend on how science is to be taught —whether by a mere cramming of facts from manuals, or by explaining how and by whom former problems have been solved,—what and how vast are other problems yet waiting for, and capable of solution. And even where the researches of physical science can do little more than guide conjecture, or illustrate merely what it cannot prove, how grand are the questions which it excites us to ask, and on which it enables us to gather some amount of evidence! In Geology, is it true, or is it not true, that, "we can see no trace of a beginning—no symptom of an end?" To what extent, and in what sense are we yet entitled to say, that there has been an advance in organisation as there has been advance in time? In Physiology, what is the meaning of that great law, of adherence to type and pattern, standing behind as it were, and in reserve of that other law by which organic structures are specially adapted to special modes of life? What is the relation between these two laws? and can any light be cast upon it, derived from the history of extinct forms, or from the conditions to which we find that existing forms are subject? In Vegetable Physiology do the same, or similar laws prevail,—or can we trace others, such as those on the relations between structure, form and colour, of which clear indications have already been established, in communications lately made to this Association by Dr. M'Cosh and Dr. Dickie of Belfast? In Chemistry, how is it that some of the most powerful actions escape our finest analysis? In Medicine, what is the action of specifics? and are there no more discoveries to be made such as rewarded the observation of Jenner, in the almost total extinction of a fearful and frequent scourge? It is in reference to such great questions, and ten thousand others equally interesting and important, that the pursuits of science call forth the highest activities of the mind and exercise every power of thought and reasoning with which it has been endowed.

Indeed, it may fairly be questioned whether those sciences which are called exact, are necessarily the best preparation for the actual business of the world. It is the rare exception, and not the rule, when exact and perfect demonstration becomes applicable to the affairs of life. In general, men have to balance between a thousand probabilities, and to take into account a thousand conflicting tendencies. Surely there can be no training better than that which teaches us by what careful inductive reasoning—by what separation between permanent and accidental causes—by what constant reference from the present to the past, and from the past back again to the present, our existing knowledge has been attained in the paths of physical research. It is true, indeed, that where men's passions and prejudices are much concerned, no amount of teaching will ever induce them to follow or attend to the best methods of arriving at the truth. But even where there are no such disturbing causes, where moderate and candid men are expressing their sincere convictions, how constantly do we hear them ascribing effects to causes, which the slightest habit of correct reasoning would have been sufficient to dismiss! In questions of great social or political, as well as of philosophical importance, the want of such habit is often most painfully apparent, and serves in no small degree to retard the progress of mankind. The necessity of considering all questions with reference to fundamental principles, or laws, and these again with reference to the disturbing causes which delay or suspend their operation, the mode of weighing evidence, and the degree of value to be attached to that which is of a merely negative kind—these are things of which we are perpetually reminded in the pursuits of science; and these surely are no useless lessons, whether in religious, social, or political affairs.

And then there is another consideration of no small importance. As Science has now come to a stage in her progress, when she heads the Arts, and flings back upon them her reflected light, so also has she now reached a degree of development which casts some rays forward on questions of higher import than those which she can fully answer. It is in vain that we try to draw definite lines between the physical and the metaphysical—between the secular and the religious. There is a felt relation between the laws which obtain in each—such, indeed, as we might expect to find in provinces of a universal empire. The consequence is, that in every speculation on those higher questions on which men will and must speculate—in every system of Philosophy, whether ancient or modern, they draw not merely their illustrations, but not a few of their conclusions from science, or from that which passes by the name. If, therefore, her discoveries, and above all, her methods and her history, be but partially and superficially understood, the popular mind will be a perpetual prey to the most specious forms of error. But that history teaches caution. It is full of warning as well as of example. In being a history of the progress of knowledge, it is a history also of the obstructions which knowledge has encountered, and an index of those to which she is still exposed. The influence of opinions and theories preconceived—of rash conclusions, and of false analogies, has been, and still is, a perpetual source of danger. So much is this the case, that we soon learn to receive with extreme caution the inferences drawn by men of science from the facts they may bring to light, wherever these inferences touch upon other departments of knowledge. The relation in which a new fact or law stands to others is seldom at once rightly understood. It is only through fightings and controversies of every kind that it gradually finds its place; and becomes, not unfrequently, an instrument in defence of truths which at first it was supposed to sap and undermine. I do not mean to say that the full meaning of the discoveries of science is always brought to light. Far from it. It would be more true to say that their ultimate meaning is never reached; and that for every question which Science answers, she propounds another which it is beyond her powers to solve. But in this we may see the strongest of all arguments against our entertaining any fear of Science as regards the interests of Religion. It is sometimes proudly asked, who shall set bounds to Science, or to the widening circle of her horizon? But why should we try to do so, when it is enough to observe that that horizon, however it may be enlarged, is an horizon still—a circle beyond which, however wide it be, there shine, like fixed stars without a parallax, eternal problems in which the march of science never shows any change of place. If there be one fact of which science reminds us more perpetually than another, it is that we have faculties impelling us to ask questions which we have no powers enabling us to answer. What better lesson of humility than this—what better indication of the reasonableness of looking to a state in which this discrepancy shall be done away—when we shall "know, even as we are known!"

But, gentlemen, I have already detained you too long, and occupied your time far less profitably than it would have been occupied by many who are present on this occasion. The hospitality of this great city will afford you, I trust, a pleasant, and your own exertions will secure a profitable meeting. You may well engage in its business and discussions, with a sense

of the high interest and value of your pursuits—not less interesting in themselves—not less conducive to the progress and happiness of mankind—not less tasking the noblest faculties of the mind, than those which engross the attention of jurists, of soldiers, or of statesmen, when their motives are the purest, and their objects are the best.

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## Coleoptera collected in Canada.*

By William Couper, Toronto.

*For Authorities and Synonyms, see Melsheimer's Catalogue.*

### AUCHOMENUS

EXTENSICOLLIS Say; *Leconteï* Dej.

Palpi 4; pair beneath the mouth 2-articulate: second pair longer, 3-articulate; *antennæ*, 10-*articulate*; thick and smooth at base; 9th to apex slightly villous; head of a greenish color, and polished, rather rhomboid in form; thorax of a greenish color, polished, with a longitudinal sulcus through the disc, the margin narrow and more elevated posteriorly; elytra slightly tinged with purple, polished, striate, 8 striæ on each elytron—from the posterior region of scutellum abbreviated striæ occupies each side of the suture; body beneath black; femoræ, tibiæ, and tarsi yellowish-red. Toronto, common. Length 4¼ lines.

Taken in lat. 54°.—*Kirby.*

### ANISODACTYLUS

(?) ELLIPTICUS LeConte; Pr. Acad. N.S.

Black. Jaws strong, and, when constricted, are covered by a lamellate organ; palpi 4: 2-articulate, length equal; antennæ reddish, 10-articulate, the basal articulation thickest and longest: second shortest, and the apex obtuse; head wider than long, the eyes very *prominent, with a transverse cavity on* top and in a line with the base of the antennæ; thorax with an obscurely longitudinal line through the disc, margined, smooth *anteriorly, the angle in a line with the eyes*: depressed, granulate without polish posteriorly; elytra margined, striate, 8 distinct striæ on each elytron; femoræ, tibiæ, and tarsi reddish-yellow: the posterior tibiæ densely toothed. Toronto, common. Length 7 lines.

### OCHTHEDROMUS

TRANSVERSALIS *Dej.*

Palpi 4: pair beneath the mouth 2-articulate, the apex pointed—second pair 3-articulate, longer, and pointed at the apex; antennæ 11-*articulate*, slightly villous; head and thorax black, polished, the latter narrow posteriorly; elytra striate, punctured in the striæ, the latter rather obsolete towards the margin; one yellow spot behind each shoulder, and another occupy the margin on each side near the apex; body beneath black; femoræ, tibiæ, and *tarsi yellowish*. Toronto, common. Length 2¼ lines.

### COPRIS

AMMON Fabr.; *minutus* Drury.

♀. Entirely black; clypeus rounded in front, extending on each side beyond the eyes, having a slight protuberance on top; thorax margined, rather prominent, with densely minute punctures; scutellum obsolete; elytra furrowed, longer than the thorax, and margined; femoræ strong; tibiæ small at the base, thickened towards the tips, and armed with spines. Toronto, not common. Length 4½ lines.

### THANEROCLERUS

SANGUINEUS Say; *Mels. Cat.* p. 83.

Antennæ 11-articulate, thicker at the apex; head dark purple, finely punctured, and interspersed with short hairs, truncate in front; thorax narrower behind than the elytra, and of a dark purple colour, also interspersed with short hairs; the punctures are more distinct than on the head; elytra blood-red, densely punctured, and covered with short stiff hairs; body beneath and legs reddish. Toronto, under the bark of trees; not common. Length 2 lines.

### CONOTRACHELUS

Closely allied to *C. nenuphar*, Hbst.

General color rusty red; proboscis curved, the sides margined about half its length from the base, and wider at the apex, which is black; antennæ elbowed, placed about the middle of proboscis; eyes black; head short, and narrower than the thorax—the latter is granulate, and through the centre of which runs an abbreviated, polished, elevated line, with a raised polished dot on each side: narrower than the elytra; the elytra are densely punctured, and ridged with polished protuberances in front, and a broad fascia of white silky hairs, on which the punctures are rather obsolete—behind which a protuberance occurs on each elytron near the apex; femoræ clavate—posterior pair toothed. Length 2¼ lines.

This weevil destroys the butternut (*Juglans cinerea*). About the middle of August, the diseased nuts may be found beneath the trees growing on the Don flats. They are generally punctured in the side, and each contains one or two *larvæ*. I have not ascertained the time in which the *ova* are deposited, but for the purpose of discovering the *imago*, I selected about twenty of the diseased nuts, which were placed in a situation suitable for their metamorphosis. In a short time the nuts turned black, resembling an earthy substance, and in this state I examined the *larvæ* more closely; only two had become *pupa* and formed cocoons, the remainder (about twenty-four) were attacked by a Dipterous parasite, and destroyed. The two specimens obtained appeared in the *imago* state on the 27th of August.

### TRAGOSOMA

HARRISII Lec. J. Acad. 2d, 2, 107.

Antennæ 10-articulate, the basal articulation short and thick: 2d longer, and knobbed near its connection with the 1st; head short, inclining down, the eyes almost connect on top; thorax broader than long, and much narrower than the elytra—rather rugose from the number of punctures, with a short spine on each side; scutellum bell-shaped; elytra long, covered with close impressions and very fine longitudinal elevations; breast downy; color dark chestnut. Toronto, very rare. Length 1 inch, 1 line.

My specimen was found dead in July last on the Island opposite Toronto. It evidently had been sometime in the water, which destroyed much of its natural color and freshness.

### CALLIDIUM

VIOLACEUM Linn. Harr. Ins.

Of a beautiful blue or violet color; thorax transversely oval; elytra irregularly punctured. Varies in length from 4-10ths to 6-10ths of an inch, and may be found from the middle of May to June. It is very fond of pine.

I have not met a living specimen in the vicinity of Toronto. The only Canadian specimen in my collection is without the head; it was given to me by Mr. Ibbetson, who says it is rare. My description is from Mr. Harris.

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* See pages 210, 256, and 324 of this *Journal.*

CLYTUS

UNDULATUS Say; *undatus* Kirby. *Sayi* Lap. teste Hald.

Antennæ 10-articulate: a white spot at the base of each; head black, short and truncate in front; thorax globular, of a soot color, finely granulate on top, with a ring of whitish hairs on the margin in front, and slightly cinereous on each side posteriorly; elytra covered with short hairs of a lighter color than thorax, and marked as follows:—About one line behind each shoulder angle, a white spot forms an arch, and from the region of scutellum a white line occupies the suture, connecting with an oblique branch which crosses from the lateral margin, and from the latter oblique branch two longitudinal lines point posteriorly—the outside line joins the margin, the inside one joins the sutural line, enclosing a square spot of the ground color on each side of the suture: the apex is spread apart and margined with white; anterior legs short, posterior pair long; body ringed with white. Toronto and Owen Sound, not common. Length 7¼ lines.

Taken by Sir John Richardson on the shores of the Arctic Sea, mouth of the Mackenzie river.

FLEXUOSUS Fabr.; *angulatum* Fabr.; *picta* Drury; Harris's Insects, p. 85; *robiniæ* Forst.; *ziczac* Voet.

Velvet black; three transverse yellow bands on the head, four on the thorax, and six on the elytra—the tips of which are also edged with yellow; the 1st and 2d bands on elytra are almost straight, 3rd band forms a V, or, united with the opposite one, a W, as in *speciosus*—the 4th angled, and runs upwards on the inner margin towards the scutel, the 5th is broken or interrupted by a longitudinal elevated line, and the 6th is arched, and consists of three little spots; antennæ dark brown; legs rust-red. Varies from 6-10ths to 3-4ths of an inch in length. In September on locust trees, flowers of golden rod, and other flowers.—*Harris.*

In September last, I witnessed in a garden in Montreal, in which grew the species of locust attacked by these beautiful beetles—their singular attachment and propensity to destroy the above mentioned ornamental trees—an account of which is truthfully given by Mr. Harris in his Insects Injurious to Vegetation.

LEPTURA

8-NOTATA Say.

Palpi 4; antennæ 10-articulate; head black, wider than thorax—the latter black, polished, narrower anteriorly than posteriorly, much narrower than elytra, and interspersed with yellow hairs; elytra black, polished, densely punctured and covered with yellow hairs: four yellow spots on each elytron, and wider across the shoulders than at the apex—the latter spread apart; anterior femoræ and tibiæ black, tarsi with brush-like appendages; upper section of posterior femoræ yellow, posterior tibiæ black, and the tarsi yellow; body beneath, black, polished. Toronto, on wild parsnip; not common. Length 4½ lin.

MELANDRYA

STRIATA Say; *thoracica* Mels. Pr. Acad. (var. *a*); *bicolor* Mels. Pr. Acad. (var. *b*).

Palpi moniliform, 3-articulate, 2nd articulation shortest; antennæ 11-articulate, the 2nd basal articulation shortest; head, in the centre, as broad as long; thorax almost deltoid in form: finely punctured, with three hollows on top—the central one longitudinal, the marginal ones abbreviated; scutellum smooth rounded posteriorly; elytra striate, eight punctured striæ on each elytron. Length 6 lines. Toronto, common. They are generally found in decayed wood.

The color of the above is black. Specimens were sent to me from the north-western part of the Province, which are of a dull chestnut color, with red thorax; they may be the varieties cited in Melsheimer's Catalogue.

## The Laying of the Foundation-Stone of the Hall of the Canadian Institute.

On Tuesday, November 14th, His Excellency the Governor-General laid the foundation-stone of the Hall of the Institute, about to be erected on the handsome and extensive building site on Pembroke Street, presented by G. W. Allan, Esq. The ceremony took place at three o'clock in the afternoon, under most favourable and auspicious circumstances. A guard of honour, of the Enrolled Pensioners, was in attendance with their band. The members of the Institute assembled in Moss Park, whence they marched in procession to the building site, to receive His Excellency the Governor-General. His Excellency the Governor-General was attended by the Hon. Inspector-General Cayley, and Aides-de-camp Colonel Irvine and Captain Retallack. He was received with the usual military salutes, and was conducted by the Council of the Institute to a platform prepared for the purpose. Surrounding the platform on which His Excellency stood, elevated galleries were erected, one on the north for ladies, one on the west for members of the Institute, and one on the south for the Public—all of which were well filled. The ceremonies were commenced by the President of the Institute reading the following Address:—

*To his Excellency Sir Edmund Walker Head, Baronet, Governor General of British North America, &c. &c. &c.*

MAY IT PLEASE YOUR EXCELLENCY:—

We, the President, Council and Members of the Canadian Institute of Upper Canada, beg leave to renew the assurances of our devoted loyalty to Her Majesty, and to express to your Excellency the high gratification with which we see in the representative of our gracious Sovereign, one who, by the distinction achieved by him as member of the most ancient University in the empire, has given the best evidence of his personal interest in the cause of learning.

Permit us on this the first occasion of our unitedly addressing your Excellency, most respectfully to offer to you our cordial welcome to the capital of Upper Canada, and to express to you the satisfaction with which we are animated by the assurance, that, while your wisdom and experience will guide you in those responsible administrative duties which lie beyond the sphere of our objects, your distinguished academical career furnishes guarantee for your generous sympathy and encouragement in all that relates to the progress of those objects for the promotion of which we are associated together.

The Canadian Institute, founded in the year 1849, and incorporated by Imperial charter in 1851, has been established for the encouragement of learning and the developement of

science and the arts throughout this province. Originally instituted by a small body of gentlemen united for the purpose of promoting one special branch of practical science, it has since extended its aim so as to embrace the widest range of a scientific and literary society, and now numbers upwards of four hundred members, resident in all parts of the Province. The steps adopted for carrying out these comprehensive objects have been :—

Firstly. The formation of a Library of Scientific Reference, available to the public at large, and which, now that an amalgamation has been effected with the Toronto Athenæum, and the books of both institutions have been united, already constitutes the nucleus of a Library from which valuable results may be anticipated.

Secondly. The establishment of a Museum, with a special view to the illustration of the Natural History and Mineral Products, and the Economic and Industrial Resources of the Province, as well as the Ethnological and Archæological contributions to history which specially pertain to this important section of the new world.

Thirdly. The reading of original, scientific and literary communications, and discussion of the subjects thus introduced at weekly meetings held in Toronto during the winter session. And,

Fourthly. The publication of a Monthly Journal, which has now been in successful operation for more than three years, and forms not only a report of the proceedings of the Institute and of other scientific bodies in the province, but is designed to embody a record of the intellectual and economic progress of Canada, as well as to furnish an abstract of scientific proceedings throughout the world.

In accomplishing these objects the Institute has greatly to acknowledge the liberal encouragement of the Government by means both of an annual grant of money and by free accommodation furnished for a time in the Government House. The withdrawal of the latter, consequent on the transference of the Seat of Government to Toronto, added to the requisite increase of space rendered indispensable for completing the scheme of establishing a Provincial Scientific Library and Museum, have mainly contributed to force upon us the necessity of providing adequate and becoming accommodation in a building of our own. In furtherance of this we have to acknowledge the gratifying recognition of the public benefits already resulting from this Institute, in the important aid extended to us by the Provincial Government for this special object, in addition to the liberality of many of our own members, and especially the valuable gift of this site, presented to the Institute by George W. Allan, Esq., and now to be dedicated with your Excellency's gracious aid to the cause of Canadian science and scholarship.

Animated by the assurance of your Excellency's cordial sympathy in such a cause, we hail your presence among us this day as an evidence of your approbation of the objects aimed at in our union as members of the Institute, and of your appreciation of the value of such institutions for promoting the diffusion of knowledge and the advancement of science and sound learning, on which the true glory of this great Empire is founded, and by which the future greatness of this Province must be advanced.

Permit us, then, to crave of your Excellency on this auspicious occasion, when we are assembled to found a building to be devoted exclusively to the peaceful objects of intellectual emulation, that you will be graciously pleased to commence the work for us by *laying the first stone.*

His Excellency read the following reply :—

Mr. President and Gentlemen of the Canadian Institute,—

If my presence here this day can benefit the Institution to which you belong, I feel that you have a double claim upon me.

Indirectly I have been the means of turning you out of house and home: the least I can do is to help in inaugurating your new dwelling. But the intrinsic usefulness of a society such as yours, is the strongest reason why I would do my best to promote its interests.

The means which you have adopted for diffusing a taste for Science and Literature, seem well calculated for attaining heir end.

Your Museum, your Lectures, and your Journal, all tend to produce those feelings which are essential to progress in knowledge of all kinds. They encourage the conviction that every fragment of information, and every scrap of knowledge is valuable, without reference to its immediate practical utility. A fact established is so much gained towards the sum total of human knowledge, and no man can say in what train of reasoning that fact may hereafter prove a stepping stone.

The stores of your library will serve to supply the refinement of taste, and the cultivation of the intellect, which enables one man to impart knowledge to another in its most attractive form, which make the act itself of learning, a relaxation and a pleasure.

I receive with the utmost satisfaction the assurance of your loyalty to our gracious Queen.

As regards myself personally, your Address is far too flattering in every way; *but I thank you for your welcome to Toronto,* and I trust that my readiness to lay the first stone of this building will be taken as a mark of my desire to promote on all occasions the interests of the Canadian Institute.

G. W. Allan, Esq., then advanced and said :—

Mr. President, and gentlemen of the Canadian Institute,—I have much pleasure in presenting you with a deed of the site, on which your building is to be erected. In doing so permit me to express my gratification to have it in my power to promote in any way the objects of an Institution in whose welfare I feel so deep an interest. Having been connected with it from its

commencement, I have watched its progress to its present state of prosperity, and I look forward with no small degree of pride as a Canadian to the arrival of that day when this body will be entitled to take rank among similar bodies in any part of the world. I trust that this day's proceedings will give a fresh stimulus to the Society; and when I recollect the different scene presented here, not many years ago, when the most sanguine would not have anticipated that ground, then covered with forest, would now be the site of a building dedicated to the advancement of science, I am happy to have been in any way instrumental in providing a permanent site for an Institution, whose name, I trust, will ere long be favorably known far beyond the precincts of Canada.

The President of the Institute replied:—

Mr. Allan,—The Canadian Institute accepts with grateful acknowledgement your very liberal gift; and I feel that I could scarcely express too strongly the sense entertained by the Council and Members of the Institute of the obligation which you have conferred upon them.

They are well aware of the pecuniary value of the donation, for they are not ignorant of the large prices which in this prosperous city can be readily obtained for land less eligibly situated; and I need not tell you how materially the value has been enhanced by the grant coming so opportunely at the moment when the patronage of the Legislature has enabled the Institute to proceed in the erection of a building, and when the means were wanting for procuring a proper site on which to place it. This they now possess through your kindness; and the Canadian Institute and its friends will seldom look upon the handsome and commodious structure by which they intend this ground shall be adorned, without recollecting how much they are indebted for it to your respect for science and to your known disposition to co-operate heartily and generously in any measure by which the character of your countrymen may be elevated, and their rational enjoyment promoted.

The Rev. H. J. Grasett, Rector of St. James's, then offered the following prayer, during which solemn service every head was uncovered:—

O Almighty God, Father and Creator of all; Thou who by wisdom didst make the heavens and lay the strong foundations of the earth, we bow before Thee and humbly offer up our prayers and supplications for a blessing on our present undertaking.

In all our works we depend on thy protection and power. Enable us to begin, continue and end them all in Thee; for, O Lord, there is no wisdom like thy wisdom, no power like thy power, and therefore no dependence secure from disappointment, but that of making Thee our trust.

Make us always mindful that in the important purposes for which we are here associated, we have constant need of that illumination to guide us, which cometh down from above. And do Thou so bless our endeavors that those who shall here pursue the study of thy laws and of thy works, may be impressed with a due sense of the motives from which they should act, and the ends which they ought to seek in the whole course of their life. Thus may they pass their days and pursue their investigations with comfort and satisfaction to themselves, and through thy mercy in Christ Jesus, enter into thy eternal rest when the hour of their departure shall arrive.

We pray Thee to sanctify the pursuits of this Institute and of every kindred Society, and cause them to redound to thy glory and to the good of mankind. O let not infidelity be suffered to extend its deadly influence among men. And do Thou not only preserve the profession of Christianity in the world, but pour forth the Grace of thy Holy Spirit on all who believe in its truth, that they may show forth a greater zeal in its cause and adorn it by a more holy example.

Grant that the days of peace may return, and with them abundance of grace. Let the light of thy Holy Word and the blessings of civilisation resulting therefrom spread abroad in all lands. O hasten on and delay not the day, when all from the least to the greatest shall have a true knowledge of Thee and thy ways—when men shall beat their swords into plowshares, and their spears into pruning hooks, when nation shall not lift up sword against nation, nor learn war any more. But if it be not yet thy will to put an end to the distress of nations, we earnestly pray Thee to show mercy to afflicted individuals, by making the sufferings which they have to endure in this life the means of their looking for that blessed hope, and the glorious appearing of our Saviour Jesus Christ.

Make us all sensible of what we owe to Thee, for our quietness at home; for the uninterrupted administration of the means of grace: and for the blessings of civil and religious liberty which we so abundantly enjoy. Give us grace to make such a diligent use of these blessings, as to be daily improving in faith, holiness, charity, and all other christian virtues; that whatever be the events which in thy righteous providence Thou mayest permit to take place in the world, or however they may affect us in our temporal circumstances, our souls may hereafter be received into thy heavenly kingdom.

These mercies we ask in the name of Our Lord and Saviour Jesus Christ: through whose mediation we hope for them, and to whom, with thyself, O Father, and the Holy Ghost, be glory for ever and ever. Amen.

A handsome silver trowel was then presented by the architect, Fred. W. Cumberland, Esq., to his Excellency, who proceeded to perform the ceremony of laying the foundation stone. Beneath the stone in a cavity prepared for the purpose were deposited the Royal Charter of the Institute, a list of its Officers, a copy of the Address presented to his Excellency, and a copy of the 1st number of the Canadian Journal.

The ceremony being completed, the President addressed the Governor General, as follows:—

May it please your Excellency:—

Though the Society whose home is to be upon this spot,—through many years, as we hope, of increasing usefulness,—is but of recent origin, its members form already a numerous body, and are widely dispersed over the province. It will give great pleasure to those of them who are absent, to learn, as it has to those who on this occasion are present, to witness the auspicious commencement of our projected building. And they will all be grateful to your Excellency for the part which you have condescended to take in this proceeding.

The efforts of the Canadian Institute to accomplish the objects for which it was organized, must for a time be feeble; and to speak of the benefits which we trust it may be the means of conferring, it becomes us to express our hopes rather than our conviction.

Yet the country which is to be the field of its operations is seen by your Excellency to be one of great promise, and if it shall please the same good Providence which has given to us in such abundant measure the elements of material prosperity, to bless us with the continuance of peace, and to maintain among our people the same respect for law and order which has hitherto honorably distinguished them, it cannot be unreasonable to expect that some among the natives of Canada will become eminent in the walks of science, and obtain a celebrity which will shed lustre on the country of their birth.

The Government and the Legislature of the Province, which have made such strenuous efforts for the diffusion of elementary instruction among all classes of the people, have done much to encourage the Canadian Institute in the early stage of its progress, and we have no reason to doubt that they will extend to it their continued countenance and support.

The GOVERNOR GENERAL replied—Mr. President: Before quitting this spot, I must express my perfect concurrence in those hopes to which you have just given expression. I see every reason to hope that the future of Canada may make her as distinguished in literature and science as she is at present in material prosperity. I find additional reason to hope this when I see that a single individual, Mr. Allan, has shown so much zeal and liberality in the cause by his gift on the present occasion. It gives me double pleasure to assist in the ceremony of laying the foundation-stone of the Canadian Institute, when so noble a donation has been made by one of its members.

The proceedings were closed with hearty cheers for His Excellency the Governor-General, who, with his suite, drove from the ground while the band was playing the National Anthem.

## THE CONVERSAZIONE.

On the evening of the same day (Tuesday, Nov. 13th), the members of the Institute assembled, by invitation, at Moss Park, the residence of G. W. Allan, Esq., Vice-President. His Excellency the Governor-General was present, together with a number of distinguished members of the present Government. Refreshments were abundantly supplied to a very large number of visitors; and various rooms on the first floor of the mansion were severally devoted to the exhibition of works of Art, Natural History, and rare Microscopic preparations. Two papers were read, one by Professor Wilson, of University College, on "Some Associations of the Canadian and English Maple;" and the other by Paul Kane, Esq., entitled, "Notes of a Trip to Lord Selkirk's Settlement on Red River, Hudson Bay Company's Territory." Mr. Kane exhibited various sketches in oil of many attractive scenes in North-Western life. Professor Wilson's paper we give at length below:—

## SOME ASSOCIATIONS OF THE CANADIAN AND ENGLISH MAPLE.

*By* DANIEL WILSON, LL.D., *Professor of History, University College, Toronto.*

On this auspicious occasion, when the members of the Canadian Institute assemble together under such unwonted circumstances of social intercourse, it may, perhaps, be thought pardonable to select a subject which admits of treatment more in the recalling of some ancestral festive associations, than in any new contribution to the scientific or literary acquisitions which are presumed to constitute the attractions of our ordinary meetings. With this object, therefore, our Canadian Maple and its English congener have been selected, as a theme associating some pleasant ideas of the old world with those of the new.

The ancient virtues ascribed to the English Maple appear to have been derived by our ancestors from that hardy race of Northmen, by whom it is no longer doubted that this continent was visited, centuries before the adventurous barque of Columbus touched the shores of the new world. The Ante-Columbian discovery of Vinland by the Scandinavian voyagers of the tenth century, and the recognition of that long lost land as part of this continent, have naturally induced the American Archæologist to turn with curious interest to anything which may seem to indicate the faintest trace of Scandinavian influence in the monumental arts, or in the traditions of the country. In some cases, indeed, as in that of the inscribed Deighton rock, it can scarcely be doubted that the too-credulous antiquary of the new world has made the wish father to the supposed discovery.

On first arriving in Canada, and learning of the adoption, apparently by universal consent, of the leaf of the *Acer Eriocarpon*, or White Maple, as one of the emblems of Canada, I was prepared to learn of some traditions or superstitious legends connected with this tree, which, while they gave an Indian origin to its native associations, might also possibly indicate some faint trace of the traditional links which are occasionally found to connect widely severed races of the human family. This hope, it would seem, is falacious; but the following genuine Indian legend which I noted down from the recital of an American missionary among the Chippawas of Lake Superior, is interesting, as furnishing an indication that the gorgeous crimson hues of the American Maple do occasionally attract the attention of the wild Indian:—

The Chippawas believe that the mother of their tribe was a woman whom a great Manito made out of a tree which grew by the banks of the river. She had three sons at a birth, the first of whom became a beaver, and built his lodge by the river; the second changed into a fish, and swimming swiftly down the stream, disappeared in the great lake; but the third, when he grew up, became the father of the Chippawas. He went off at a certain time to hunt, and the Great Spirit met him and gave him a bow and arrows, telling him to shoot the first living thing he came to, and he would never want food thereafter. The Indian wandered many days, and at length returned toward his lodge, but he had seen no living thing. His mother came out to meet him, and he told her what the Great Spirit had said to him, and of his wandering many days in vain Thereupon she told him he had not fulfilled the commands of the Great Spirit, and turning about, she fled swiftly away. Then he remembered that this was the first living thing he had seen, and drawing his bow he pierced her with an arrow as she fled, and she immediately turned into a maple tree; but its leaves were blood-red, as they still are

when the season returns, and wherever a drop fell from them the wild rasp grew up on the spot. But hastening on, he drew his arrow from the tree, and immediately there flowed out the sweet maple juice, and the Indian drank of it and was refreshed, and he gave of it to his brother, the beaver, and they knew that it was the Great Spirit who made the mother of the Chippawas.

Such is a legend of the Indian tribe to which this land once pertained, showing, as might have been expected, that the substantial products of the *Acer Saccharinum*, rather than any graceful beauties in other varieties, constitute their source of estimation of the maple tree.

Without supposing that there is the slightest grounds for tracing a common origin, it will be seen that the idea of men being originally made from trees, was as favourite a legend among our Anglo-Saxon ancestors as with the Indians of Lake Superior; and familiar as all of us now are with the new emblematic significance attached to the beautiful Canadian Maple Leaf, figured on the silver trowel with which his Excellency laid the foundation stone of our new hall this day, it may not be uninteresting to recall some of the associations which centuries have gathered around the common maple of England, as well as other species of the tree to which the Romans gave the generic name of *Acer*.

This name would appear to have been applied in various forms in several of the Indo-European languages, to trees not always of the same genus, nor even bearing a very close resemblance to each other. It is the *Aser* and the *Ask*, of the old Norse eddas, as in the Edda Saemundi, where the *Aser Ydrasils*, or tree of Odin is referred to: the mighty tree under which the Gods of the Norsemen were believed to sit in judgment, while its branches extended throughout the world, and overshadowed heaven itself. It is also the *æsc* of the Anglo-Saxons, which, in the language of our forefathers, not only signified the ash tree, but also *a man*, because the northern nations supposed the first man to have been made of that tree. It is the *masarn* of the ancient Britons, still applied by the Welsh to the sycamore tree; and the German *maser*, the Dutch *maeser*, the old Swedish *masur*, the Icelandic *mansur* and *mosor*, and the Scottish and old English *mazer*, as well as the modern English maple, all applied to the varieties of the maple tree. From the various forms of the name it appears to be obvious that the old English one is derived from a Scandanavian and not an Anglo-Saxon source; and a similar origin has been assigned to the well-known superstitious virtues ascribed to the Scottish Rowan, or Mountain Ash, as at once a potent instrument of witchcraft, and an infallible charm against its spells. To a like source it would also seem no less probable that we may trace that ancient application of the maple, to which I have now specially to refer, for the manufacture of the favourite drinking-cup and wassail bowl. The close texture of the maple wood, with the beauty of its grain, and its susceptibility of a high polish, doubtless contributed to its continued use for the manufacture of the pledge-cup and bowl. Hence its Scandinavian name of maser came to be applied to the cup made from the wood of the tree; and when at a later period, other woods, and even the costliest metals were substituted, the old designation of the mazer-cup was still retained. The late Mr. T. H. Turner, remarks, in a series of papers in the *Archæological Journal*, on the "usages of domestic life in the middle ages:" "our ancestors seem to have been greatly attached to their mazers, and to have incurred much cost in enriching them. Quaint legends, in English or Latin, monitory of peace and good-fellowship, were often embossed on the metal rim and on the cover; or the popular, but mystic Saint Christopher, engraved on the bottom of the interior, rose in all his giant proportions, before the eyes of the wassailer, giving comfortable assurance that on that festive day, at least, no mortal harm could befall them."

The value attached to the mazer-cup in olden times, no doubt, arose in part from the veneration with which it came to be regarded as a family heirloom, and as such, engraven with favourite devices and pious legends, and sometimes decorated with chasing and rich carvings. That it was held in special esteem, independent of its mere intrinsic value, is shown by its frequent specification in old inventories and valuations. In an assessment of the Borough of Colchester, for example, in the beginning of the 14th century, (29th of Edward I.) mazers are repeatedly mentioned among the household effects of the citizens, and always at valuations which show them to have been wooden bowls. One *ciphus de mazero* is valued at 18*d.*, and another *ciphus de mazero parvus* at 6*d.* The highest valuation of a citizen's mazer-cup is 2*s.*, and this may, perhaps be assumed to have had the addition of a silver rim, decorated with legend or moral rhyme. A deeper historic interest attaches to the more costly mazers mentioned in an inventory of the treasure and jewels of James III. of Scotland, as the "FOUR MASARIS CALLED KING ROBERT THE BROCIS." But very different, yet not perhaps less curiously illustrative, is the following inventory introduced in the old black-letter ballad printed by Wynken de Worde, entitled, "*A lytell geste of Robyn Hode.*" The goods are those of the Sheriff of Nottingham, and the inventory is by "Lytell John":—

"They dyde them to the treasure-house
As fast as they might gone,
The locks that were of good stele
They brake them every one;
They took away the sylver vessels
And all that they might get,
Peces, mazers, and spones,
Wolde they none forgete."

The quaint simplicity both of the decorations and the inscriptions of many of those old wassail bowls furnishes interesting illustrations of the manners and ideas of the age to which they belong. Our forefathers had a pious, and, withal, a very convenient fashion, of uniting religion with their daily sports, and even as it might seem, seeking to sanctify their excesses. Chaucer and Dunbar wind up their freest versions of the Decameron with a pious couplet; and the latter poet thus closes his "Droichis (or dwarf's) part of the play"—

"God bless thame, and the haly rude,
Gives me drink, sa it be gude;
And wha trowis best that I do hide,
Skynk first to me the can."

A very beautiful mazer of the time of Richard II., now in the possession of Evelyn Philip Shirley, Esq., is made of highly polished maple wood, hooped with a richly ornamented rim of silver gilt, on which is engraven the couplet:—

"In the name of the Trinitie,
Fill the kup and drinke to me."

Inscriptions of this nature were doubtless regarded as nearly equivalent to the more modern grace, and they are accordingly of frequent occurrence, as on the beautiful Hebridean Drinking Cup, celebrated by Sir Walter Scott, in the "Lord of the Isles," as that—

"Erst own'd by Royal Somerled."

It is also of a smooth polished wood, probably maple, and

on its silver rim is the date 1493, and this appropriate verse from the CXLIV. Psalm, according to the Vulgate: "*Oculi omnium in te sperant Domine, et tu das escam illorum in tempore opportuno.*"

A few of the notices of the mazer by our earlier poets will suffice to illustrate the familiar use of the maple-bowl in ancient times. The earliest mention of it which has come under my notice occurs in an English metrical version of "Wace's Brut d' Angleterre," executed by Robert Mannying, or Robert de Brunne, in the reign of Edward III. Maister Wace's *De Brut*," which he finished in the year 1155, is a French metrical version of Geoffrey of Monmouth's History of Britain, from the time of the imaginary Brutus to the reign of Cadwallader, A.D. 689. As a historic document it is, of course, valueless; but, like most of the old romances, it furnishes valuable illustrations of the manners and customs of the age in which it was written. The passage referred to occurs in the account of King Arthur's coronation. The ceremony, with all its feastings and jousts, being over, the King dismisses his guests with suitable gifts. To Knights and Nobles he gives burghs and cities; to Abbots and Bishops, rents and tithes; and to those—

"That of other landes were,
That for love came there,
He gave steeds and cups of gold,
None richer aboun mould;
Some gave he hauberks, some greyhounds,
Some rich robes worth many pounds,
Some mantels with veir and gris,
And some *Mazers* of rich price."

In Chaucer's "Rime of Sire Thopas," in the Canterbury Tales, when the Knight is preparing for the combat with Sire Oliphant, the giant with three heads, his merry men are commanded to make him both game and glee, to rouse him for the fight; and along with other cheering restoratives:—

"They fetch him first the sweet wine,
And mede eke in a mazelin,
And real spicery."

Spenser furnishes a beautiful description of a highly-wrought emblematical mazer cup, in his Shepherd's Callendar, evidently suggested by the bowl for which the shepherds contend in Virgil's Third Pastoral:—

"Lo Perigot the pledge which I plight,
A mazer ywrought of the maple ware,
Whereon is enchased many a fayre sight,
Of bears and tigers that maken fiers war;
And over them spread a goodly wild vine,
Entrailed with a wanton ivy twine.

"Thereby is a lamb in the wolf's jaws;
But see how fast runneth the shepherd swain
To save the innocent from the beaste's paws,
And here with his sheep hook hath him slain.
Tell me, such a cup hast thou ever seen?
Well might it become any harvest Queen."

Dryden, in rendering the corresponding passage from Virgil, adheres to the Classic designation of a beechen bowl, though he refers to it elsewhere as a mazer. Nor were the virtues of the maple, the "acerque coloribus impar" of Ovid, unappreciated by the ancients. Virgil constructs his throne for the good Evander, of maple inlaid with ivory. Pliny enlarges on its virtues, and frequent notices occur of its use by the Romans in the construction and enlarging of their costliest furniture. Its ancient British repute partakes more of the social character of the Anglo-Saxon. The favourite wassail drink of our ancestors, made of roasted apples, sugar, and ale, appears to have been specially associated with the maple bowl. The old English wassail quatrain indeed runs thus:—

"Wassail! wassail! all over the town,
Our toast it is white, our ale it is brown;
Our bowl it is made of a maplin tree,
We be good fellows all; I drink to thee."

One of the quaint entries in Pepys's Gossiping Diary is: "On the 4th January, 1667, Mrs. Pepys had company to dinner, and at night to sup, and then to cards, and last of all to have a flagon of ale and apples, drunk out of a wood cup, as a Christmas draught, which made all merry." The Christmas mirth of the old diarist, while it recalls, may serve to illustrate the practical jests of "That shrewd and knavish sprite called Robin Good-fellow," as narrated by himself in the "Midsummer Night's Dream:"—

"And sometimes lurk I in a gossips bowl,
In very likeness of a roasted crab;
And when she drinks, against her lips I bob,
And on her withered dew-lap pour the ale."

The mazer is more distinctly referred to by Shakspeare's contemporaries, Beaumont and Fletcher, in the beautiful song of Maximus, introduced in the last scene of "Valentinian:"—

"Good Lyæus ever young,
Ever honored ever sung;
Stained with blood of lusty grapes,
In a thousand lusty shapes,
Dance upon the Mazer's brim,
In the crimson liquor swim;
From thy plenteous hand divine
Let a river run with wine."

Such illustrations from the poets, as well as the notices n ancient inventories and deeds, might readily be extended, with a little research, but I shall only quote one other metrical reference to the Mazer, which occurs in the old Scottish Ballad of Gill Morice. Lord Bernard, roused to wrath by the message brought by Gill Morice's page to his lady, is thus described in the homely but graphic language of the old minstrel:

"Then up and spak the bauld baron,
An angry man was he;
He's taen the table wi' his foot,
Sae has he wi' his knee,
Till siller cup and mazer dish
In flinders he garr'd flee."

From the pious legends frequently inscribed on many of these ancient cups, they have been occasionally described by modern writers as sacred vessels designed only for religious uses. The use of wooden vessels as chalices, was, however, for obvious reasons, abandoned at an early period, so that the *calices lignei* became in later times a proverbial illustration of the obsolete simplicity of primitive ages. The old Scottish Jurist, Fountainhall, in moralizing in his "Historical Notes," on the wealth first acquired by the church in the seventh century, exclaims: "We may now take up that old regrait: when there were *calices lignei* there were then *sacerdotes aurei*, but now when our chalices are of gold and silver, we have got *ligneos sacerdotes*." Another old Scottish writer revives the idea of the *calices lignei*, in a quaint, but very beautiful allusion to the Mazer cup, referred to metaphorically as a sacramental chalice. It occurs in Zacharie Boyd's "Last Battell of the Soule," published at Edinburgh in 1629: "Take now," says he, "the cup of salvation, *the great Mazer of his mercy*, and call upon the name of the Lord." The character of the inscriptions on the ancient Mazers, whether of wood, or the precious metals, notwithstanding the quaint piety of some of these legends,

generally suffices to put at rest all idea of their use otherwise than at the social board. It would be easy to multiply examples, did not I fear that I have already encroached too long on your patience, in this antiquarian ramble suggested by our Canadian maple leaf. The collegiate treasuries of Oxford still boast several costly Mazers, which have escaped the destruction of the great civil war; and Pembroke College, Cambridge, possesses a beautiful example, silver gilt and with this jovial couplet engraved round the bowl.

"Sayne Denis yt es me dere,
For he's lof drink and mak gud cher."

On the stem, also, is the pious invocation: "God help at need;" which yet, in company with that round the bowl, precludes all idea of its use for the altar. Let me, however, rather close this notice of the maple bowl, with the description of one of the 17th century now in the collection of an old friend, Mr. W. Johnston of Edinburgh. It is made of maple, curiously carved with animals, trees, and flowers: the unicorn, the stag, the hedgehog, and an ostrich regaling itself with a horse-shoe; while the unoccupied surface is copiously inscribed with pious aphorisms in prose and verse. Round the rim of the stand are the words and date:—

"They that seeke after the Lord shall prayse him, their harts shall live forever. 1611."

On the bowl of the cup is the inscription:—

"The fountayne of all health and wealth and joyes
To thirsty soules, he giveth drink indeed;
Such as turne to him from their evill wayes
Shall finde sound comfort in their greatest neede.
But evill workers that in sinne remaine
They are ordayned to eternall payne.
"For every one of us shall be rewarded according to our workes, therefore repent unfaynedly and amend."

But the most characteristic part of the inscription lurks modestly on the under side of the stand, where the Mazer thus takes up the hortatory strain in *propria persona*:—

"Missuse me not although I am no plate;
A Maple Cupp that is not out of date;
Drinke well and welcome, but be not too free;
Examine whether that in Christ you be;
If that your faithe be true, and firm, and sound,
Then in all good workes you will still abound.
So run that ye may obtayne."

One can scarcely avoid fancying there was a little quiet humour lurking in the mind of the carver, when he inscribed these latter excellent and very practical maxims on the under side of the stand, where it was only possible to peruse them when the cup was emptied; as doubtless it has often been by the Cavaliers of the Commonwealth, and the jolly roysterers of the Restoration. Out of just such a piously inscribed Mazer-bowl one can fancy the gossiping, moralising, but woefully temptible old diarist, Mr. Secretary Pepys, drinking his Christmas wassail-draft of ale and apples, "which made all merry."

But the Mazer has had its memory revived in the modern poet's page. It is one interesting result of the curious alliance effected between the antiquary and the muses, by Sir Walter Scott,—who loved, even when, as in his "Antiquary," he laughed at such old world pursuits,—that while no later English poet than Dryden refers to the Mazer cup, it figures once more in the Scottish poem: the "Lord of the Isles;" and with this, the latest allusion to the ancient wassail bowl constructed of the maple tree, or associated with its name and use, I shall close these desultory illustrations of the Canadian and English maple. Founding his allusions on the notice of the four Mazers of King Robert the Bruce among the treasures of James III. that King is thus introduced as celebrating the recovery of his father's halls:—

"Bring here, he said, the Mazers four
My noble fathers loved of yore.
Thrice let them circle round the board,
The pledge fair Scotland's rights restored!
And he whose lips shall touch the wine
Without a vow as true as mine,
To hold both lands and life at nought
Until her freedom shall be bought,—
Be brand of a disloyal Scot,
And lasting infamy his lot."

## CANADIAN INSTITUTE.

**Council Meeting—September 21st, 1855.**

The subject of a new series of the *Journal* was discussed, and the following programme adopted:—

**Canadian Journal—New Series.**

1. The *Journal* to be published in octavo form, each alternate month, beginning with January, 1856.

2. All original Communications to be inserted first, under this or some similar general heading, and whether long or short, to have invariably the name or initials of the Author.

3. Original Reviews to form the Second Division in each number, and Reports of the Meetings of the Institute and other Societies, the Third Division.

4. All matter derived from published sources, to be printed in small type, and form a distinct division, or appendix, under the title of "Scientific and Literary Excerpts," or some other similar heading.

5. The conduct of the *Journal* to be entrusted to an Editing Committee, to be annually nominated by the Council from the general body of the Members of the Institution, at their last meeting in April.

6. The Council to elect one of their Editing Committee as Convener, who shall perform the duties of General Editor in the conduct of the *Journal*, receiving and transmitting communications and works for reviews to the members of the Committee, to whom their subjects pertain; and exercising the general oversight requisite for the successful issue of a periodical publication.

7. The Convener to summon the Committee, once at least in the interval between the publication of each number, to deliberate on the contents of the succeeding number.

8. To be incumbent on each Member of the Editing Committee, to endeavour to obtain original communications of interest and value in his own department, in addition to his own personal contributions.

9. The duties of the Editing Committee, to be classified and divided among its members, according to the following sub-divisions, subject to alteration or addition by the Council.

SUB-COMMITTEES.

I. Geology.—E. W. Logan, F.R.S. & G.S., Director of the Provincial Geological Survey; Henry Y. Hind, M. A., Professor of Chemistry, Trinity College, Toronto.

II. Physiology and Natural History.—James Bovell, M. D., Professor of the Institutes of Medicine, Trinity College, Toronto.

III. Ethnology and Archæology.—Daniel Wilson, L. L. D., Professor of History, University College, Toronto.

IV. Chemistry and Mineralogy.—Henry Croft, D. C. L., Professor of Chemistry, University College, Toronto; J. G, Chapman, Professor of Mineralogy, University College, Toronto.

V. Mathematics and Natural Philosophy.—J. B. Cherriman, M. A., Professor of Mathematics, University College, Toronto; Rev. G. C. Irving, M. A., Professor of Mathematics, Trinity College, Toronto.

VI. Engineering and Architecture.—

10. To be incumbent on Editors of Sections, to read for the press all Communications in their own departments.

11. The Council to have supreme control of the *Journal;* but no article to be admitted contrary to the wishes of a majority of the Editing Committee.

**Council Meeting—October 13th, 1855.**

The following gentlemen were provisionally elected members of the Institute:—

| | |
|---|---|
| W. M. Matheson | Toronto. |
| Professor Young | Knox's College, do. |
| L. A. H. Latour | Montreal. |
| Charles W. Coverton, M. D. | Simcoe. |

**Council Meeting, October 27th, 1855.**

The Second Vice-President announced that His Excellency the Governor-General had consented to officiate at the Laying of the Foundation-stone of the proposed Institute Building.

It was resolved that the Rev. *H. J. Grasett* be requested to act as officiating clergyman on that occasion.

Committees, composed of members of Council, were appointed to collect subscriptions towards the Building Fund from the members of the Institute in separate divisions of the City.

A copy of the American Journal of Science and Art was ordered to be sent to various Toronto publishers, to obtain estimates per sheet for printing the New Series of the *Canadian Journal* after the typographical model of that publication.

It was resolved that Daniel Wilson, LL.D., Professor of History, University College, be requested to act as Convener of the Publishing Committee.

**Council Meeting, November 10th, 1855.**

The following gentlemen were provisionally elected members of the Institute:—

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| Larratt W. Smith, D.C.L. | Toronto. |
| A. Sullivan | " |
| Thos. W. Lawford | *London.* |
| John Patton | Toronto. |
| Professor Kingston, M.A. | University College, do. |

**Council Meeting, November 20th, 1855.**

The following gentlemen were provisionally elected:—

| | |
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| Moses H. Parly | St. John's, N.B. |
| W. McMaster | Toronto. |
| A. Bostwick | " |
| George Beatty, Secretary, O.S.H.R.R. | " |
| Andrew Russell | " |

The Indenture drawn up by Mr. Mowat, respecting the Transfer of Books, &c., from the Athenæum to the Canadian Institute, was laid on the table and ordered to be executed.

It was resolved that the Corresponding Secretary be directed to convey to Mr. Mowat the thanks of the Council, for his valuable services in completing the arrangements with the Athenæum.

## QUEBEC LITERARY AND HISTORICAL SOCIETY.

At the first Stated Meeting of the Season, held at the Society's rooms, Henderson's Buildings, St. Lewis Street, on Wednesday evening, 3rd October, Lieut. A. Noble, Royal Artillery, F.R.A.S., was elected Vice-President, in the place of G. T. Kingston, Esq., M.A., removed to Toronto. F. N. Boxer, Esq., was elected Recording Secretary, in the place of Henry E. Steele, Esq., removed to Toronto. The Secretary announced a donation to the Society from Robert Symes, Esq., life-member, consisting of portions of the original Indian costume, worn by him as "Hotsawath," Chief of the Huron Tribe, when the Historical Painting in possession of this Society was painted by H. D. Thielcke. Also, from the same donor, an embroidered cushion formerly used on the altar of the old church at the Indian village of Lorette, and which was brought to this country by the early Jesuit missionaries from France. Also, and from the same, the original "Registers of Interments at the hospitals and the city of Quebec, during the visitations of cholera in the years 1849 and 1851. Other donations during the summer:—from the Rhode Island Historical Society, "Discourse on the Life and Times of John Howland, Pres. R. I. H. Society, by E. B. Hall, D.D.;" from the Hon. East India Company, "Meteorological Observations, Madras, 1851;" from the Royal Society, Edinburgh, "Proceedings of Session, 1853–54;" from T. D. Harrington, "Account of Scientific Discovery, 1854;" from Lieut. Savage, R.E., "Russia as it is," by Growski; "Cornhill to Cairo," by Titmarsh.

At the second Stated Meeting, held Wednesday, 17th October, an interesting paper, entitled, "Reminiscences whilst assisting to draw the boundary line between the United States and the B.N.A. Provinces, in 1843," was read by Mr. Boxer. The Secretary announced a donation to the Library from Lieut. Savage, R.E., Vice-President, viz.: "Papers on the corps of Royal Engineers, "The Night Side of Nature," and "Hard Times." Intimation being received of the departure of E. T. Fletcher, Esq., for Toronto, Dr. R. H. Russell was requested to act as Librarian in his stead, till the ensuing annual election of officers.

At the third Stated Meeting, held Wednesday, 7th November, the *Council Secretary announced the receipt of a manuscript* for one of the Society's prizes of the current year, entitled, "An Essay on Art in Architecture." The Secretary announced the following donations to the Library, viz.: from Noel H. Bowen, Esq., "Faust, a dramatic poem," and "The Bloodstone," by Donald McLeod; from F. N. Boxer, Esq., "Correspondence between the Chief Superintendent of Schools, C.W., and other persons, on Separate Schools." An entertaining paper on Entomology was then read by Mr. Savage, R.E., Vice-President.

At the Monthly General Meeting, held Wednesday afternoon, 14th November, the following gentlemen were elected associate members of the Society: Richard Penniston White, James Dunbar, and James Martin, M.D. E. The Librarian, Curators, and Corresponding Secretary had no reports to present. Mr. Boxer presented to the Library "Scott's Dæmonology."

GEORGE T. CARY,

*Treasurer and Assistant Secretary.*

Quebec, 17th November, *1855.*

## MONTREAL NATURAL HISTORY SOCIETY.

The ordinary monthly meeting of this Society was held in the Museum on Monday evening, October 29th, His Lordship the Bishop of Montreal in the chair. There were present Rev. A. D Campbell, Drs. Workman, Scott, Hingston, Craik, D. C. McCallum, Barnston, Fraser, Trudel; and Messrs. Latour, Davis, Browne, Simms, Dutton and Rennie. The minutes of last ordinary meeting were read over and approved. Mr. W. H. A. Davis presented a copy of the revised By-laws, and reported that one of the Sub-Committee appointed to prepare them, Professor Andrews, had left this city for Quebec. The meeting filled up the vacancy thus created, by the appointment of Dr. McCallum. Read, a letter from Hector L. Langevin, Esq., of Quebec, a corresponding member of the Society, transmitting a copy of a French Work on Canada, written by him. Ordered, that the letter be acknowledged and the thanks of the Society returned to the donor for his contribution. Dr. Workman reported that in compliance with an application made by him to the Board of Directors, the Smithsonian Institute had forwarded for the Society a complete set of their valuable "Contributions to Knowledge." Ordered that the volumes be acknowledged, and the thanks of the Society returned to the Institute for their very generous and valuable donation. The meeting then proceeded to ballot for members, when R. Thomas, Esq., of Montreal, was declared unanimously elected an ordinary member, and Wm. Couper, Esq., of Toronto, a corresponding member. The election of a First Vice-President, in room of Professor Andrews, now residing in Quebec, was then commenced, the Chairman having appointed Dr. Workman and Mr. Dutton Scrutineers. Upon examining the votes, L. A. H. Latour, Esq., was found to have been duly elected; and in room of Mr. Latour, as Second Vice-President, W. H. A. Davis, Esq., was elected, and in room of Mr. Davis, as Third Vice-President, the Rev. A. D. Campbell was elected. The recommendation of the Council in their Annual Report to elect His Excellency Sir Edmund Head an Honorary Member of the Society, and which, in consequence of the absence of the requisite quorum prescribed by the Act of Incorporation, had hitherto not been acted upon, was next taken into consideration, and the Governor General elected by acclamation. Dr. Fraser, Chairman of the Lecture Committee, stated that so soon in January as their new Lecture Room would be finished, the usual Winter Series of Lectures would be delivered by Members of the Society. Several names were already on the list, and the Committee had authorized him to express their hope that His Lordship would so far honour them as to inaugurate the Course. The Chairman said, that although they must not expect him to deliver a Scientific Lecture, he would most certainly open the Course. This the Society would naturally expect from the position which he held as its President; and though he had as yet been able to do but little in that capacity to help them on, he would gladly introduce their lectures if they felt it would assist them. The announcement was received with applause, and the meeting adjourned.

A. N. RENNIE,
*Recording Secretary*

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### Geology in America.

(*Continued from page* 361.)

There are the following epochs in the Post-tertiary: the *Drift epoch*, the *Laurentian epoch*, an epoch of depression; the *Terrace epoch*, an epoch of elevation—three in number, unless the Drift and Laurentian epochs are one and the same.

As this particular point is one of much interest in American geology, I will briefly review some of the facts connected with the drift.

The drift was one of the most stupendous events in geological history. In some way, by a cause as wide as the continent, and I may say, as wide nearly as the world, stones of all sizes to immense boulders one to two thousand tons in weight, were transported, along with gravel and sand, over hills and valleys, deeply scratching the rocks across which they travelled.

Although the ocean had full play in the many earlier ages, and an uneasy earth at times must have produced great convulsions, in no rock strata, from the first to the last do we find imbedded stones or boulders at all comparable in magnitude with the immense blocks that were lifted and borne along for miles in the Drift period.

Much doubt must remain about the origin of the drift until the courses of the stones and scratches about mountain ridges and valleys shall have been exactly ascertained. The general course from the north is admitted; but the special facts proving or disproving a degree of dependence on the configuration of the land have not yet been sufficiently studied.

One theory, the most prevalent, supposes a deep submergence over New England and the north and west, even to a depth of four or five thousand feet, and conceives of icebergs as floating along the blocks of stone and at bottom, scratching the rocks. Another, that of the Professors Rogers, objects to such a submergence, and attributes the result to an incursion of the ocean from the north, in consequence of an earthquake movement beneath the Arctic Seas.

The idea of a submergence is objected to, on the ground that the sea has left no proofs of its presence by fossils or seashore terraces or beaches. Unless the whole continent were submerged, of which there is no evidence whatever, there must have been in the Post-tertiary period an east and west line of seashore, say across New Jersey, Pennsylvania, Southern Ohio, and other States west, or still further south; and yet no such seashore marks now exist to trace its outline—although the ocean must have been a portion of the same that had laid up the cretaceous and tertiary beds all along the coasts, and in fact already contained the oysters and clams and many other species of Molluscs which now exist.

Can it be that, contrary to all the ways of the past, such a grand submergence as this view supposes, placing New England 4,000 feet under water, could have transpired without a seashore record? Very many have replied in the affirmative; and one able advocate of this view, who sees no difficulty in the total absence of seashore terraces or fossils at all levels above the Laurentian beds, finds in the succeeding epochs seashore accumulations in all the terraces of our rivers. Why this wonderful contrast? What withheld the waves from acting like waves in the former case, and gave unbounded license in the latter?

This much then seems plain, that the evidence, although negative, is very much like positive proof, that the land was not beneath the sea to the extent the explanation of the drift phenomena would require.

There are other objections to this view of submergence. If North America was submerged from the southern boundary line of the drift far into the Arctic regions, this would have made a much warmer climate for the continent than now; and if only half way, then there is another east and west shore line to be traced out before the fact of the submergence can be admitted.

Again, we know how the ice, while yet a glacier or along a shore of cliffs, (for all bergs were once glaciers,) may receive upon it heavy blocks of stone, even a thousand tons in weight, and bear them off to distant regions, as now happens in the North Atlantic; but we have no reason to believe that the massy foot of a berg could pick up such blocks, and carry them twenty miles to drop them again; and hence the short distance of travel would seem to prove that the bergs were made at that short distance to the north, and this implies the existence there of glacier valleys, and a glacier theory.

But without considering other difficulties, I pass to the inquiry whether the lands, if not submerged, were at any higher level than now?

There is evidence of a striking character that the regions or coasts over the higher latitudes, in both the northern and southern hemispheres, were much elevated above their present condition. The *fiords* or deep coast channels, scores of miles long, that cut up the coast of Norway and Britain, of Maine, Nova Scotia, and Greenland, of Western America from Puget's Sound north, of Southern South America from Chiloe south, of Van Diemen's Land and other southern islands—are all valleys that could not have been scooped out when filled with the ocean's water as now. That could have been formed only when the land in those high latitudes, north and south, was elevated till their profound depths were nearly dry. Whether this elevation was in the period of the Post-tertiary has not been precisely ascertained. But as they are proofs of a north-and-south system of oscillations, the same that was in action in the drift epoch, and as the cold that such a change

would occasion is not very distinctly apparent in the Tertiary period, and much less in the earlier, we have reason for referring the greater part of the elevation to that drift era, and for believing that the excavation of these fiord valleys was then in progress. Both fiords and drift are alike high-latitude phenomena on all the continents north and south. The change of climate between the Cretaceous and Tertiary, and the absence of tertiary beds north of Cape Cod, may have been connected with an incipient stage in this high-latitude movement.

However this be, there is other evidence in the cold of the drift period of some extraordinary cause of cold. The drift in Europe and Britain is generally attributed to glaciers and icebergs during a period of greater cold than now; and the fact of this greater cold is so generally admitted that it is common to speak of it as the glacial epoch. Prof. Agassiz, moreover, has urged for this continent the glacial theory.

In a memoir of great research, by Mr. Hopkins, of Cambridge, England, the able author maintains that this glacial cold might have been produced over Europe, partly at least, by a diversion of the Gulf-stream from its present position. He seems in his paper to attribute too much effect to the Gulf-stream and too little to the prevailing currents of the atmosphere; but setting this aside, it is unfortunate for the hypothesis that there is no reason to suppose that America was not then as much in the way of such a diversion as now. The small changes of level which the Tertiary and Post-tertiary of the Gulf have undergone, prove that the gate of Darien was early closed, and has since continued closed. America, as far as ascertained facts go, has not been submerged to receive the stream over its surface. If it had been, it would have given other limits to her own drift phenomena; for it is an important fact that these limits in America and Europe show the very same differences in the climates or in the isothermals, as that which now exists.

On the question of the drift, we therefore seem to be forced to conclude that, whatever be the difficulties we may encounter from the conclusion, the continent was not submerged, and therefore icebergs could not have been the main drift agents. The period was a cold or glacial epoch, and the increase of cold was probably produced by an increase in the extent and elevation of northern lands. Further than this, in the explanation of the drift, known facts hardly warrant our going.

If then the drift epoch was a period of elevation, it must have been followed by a deep submergence to bring about the depression of the Continent, already alluded to, when the ocean stood at least 400 feet in Lake Champlain, and a whale was actually stranded on its shores; and when the upper terrace of the rivers was the lower river flat of the valleys.

This submergence, judging from the elevated sea beaches and terraces, was 400 to 500 feet on the St. Lawrence and Lake Champlain; 80 feet at Augusta, Me.; 50 feet at Lubec; 30 feet at Sancoti Head, Nantucket; over 100 at Brooklyn, N.Y., and 200 to 250 in Central New England, just north of Massachusetts; while south in South Carolina it was but 8 feet.

But whence the waters to flood valleys so wide, and produce the great alluvial plains, constituting the upper terrace so immensely beyond the capability of the present streams? Perhaps, as has been suggested for the other continent, from the melting snows of the declining glacial epoch. The frequent absence of fine stratification, so common in the material of this upper terrace, has often been attributed to a glacial origin.

According to this view, the events of the Post-tertiary period in this country make a single consecutive series dependent mainly on polar or high-latitude oscillations. An elevation for the *first* or GLACIAL *epoch;* a depression for the *second* or LAURENTIAN *epoch;* a moderate elevation again, to the present height, for the *third* or TERRACE *epoch.*

The same system may, I believe, be detected in Europe; but, like all the geology of that continent, it is complicated by many conflicting results and local exceptions, while North America, as I have said, is like a single unfolding flower, in its system of evolutions.

There is the grandeur of nature in the simplicity to which we thus reduce the historical progress of the continent. The prolonged series of oscillations, acting by pressure from the south-east beneath the Atlantic, reach on through immeasureable ages, producing the many changes of level through the Silurian and Devonian, afterward with greater frequency in the Carboniferous, and then, rising with quickened energy and power, folding the rocks and throwing up the long range of the Apalachians with vast effusions of heat through the racked and tortured crust, next go on declining as the Jurassic and Cretaceous periods pass, and finally fade out in the Tertiary. The Northern oscillations, perhaps, before in progress, then begin to exhibit their effects in the high temperature latitudes, and continue to the Human Era. The sinking of Greenland now going on may be another turn in the movement; and it is a significant fact that while we have both there and in Sweden northern changes of level in progress, such great secular movements have nowhere been detected on the tropical parts of the continent.

In deducing these conclusions I have only stated in order the facts as developed by our geologists. Were there time for a more minute survey of detail the results would stand forth in bolder characters.

The sublimity of these continental movements is greatly enhanced when we extend our vision beyond this continent to other parts of the world. It can be no fortunate coincidence that has produced the parallelism between the Appalachian system and the great feature lines of Britain, Norway and Brazil, or that has covered the North and South alike with drift and fiords. But I will not wander, although the field of study is a tempting one.

In thus tracing out the fact that there has been a plan or system of development in the history of this planet, do we separate the Infinite Creator from his works? Far from it; no more than in tracing the history of a plant. We but study the method in which Boundless Wisdom has chosen to act in creation. For we cannot conceive that to act without plan or order is either a mark of divinity or wisdom; and assuredly it is far from the method of the God of the Universe, who has filled all Nature with harmonies; and who has exhibited his will and exalted purpose as much in the formation of a continent, to all its details, as in the ordered evolution of a human being. And if man from studying physical nature begins to see only a deity of physical attributes, of mere power and mathematics, he has but to look within at the combination of the affections with intellect, and observe the latter reaching its highest exaltations when the former are supreme, to discover that the highest glory of the Creator consists in the infinitude of his love.

My plan laid out in view of the limited time of a single address, has led me to pass in silence many points that seemed to demand attention or criticism; and also to leave unnoticed the labors of many successful investigators.

There are some subjects, however, which bear on general geology that should pass in brief review:—

I. The rock-formations in America may in general be shown to be synchronous approximately with beds in the European series. But it is much more difficult to prove that catastrophes were synchronous; that is, revolutions limiting the ages or periods.

The revolution closing the Azoic age, the *first* we distinctly observe in America was probably nearly universal over the globe.

An epoch of some disturbance between the Lower and Upper Silurian is recognized on both continents. Yet it was less complete in the destruction of life in Europe than here—more species there surviving the catastrophe; and in this country there was but little displacement of the rocks.

The Silurian and the Devonian ages each closed in America with no greater revolutions than those minor movements which divided off the subordinate periods in those ages. Mr. Hall observes that they blend with one another and the latter also with the Carboniferous; and that there is no proof of cotemporaneous catastrophe, giving them like limits here and in Europe. But after the Carboniferous came the Appalachian revolution, one of the most general periods of catastrophe and metamorphism in the Earth's history. Yet in Europe the disturbances were far less general than with us, and occurred along at the beginning and end of the Permian period.

From this epoch to the close of the Cretaceous, there were no cotemporaneous revolutions, as far as we can discover. But the Cretaceous period terminates in an epoch of catastrophe which was the most universal on record—all foreign cretaceous species having been exterminated, and all American with a few doubtful exceptions. This third general revolution was the prelude to the Mammalian age.

But there is no time to do this subject justice, and I pass on, merely adding, on account of its interest to those who would understand the first chapter of Genesis, that there is no evidence whatever in geology that the Earth after its completion passed through a chaos and a six days' creation at the epoch immediately preceding man, as Buckland in the younger days of the science suggested on *Biblical*, not on geological grouud. No one pretends that there is a fact or hint in geology to sustain such an idea; moreover the science is totally opposed to it.

II. The question of the existence of a distinct *Cambrian System* is decided adversely by the American records. The Molluscs, in all their grand divisions appear in the Lower as well as the Upper Silurian, and

the whole is equally and alike the Molluscan or Silurian Age. The term Cambrian, therefore, if here used for fossiliferous strata, must be made subordinate to Silurian.

The *Taconic System* of Emmons has been supposed by its author to have a place inferior to the Cambrian of Sedgwick, or else on a level with it. But the investigations of Hall, Mather, and Rogers, and more lately of Logan and Hunt, have shown that the Taconic slates belong with the upper part of the Lower Silurian, being in fact, the Hudson river Shales, far from the bottom of the scale.

III. The American rocks throw much light on the origin of coal. Prof. H. D. Rogers, in an able paper on the American coal fields, has well shown that the condition of a delta or estuary for the growth of the coal plants, admitted even now by some geologists, is out of the question, unless the whole continent may be so called; for a large part of its surface was covered with the vegetation. Deltas exist where there are large rivers; such rivers accumulate and flow where there are mountains. How then could there have been rivers or true deltas of much size in the coal period, before the Rocky Mountains or Appalachians were raised. It takes the Andes to make an Amazon. This remark has a wider application than simply to the coal era.

IV. In this connection, I add a word on the idea that the rocks of our continent have been supplied with sands and gravel from a continent now sunk in the ocean. No facts prove that such a continent has ever existed, and the whole system of progress, as I have explained, is opposed to it. Moreover, gravel and sands are never drifted away from seashores except by the very largest of rivers like the Amazon; and with these, only part of the lightest or finest detritus is carried away; for much the larger part is returned to the coast through tidal action, which has a propelling movement shoreward where there are soundings. The existence of an Amazon or any such Atlantic continent in Silurian, Devonian, or Carboniferous times, is too wild an hypothesis for a moment's indulgence.

V. The bearing of the facts in American Palæontology on the science might occupy another full discourse, I will close with brief allusions to some points of general interest.

1. The change in the Fauna of the Globe as the Age of Man approached, is one of the most interesting facts in the Earth's history. It was a change, not in the types of the races—for each continent retains its characteristics—but a remarkable dwindling in the size of species. In North America, the Buffalo became the successor to the huge Mastodon, Elephant and Bootherium: the small beaver to the great Castoroides, and the existing Carnivora are all comparatively small.

Parallel with this fact we find that in South America, as Dr. Lund observes, where in the last age before Man, there were the giant Megatherium, and Glyptoden and other related Edentata there are now the small Sloths, Armadillos, and Ant-eaters.

So, also, in the Oriental Continent the gigantic lion, tiger, hyena, and elephant, and other monster quadrupeds, have now their very inferior representatives.

In New Holland, too, the land of Marsupials, there are Marsupials still, but of less magnitude.

2. The American Continent has contributed to Science a knowledge of some of the earliest traces of reptiles—the species of the Pennsylvania coal formation, described by Dr. King and Mr. Lea, and others from the Nova Scotia coal fields, discovered by Messrs. Dawson and Lyell.

It has afforded the earliest traces of birds thus far deciphered in geological history—the colossal and smaller waders whose tracks cover the clayey layers and sandstones of the Jurassic rocks in the Connecticut Valley. The earliest Cetacea yet known are from the American Cretaceous beds, as described by Dr. Leidy, and among the large Mammals which had possession of the renewed world after the Cretaceous life had been swept away, the largest, as far as has been ascertained, lived on this continent. The Palæotheria of the Paris basin, described by Cuvier, were but half the size of those of Nebraska.

But here our boasting ceases; for as Agassiz has shown, the present Fauna of America is more analogous to the later tertiary of Europe than to the existing species of that continent.

In the Palæozoic Ages, to the close of the Coal Period, the American Continent was as brilliant and profuse in its life as any other part of the world. It was a period, indeed, when the globe was in an important sense a unit, not individualized in its climates or its distribution of life, and only partially in its seas. But from this time the contrast is most striking.

The whole number of known American species of animals of the Permian, Triassic, Jurassic, Cretaceous, and Tertiary periods is about 2,000; while in Britain and Europe, a territory even smaller, there were over 20,000 species. In the Permian we have none; while Europe has over 200 species. In the Triassic none, Europe 1,000 species; in the Jurassic 60, Europe over 4,000; in the Cretaceous 350, Europe 5,000 to 6,000; in the Tertiary less than 1,500, Europe about 8,000.

America, since Palæozoic times, has therefore been eminent for the poverty of its Fauna.

Again, the Mammalian Age in America, although commencing with huge Pachyderms, shows little progress afterward. The large quadrupeds continue to be mainly herbivorous, and the Carnivora, the higher group, are few, and of comparatively small size. The *Herbivora are still the typical species.* While in Europe and Asia, at the same time—that is, in the Post-tertiary—the Carnivora are of great size and ferocity far exceeding the largest of modern lions and tigers. The single species of lion described from a bone from near Natchez, by Dr. *Leidy, hardly lessens the contrast.*

South America, as has been remarked by Agassiz and others, sustains this inferior position of America. The huge sloths, megatheria, and other Edentata of the South are even lower in grade than the ordinary Herbivora, and place the southern continent at an inferior level in the scale. Although there were Carnivora, they were much smaller than the European, The *Edentates are, in fact, its typical species.*

The supremacy of the great Oriental Continent is therefore most signally apparent.

The contrast is still greater with Australia and New Zealand, whose past and present Fauna and Flora have been well said, by Agassiz, and afterwards by Owen, to represent the Jurassic period, the present era affording Trigonias, Terebratulæ, Cestracient Fishes, and the Araucarian Coniferæ, all Jurassic types, beside kangaroos and moas. Among Mammals, the *Marsupials,* the lowest of all in the class, *are its typical species.*

Ever since Palæozoic times, therefore, the Oriental Continent—that is, Europe, Asia, and Africa combined—has taken the lead in animal life. Through the Reptilian age, Europe and Asia had species by thousands, while America was almost untenanted. In the later Mammalian age, North America was yet in the shade, both in its Mammals and lower tribes, South America in still darker shadows, and Australia even deeper still. The earth's antipodes were like light and darkness in their zoological contrasts. And was there not in all this a prophetic indication, which had been growing more and more distinct, that the Eastern continent would be man's chosen birth-place? that the long series of living beings which had been in slow progression through incalculable ages would there at last attain its highest exaltation? that the stupendous system of nature would there be opened to its fullest expansion?

Another of our number has shown, in eloquent language, how the diversified features and productions of the Old World conspired to adapt it for the childhood and development of the race; and that when beyond his pupilage, having accomplished his rescue from himself and the tyranny of the forces around him, and broken the elements into his service, he needed to emerge from the trammels of the school-house in order to enjoy his fullest freedom of thought, and action, and social union. Prof. Guyot observes further, that America, ever free, was the appointed land for this freedom and union, of which its open plains and oneness of structure were a fit emblem; and that, although long without signs of progress or hope in its future, this land is to be the centre of hope and light to the world.

In view of all these arrangements, Man may well feel exalted. He is the last of the grand series. At his approach the fierce tribes of the earth drew back, and the race dwindled to one-fourth its bulk and ferocity—the huge mastodons, lions, and hyenas yielding place to other species better fitted to be his attendants, and more in harmony with the new creation. Partaking of the Divine image, all nature pays him tribute; the universe is his field of study; and eternity his future. Surely it is a high eminence on which he stands.

But yet he is only *one* in the series—one individuality in the vast system. *How vain the philosophy which* makes the creature the God of Nature, or Nature its own author. Infinitely beyond man, infinitely beyond all created things is that Being, with whom this system and the combined systems of immensity were as one purpose of His will.

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### African Explorers—Barth and Vogel.

A telegraphic despatch from Dr. H. Barth, dated "Marseilles, 8th of September, 11·5 a.m.," received by me at Gotha this day, at 2·5 p.m., conveys the gratifying intelligence that this extraordinary man, already believed dead, set his foot on European shore this morning, *en route*

for London, to present himself to the Foreign Office. He intends to remain in London till about the 20th instant, and then to hasten on to Hamburgh, his native town, where his aged father and sister reside.

It may not be uninteresting to recapitulate, on the very successful and happy termination of this most arduous and hazardous undertaking of Dr. Barth, a few of the principal dates of his journeys.

It was on the 8th of December, 1849, that he left Marseilles for *North Africa, in company with the late Dr. Overweg.* Having arrived at Tripoli, the two travellers explored the Gharian mountain, during the month of February, 1850, after which they started for Lake Tsad, together with the late Mr. Richardson, on the 23rd of March. Travelling by way of the Oases of Ilessi and Shinti, Murzuk and Jerdalus, they arrived at the Kasar Janoon, or Palace of the Demons, in the vicinity of Ghat, on the 15th of July. In exploring this celebrated group of hills Dr. Barth nearly perished, for he lost his way in the desert, was twenty-eight hours without water, and suffered the most *horrible tortures from thirst, having drunk his own blood.* Passing by Ghat, Talesseles, and Aison, the travellers entered the kingdom of Air, or Asben, on the 21st of August. Here Dr. Barth, by his firm and resolute bearing against an attacking body of Tuaricks, saved the Expedition from an ignominious retreat back to the north. Afterwards, while his companions remained at Tintellust, he undertook, alone, a journey to Agadez, the capital (4th Oct. to 6th Nov.), by which he greatly added to the store of our knowlege of Northern Africa.

The Expedition entered Sudan on the 1st of January, 1851, and arrived at Tagelal on the 11th, where the travellers separated,—Dr. Barth taking the route to Kashna and Kano. In this place he collected a great deal of information. While on his march to Kuka, he received the sad news of Mr. Richardson's death, which took place at Ungurutua on the 4th of March. With praiseworthy energy he hastened on to that place in order to fulfil the last duty to his travelling companion. He secured all his papers and transmitted them to London, where they were shortly afterwards published.

Arriving at Kuka on the 2nd of April, he found the whole Expedition disorganized and in a very disheartening condition, from being without provisions and means, their funds being entirely exhausted. But he succeeded in borrowing a sum of money from the Vizier of Bornu, paid the debts incurred by Mr. Richardson, and thus saved the Expedition a second time from failure by his well-timed energy and perseverance.

On the 29th of March, 1851, Dr. Barth undertook his memorable journey to Adamawa, in which he discovered the River Binue, by means of which, the long-hidden and hitherto inaccessible regions of Central Africa have been thrown open to English enterprise.

Dr. Barth, having returned to Kuka from Adamawa on the 22nd of July, explored Kanem from September to November, in company with Dr. Overweg, and then penetrated in a direction of SSE. from Kuka, as far as Musgo and beyond, from the 25th of November to the 1st of February, 1852.

Dr. Barth, once more single-handed, undertook another journey, from the end of March to the 20th of August, in which he pushed his way eastwards across the river Shary into Bagirmi and as far as its capital, Maseña, by which journey he added considerable to our knowledge of the countries east and south-east from Lake Tsad, as far as the basin of the Nile.

On the 27th of September, 1852, Dr. Barth lost his only companion and friend, Dr. Overweg, who died on the borders of Lake Tsad; but his own health being unimpaired, he determined, with true heroism, to continue his researches alone, and undertook his bold journey to Timbuktu. He left Kuka on the 25th of November, 1852, reached Kashna in February, 1853, Sakatu in the beginning of April, and entered Timbuktu on the 7th of September. After a protracted stay of nearly a year at this famous place, he made his way back to Kano, which he reached on the 17th of October, 1854; and on the 1st of December last met Dr. Vogel between that place and Kuka. Thence he re-crossed the Sahara to Tripoli, and thus finally reached Marseilles.

In his unparalleled journey to Timbuktu, Dr. Barth discovered two large empires, Gando and Hamd-Allahi, of which not even the names were known previously,—he gained a complete insight into the history and present state of Timbuktu, its people, and all the surrounding countries,—and, for the first time, made a minute survey of the River Kowara in its middle course,—and altogether created a new era in the history of African discovery and regeneration.

A letter from Dr. Barth, dated Murzuk, July 20, and received after the despatch, contains also news of Dr. Vogel's progress and intended movements. This youthful explorer had reached the great and celebrated Fellata town, Yakoba, which Lander, Overweg, Barth, the Chadda Expedition, and others had previously been anxious to visit, without, however, succeeding; Dr. Vogel was the first European who reached Yakoba. The position of this very important point is, according to Dr. Vogel's astronomical observations—

10° 17′ 30″ north latitude,
9° 28′ 0″ east longitude Greenwich;

which is considerably different from all positions hitherto assumed, namely, much more to the north-west. From Yakoba Dr. Vogel intended to push his way to the south, across the Binue into Adamawa, to ascend the great mountain Alantika, situated south-east of Yola, and to penetrate as far as Tabati and Baya (see Dr. Barth's map published by me last year). Thence he intended to retrace his steps north-eastwards, in order to attempt the exploration of Waday.

AUGSTUS PETERMANN.

*Gotha, September 8th.*

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*Singular Mortality amongst the Swallow Tribe*, by Mr. E. J. LOWE.—There has seldom been recorded a more singular circumstance than the mortality amongst the swallow tribe, which occurred on the 30th and 31st of May in the present year. (Eng.) The unusually cold weather for this advanced season appears to have operated in producing the destruction of the greater number of this useful tribe of migratory birds. The severity of the weather causing a sarcity of insects (the ordinary food of the swallow), and rendering the birds too weak to enable them to search for food. On the 30th of May the swallows became so tame that they flew about the legs of persons, and could be caught without difficulty, on the following morning most of them lay dead upon the ground or in their own nests. In this neighborhood (near Nottingham) the greatest mortality was occasioned amongst the house swallow (*Hirundo rustica*), yet solely because this bird predominates. Near the Red Tunnel at Trumpton there are great numbers of sand-martins (*Hirundo raparia*), and there, in a saw-pit on the banks of the river Soar, hundreds congregated and died. At Borrowash, near the Derwent river, there are very many white martins (*Hirundo urbica*); they also congregated and died, lying ten and twenty deep on the different window-sills. Several persons opened their windows, and the birds were very willing to take shelter in the rooms, exhibiting no disposition to depart. Many were kept alive in the different houses by being fed with the *aphis* of the rose-tree, the only procurable insect. At Bulwell, Wollaton, Long Eaton, Gawley, and many other places, the same fearful mortality occurred. Farmers opened their barn-doors to admit the birds. To show the extent of the deaths, it may be mentioned that at one place where previously there were fifty nests occupied only six pair survived to take possession of them. The manner in which they congregated was a curious feature in the occurrence. A swallow would fly round a heap of dead and dying companions, and then suddenly dart down and bury itself amongst them. On the same days, in the vale of Belvoir, and parts of Nottinghamshire and Lincolnshire, several hundred newly shorn sheep perished.

*On the Species of Meriones and Arvicolæ found in Nova Scotia*, by Mr. J. H. DAWSON.—There appears to be two species of Meriones in Nova Scotia:—one of them is identical with *M. Labradorius* of Sir J. Richardson, differing only in some trifling characters; the second species is smaller, darker coloured, and has coarser hair. The average dimensions of three adult specimens are:—length of head and body, 3 inches 6 lines; tail, 4 inches 8 lines; tarsus and foot, 1 inch 4 lines. The author had not found any description of this last species; but would not desire to name it as a new species until he had made further inquiry. Should it prove to be new, he would claim for it the name *M. Acadicus*. This species inhabits grain fields. It does not burrow, but prepares forms in sheltered places, lying very close; and, when disturbed, escaping by a few rapid leaps or bounds. It feeds by day, and does not appear to prepare any store of food for winter. It is usually stated that these leaping mice are adapted to level and open countries; it therefore appears singular that in a country originally densely wooded two species should exist. Their natural habitat may have been those places from which the woods have been removed by fire, and replaced by herbaceous plants and shrubs. The most common Arvicola in Nova Scotia is the *A. Pennsylvanica*, which in form and habits closely resembles the European *A. vulgaris*. Its burrows, forming a neat nest, have two entrances, each with a sort of ante-chamber to enable the animal to turn itself. It excavates galleries under the snow in winter, devouring grass roots, bark of trees, &c.; and at the same season it often resorts to barns and out-houses.—*British Association at Glasgow.*

**Monthly Meteorological Register, at the Provincial Magnetical Observatory, Toronto, Canada West.—September, 1855.**

*Latitude, 43 deg. 39.4 min. North. Longitude, 79 deg 21. min. West. Elevation above Lake Ontario, 108 feet.*

| Day. | Barom. at temp. of 32 deg. 6 A.M. | 2 P.M. | 10 P.M. | Mean. | Temp. of the Air. 6 A.M. | 2 P.M. | 10 P.M. | M'N. | Mean Temp. + or − of the Average | Tension of Vapour. 6 A.M. | 2 P.M. | 10 P.M. | M'N | Humid'y of Air. 6 A.M. | 2 P.M. | 10 P.M. | M'N | Wind. 6 A.M. | 2 P.M. | 10 P.M. | Mean Direct. | Mean Vel'y | Rain in Inch. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29·704 | 29·567 | 29·617 | 29·629 | 56·4 | 79·8 | 72·8 | 71·2 | + 8·2 | 0·410 | 0·600 | 0·692 | 0·563 | 92 | 61 | 89 | 76 | Calm | S E b S | W S W | S 32 W | 11·63 | 0·425 |
| 2 | ·736 | ·764 | — | — | 61·7 | 71·6 | — | — | — | ·398 | ·387 | — | — | 74 | 51 | — | — | N W b W | N W | N | N 18 W | 10·38 | 0·035 |
| 3 | ·778 | ·767 | ·779 | ·772 | 57·2 | 59·9 | 51·9 | 55·6 | — 6·8 | ·406 | ·361 | ·314 | ·352 | 88 | 72 | 82 | 81 | E b N | E | N | E 41 N | 7·81 | ... |
| 4 | ·823 | ·882 | ·924 | ·875 | 49·9 | 63·2 | 55·6 | 57·2 | — 4·9 | ·285 | ·415 | ·324 | ·336 | 81 | 74 | 75 | 73 | N | E b S | N N E | E 31 N | 7·61 | ... |
| 5 | ·969 | ·939 | ·939 | ·944 | 55·5 | 68·8 | 57·1 | 61·2 | — 0·6 | ·364 | ·386 | ·420 | ·398 | 85 | 57 | 92 | 78 | N N E | E b N | N E | E 27 N | 7·04 | ... |
| 6 | ·968 | ·933 | ·909 | ·938 | 56·2 | 68 8 | 57·8 | 61·5 | + 0·1 | ·385 | ·464 | ·420 | ·433 | 87 | 67 | 90 | 82 | N b E | E | N E | E 25 N | 5·83 | ... |
| 7 | ·937 | ·843 | ·779 | ·843 | 57·8 | 72·5 | 61·2 | 64·0 | + 2·8 | ·420 | ·539 | ·495 | ·487 | 90 | 76 | 94 | 84 | N N W | S b E | Calm. | S 1 W | 3·58 | ... |
| 8 | ·760 | ·628 | ·619 | ·660 | 63·0 | 78·8 | 70·0 | 71·5 | +10·8 | ·518 | ·649 | ·649 | ·585 | 92 | 68 | 91 | 78 | W S W | S S W | S W | S 32 W | 6·36 | 0·185 |
| 9 | ·673 | ·656 | — | — | 69·0 | 80·5 | — | — | — | ·614 | ·340 | — | — | 74 | 33 | — | — | N W b N | N W b W | N b W | N 29 W | 10·77 | ... |
| 10 | ·746 | ·705 | ·662 | ·697 | 60·0 | 72·5 | 60·4 | 64·5 | + 4·5 | ·386 | ·481 | ·460 | ·441 | 76 | 65 | 89 | 75 | N | S E b E | N E b N | E 1 S | 3·84 | ... |
| 11 | ·673 | ·592 | ·564 | ·607 | 57·1 | 78·0 | 71·0 | 70·2 | +10·6 | ·420 | ·684 | ·638 | ·589 | 92 | 73 | 86 | 81 | Calm. | S S E | S W b W | S 17 W | 6·15 | ... |
| 12 | ·579 | ·486 | ·483 | ·517 | 70·4 | 80·0 | 70·7 | 73·1 | +13·8 | ·603 | ·666 | ·664 | ·626 | 84 | 67 | 91 | 80 | S S W | S S W | W b S | W 24 S | 12·54 | 0·240 |
| 13 | ·699 | ·781 | ·857 | ·785 | 59·2 | 65·0 | 51·7 | 58·9 | + 0·1 | ·460 | ·224 | ·282 | ·311 | 93 | 36 | 74 | 65 | N | N b W | N b W | N 6 W | 11·48 | ... |
| 14 | ·870 | ·776 | ·710 | ·777 | 50·5 | 61·2 | 51·5 | 54·7 | — 3·7 | ·282 | ·333 | ·290 | ·301 | 79 | 65 | 78 | 72 | N E b N | E b N | N b E | E 34 N | 8·79 | ... |
| 15 | ·726 | ·636 | ·578 | ·640 | 48·5 | 66·5 | 55·3 | 58·0 | + 0·1 | ·258 | ·428 | ·417 | ·391 | 77 | 67 | 97 | 82 | N | E S E | N b E | E 15 S | 4·56 | ... |
| 16 | ·575 | ·550 | — | — | 56·7 | 74·1 | — | — | — | ·423 | ·537 | — | — | 94 | 66 | — | — | W b S | S b W | N b W | W 36 S | 6·53 | ... |
| 17 | ·663 | ·527 | ·427 | ·527 | 59·2 | 70·6 | 68·2 | 66·3 | + 9·3 | ·483 | ·586 | ·635 | ·570 | 98 | 81 | 95 | 91 | N b W | E S E | S S W | S 8 E | 4·93 | 2·535 |
| 18 | ·367 | ·662 | ·806 | ·632 | 65·7 | 50·1 | 45·9 | 53·3 | — 3·3 | ·554 | ·301 | ·202 | ·329 | 90 | 85 | 66 | 77 | N | N N E | N E | N 25 E | 9·65 | 0·275 |
| 19 | ·998 | 30·006 | 30·003 | 30·016 | 39·5 | 49·5 | 42·4 | 44·1 | —12·0 | ·160 | ·219 | ·218 | ·206 | 67 | 63 | 81 | 72 | N E | S b E | N b E | E 27 N | 5·76 | ... |
| 20 | ·979 | 29·892 | 29·814 | 29·883 | 47·2 | 55·5 | 48·8 | 50·8 | — 4·8 | ·212 | ·254 | ·291 | ·250 | 66 | 66 | 85 | 69 | E S E | E b N | N b E | E 16 N | 7·51 | ... |
| 21 | ·739 | ·606 | ·601 | ·643 | 49·8 | 56·2 | 56·0 | 54·8 | — 0·8 | ·320 | ·412 | ·420 | ·391 | 91 | 93 | 96 | 93 | N b E | E N E | N E | N 27 E | 2·52 | 0·010 |
| 22 | ·701 | ·766 | ·851 | ·779 | 56·0 | 58·3 | 53·0 | 55·5 | + 0·9 | ·420 | ·279 | ·328 | ·336 | 96 | 58 | 82 | 79 | N N W | N W b N | N b W | N 14 W | 8·69 | ... |
| 23 | ·924 | ·919 | — | — | 50·6 | 61·4 | — | — | — | ·291 | ·359 | — | — | 81 | 67 | — | — | N | S E b E | E S E | E 21 S | 7·54 | ... |
| 24 | ·873 | ·793 | ·773 | ·805 | 58·2 | 67·7 | 61·4 | 62·1 | + 8·4 | ·401 | ·468 | ·493 | ·457 | 84 | 71 | 92 | 84 | S b E | S E | N E | E 41 S | 5·57 | 0·550 |
| 25 | ·725 | ·596 | ·439 | ·570 | 62·1 | 69·3 | 62·6 | 65·2 | +12·0 | ·504 | ·622 | ·506 | ·546 | 93 | 90 | 91 | 90 | S S E | S E | E | S 34 E | 5·29 | 0·895 |
| 26 | ·310 | ·247 | ·414 | ·326 | 65·0 | 72·7 | 54·6 | 64 0 | +11·3 | ·566 | ·351 | ·374 | ·428 | 95 | 45 | 90 | 76 | S | W b N | W b S | W 6 S | 12·10 | 0·005 |
| 27 | ·537 | ·660 | ·770 | ·666 | 50·2 | 51·5 | 42·7 | 47·5 | — 4·7 | ·283 | ·216 | ·214 | ·223 | 79 | 58 | 80 | 69 | W | N W b W | N W b W | W 37 N | 12·47 | ... |
| 28 | ·864 | ·844 | ·824 | ·838 | 36·1 | 55·3 | 46·7 | 46·9 | — 4·9 | ·191 | ·284 | ·278 | ·254 | 90 | 66 | 88 | 80 | N W b N | S b E | E b N | E 12 S | 4·99 | ... |
| 29 | ·782 | ·688 | ·525 | ·656 | 44·5 | 59·0 | 58·9 | 55·0 | + 3·7 | ·264 | ·345 | ·405 | ·352 | 91 | 71 | 83 | 82 | N E b N | E b N | S S E | E 8 S | 7·23 | 0·385 |
| 30 | ·379 | ·468 | — | — | 59·9 | 63·0 | — | — | — | ·452 | ·484 | — | — | 89 | 87 | — | — | S E b E | N W b N | N b W | W 12 N | 9·42 | 0·045 |
| M | 29·751 | 29 713 | 29·707 | 29·721 | 55 0 | 65 2 | 57 1 | 59·5 | + 2·0 | 0·382 | 0·423 | 0·417 | 0 406 | 86 | 67 | 86 | 79 | 5·54 | 10·43 | 6 09 | N 20 E | 7·61 | 5·585 |

Highest Barometer..... 30·092, at 8 a.m. on 19th } Monthly range:
Lowest Barometer..... 29·247, at 2 p.m. on 26th } 0·845 inches.

Highest registered temperature 82°·6, at p.m., on 1st } Monthly range:
Lowest registered temperature 33°·0, at a.m. on 28th } 49°·6.

Mean Maximum Thermometer..... 68°·44 } Mean daily range:
Mean Minimum Thermometer..... 49°·94 } 18.51.

Greatest daily range.....28°·8, from p.m. of 26th to a.m. of 27th.
Least daily range .....11°·6, from p.m. of 20th, to a.m. of 21st.

Warmest day..... 12th. Mean temperature.....73°·05 } Difference,
Coldest day..... 19th. Mean temperature.....44°·12 } 28°·93.

Greatest intensity of Solar Radiation, 96°·4 on p.m. of 11th } Range,
Lowest point of Terrestrial Radiation, 27°·5 on a.m. of 28th } 68°·9.

Aurora observed on 2 nights: viz. on 10th and 27th.
Possible to see Aurora on 20 nights. Impossible on 10 nights.
Raining on 12 days. Raining 43·6 hours; depth, 5·585 inches.
Mean of Cloudiness, 0·45.
Thunder storms occurred on the 1st, 9th, 17th, and 25th.
Sheet lightning observed on the 8th and 11th.

The 17th was the most rainy day recorded at the Observatory since the 20th November, 1851.

Complete Saturation occurred at midnight of 21st.

28th, 6 a.m., Hoar Frost first observed this Season.

29th, Halo round the Moon at midnight, diameter 45°.

*Sum of the Atmospheric Current, in miles, resolved into the four Cardinal directions.*

| North. | West. | South. | East. |
|---|---|---|---|
| 2269·85 | 1415·13 | 1395·95 | 1739·76 |

Mean direction of Wind, N 20° E. Mean velocity 7·61 miles per hour.
Maximum velocity, 30·6 miles per hour, from 10 to 11 a.m. on 27th.
Most windy day, the 12th; mean velocity, 12·54 miles per hour.
Least windy day, the 21st; mean velocity, 2·52 " "
Most windy hour, 1 p.m.; Mean velocity, 10·55 miles per hour.
Least windy hour, 9 p.m.; Mean velocity, 5·37 " "
Mean diurnal variation, 5·18 miles.

The Mean Temperature of September, 1855, has been 1°·4 warmer than the average of the last 16 years; the depth of Rain which fell during the month was 1·127 inches on the surface greater than the mean monthly quantity; and the mean velocity of the wind recorded has also been greater than the average of the last 8 years by 2,47 miles per hour.

**Comparative Table for September.**

| Year. | Temperature: Mean. | Dif. from Av'ge | Max. obs'vd | Min. obs'vd | Range | Rain: D's. | Inch. | Wind: M'n Direc. | Mean Velocity in Miles. | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1840 | 54·0 | —4·1 | 70·2 | 29·4 | 40 8 | 4 | 1·380 | ... | ... | |
| 1841 | 61·3 | +3·2 | 79·9 | 37·5 | 42·4 | 9 | 3·340 | ... | 0·26 | lbs. |
| 1842 | 55 7 | —2·4 | 83 5 | 28·3 | 55·2 | 12 | 6·160 | ... | 0·45 | lbs. |
| 1843 | 59·1 | +1·0 | 87·8 | 33·1 | 54·7 | 10 | 9·760 | ... | 0·57 | lbs |
| 1844 | 58 6 | +0 5 | 81·5 | 29·6 | 51·9 | 4 | impt. | ... | 0·26 | lbs. |
| 1845 | 56·0 | —2·1 | 78·8 | 35 3 | 43·5 | 16 | 6·245 | ... | 0·34 | lbs. |
| 1846 | 63·6 | +5·5 | 84·0 | 39·0 | 45·0 | 11 | 4·595 | ... | 0·33 | lbs. |
| 1847 | 55·6 | —2·5 | 74·8 | 38·1 | 36·7 | 15 | 6·665 | ... | 0·33 | lbs. |
| 1848 | 54 2 | —3·9 | 80·9 | 29 5 | 51·4 | 11 | 3·115 | W 19 N | 5·81 | Miles. |
| 1849 | 58·2 | +0·1 | 80·6 | 33·5 | 47·1 | 9 | 1·480 | W 15 N | 4·23 | Miles. |
| 1850 | 56·5 | —1·6 | 76·0 | 31·7 | 44·3 | 11 | 1·735 | W 24 S | 4·78 | Miles. |
| 1851 | 60·0 | +1·9 | 86·3 | 33·4 | 52·9 | 9 | 2·665 | N 14 E | 5·45 | Miles. |
| 1852 | 57·5 | —0·6 | 81·8 | 36·1 | 45·7 | 10 | 3·630 | W 17 N | 4·60 | Miles. |
| 1853 | 58·8 | +0·7 | 85·4 | 36·1 | 49·3 | 12 | 5·140 | N 5 E | 4·30 | Miles. |
| 1854 | 61·0 | +2·9 | 93·1 | 36·3 | 56·8 | 14 | 5·875 | N 18 W | 4·31 | Miles. |
| 1855 | 59 5 | 1·4 | 81 7 | 36·1 | 45·6 | 12 | 5·585 | N 20 E | 7 61 | Miles. |
| | | | | | | | | | 0·36 | lbs. |
| M'n. | 58·10 | | 81·64 | 33·94 | 47·70 | 10·6 | 4·458 | | 5·14 | Miles. |

**Monthly Meteorological Register, St. Martin, Isle Jesus, Canada East.—September 1855.**

NINE MILES WEST OF MONTREAL.

BY CHARLES SMALLWOOD, M.D.

*Latitude*—45 *deg.* 32 *min. North. Longitude*—73 *deg.* 36 *min. West. Height above the Level of the Sea*—118 *Feet.*

| Day. | Barom. corrected and reduced to 32° Fahr. | | | Temp. of the Air. | | | Tension of Vapor. | | | Humidity of Air. | | | Direction of Wind. | | | Velocity in Miles per Hour. | | | Rain in Inches | Weather, &c. A cloudy sky is represented by 10; A cloudless sky by 0. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10. P.M. | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10 P.M. | | 6 A.M. | 2 P.M. | 10 P.M. |
| 1 | 29·800 | 29·621 | 29·623 | 56·2 | 78·9 | 70·0 | ·432 | ·739 | ·692 | ·94 | ·78 | ·95 | S W | S W b W | W | 0·38 | 1·87 | 8·12 | 0·152 | Cir. Cum. Str. | Cir. Cum. Str.10 | Cum. Str. 4, thu. |
| 2 | ·696 | ·884 | ·866 | 64·1 | 62·9 | 52·6 | 476 | 333 | 283 | 79 | 59 | 70 | W N W | N W b W | N W b W | 5·70 | 15·11 | 7·47 | ... | Cirr Str. 5. [6. | Str. 2. | Do. 4. |
| 3 | ·972 | ·906 | ·951 | 44·0 | 69·3 | 49·7 | 271 | 486 | 312 | 87 | 69 | 86 | N b W | E b N | S E b E | 5·92 | 2·12 | 0·28 | ... | Str. 8. | Clear. | Do. 4. |
| 4 | 30·056 | 30·061 | 30·102 | 52·1 | 72·0 | 57·9 | 330 | 584 | 335 | 85 | 76 | 78 | E b N | E N E | E b S | 0·76 | 2·19 | 0·75 | ... | Clear. | Do. | Clear. |
| 5 | ·156 | ·119 | ·095 | 52·6 | 78·2 | 58·1 | 373 | 523 | 412 | 93 | 55 | 84 | E b S | S W b W | S b W | Calm | 1·12 | 0·20 | ... | Do. | Do. | Do. |
| 6 | ·131 | ·086 | ·094 | 46·0 | 77·1 | 60·0 | 319 | 560 | 443 | 94 | 63 | 85 | S b W | S b W | S b W | Calm | Calm | Inap. | ... | Do. | Do. | Do. |
| 7 | ·046 | 29·899 | 29·876 | 57·0 | 77·7 | 64·8 | 456 | 589 | 534 | 95 | 65 | 89 | S b W | S b W | W b S | Calm | 0·30 | 3·90 | Inapp. | Do. | Cum. Str. 10. | Cum. Str. 10. |
| 8 | 29·796 | ·718 | ·788 | 64·0 | 73·2 | 70·9 | 571 | 692 | 692 | 95 | 86 | 94 | W b S | W b S | S W b S | 1·40 | 1·77 | 0·92 | ... | Cum. Str. 4 | Do. 10. | Clear. |
| 9 | ·629 | ·598 | ·796 | 71·1 | 80·1 | 61·7 | 681 | 532 | 431 | 90 | 53 | 79 | W b S | N W b W | N W | 4·30 | 13·50 | 12·80 | ... | Clear. | Cum. 2. | Do. |
| 10 | ·886 | ·713 | ·755 | 50·7 | 77·3 | 62·4 | 326 | 506 | 421 | 87 | 55 | 75 | N W | W b S | N W b W | 0·81 | 0·90 | 5·15 | ... | Do. | Clear. | Cir. Str. 6. |
| 11 | ·759 | ·714 | ·683 | 61·7 | 78·7 | 66·6 | 511 | 638 | 544 | 93 | 67 | 85 | W S W | S W b W | S b W | 0·15 | 0·87 | 0·40 | ... | Do. | Cir. Cum. Str. 9. | Clear, ft. aurora. |
| 12 | ·470 | ·389 | ·457 | 70·4 | 87·6 | 75·6 | 659 | 776 | 670 | 90 | 62 | 78 | W b S | W b S | S W b W | 1·75 | 11·25 | 14·00 | ... | Cirr. Str. 4. | Cum. Str. 4. | Clear, sht. li'ng. |
| 13 | ·700 | ·775 | ·929 | 58·3 | 66·2 | 51·1 | 412 | 317 | 264 | 85 | 49 | 68 | N W | N W b W | N W b W | 7·69 | 20·00 | 9·08 | 0·203 | Cir. Str. 10. | Clear. | Do. ft. aur. lght. |
| 14 | ·956 | ·987 | ·905 | 42·1 | 66·2 | 45·3 | 215 | 354 | 272 | 76 | 55 | 86 | N E | S S E | S E | 0·50 | 1·14 | 0·64 | ... | Clear, Frost. | Do. | Do. |
| 15 | ·850 | ·714 | ·694 | 44·5 | 67·1 | 60·0 | 282 | 455 | 441 | 92 | 69 | 84 | S E b E | S E b E | S | Inap. | 1·35 | 3·14 | ... | Do. | Cir. Str. 4. | Cirr. Str. 8. |
| 16 | ·651 | ·626 | ·723 | 62·3 | 73·4 | 48·5 | 499 | 628 | 332 | 89 | 78 | 97 | S W | W b S | N E b N | 1·00 | 2·77 | 6·51 | 0·566 | Str. 10. | Do. 10. | Rain. |
| 17 | ·765 | ·751 | .656 | 51·0 | 60·9 | 54·2 | 350 | 416 | 400 | 90 | 79 | 93 | N N E | E b S | N E b N | Inap. | 2·25 | 0·11 | 0·683 | Cirr. Str. 10. | Do. 4. | Rain. |
| 18 | ·635 | ·715 | ·839 | 49·1 | 52·1 | 43·2 | 336 | 246 | 216 | 93 | 61 | 73 | N E b N | N b E | N E b N | 3·25 | 10·62 | 4·75 | 0·632 | Rain. | Do. 2. | Clear. |
| 19 | 30·040 | 30·005 | 30·086 | 38·4 | 51·7 | 36·0 | 189 | 238 | 182 | 76 | 61 | 78 | N | N N E | N N W | 0·90 | 0·72 | 0·22 | ... | Clear. | Cum. 2. | Do. |
| 20 | ·140 | 29·989 | 29·930 | 34·2 | 60·0 | 48·7 | 204 | 293 | 281 | 95 | 56 | 80 | W b N | S W b W | S W b W | 0·24 | 0·22 | 0·83 | ... | Do. | Clear. | Cirr. Str. 6. |
| 21 | 29·846 | ·754 | ·770 | 42·9 | 61·0 | 52·6 | 263 | 407 | 349 | 92 | 75 | 87 | W | S W b W | S E b S | 0·40 | 0·12 | Inap. | Inapp. | Do. | Cir. Cum. Str.10 | Do. 10. |
| 22 | ·841 | ·844 | ·924 | 50·0 | 58·0 | 51·4 | 314 | 412 | 337 | 85 | 84 | 81 | N E b E | N E b E | N E b E | Calm | Calm | Calm | Inapp. | Cirr. Str. 10. | Cir. Str. 4. | Cum. Str. 4. |
| 23 | 30·075 | 30·155 | 30·161 | 46·8 | 67·4 | 46·4 | 303 | 455 | 303 | 93 | 69 | 93 | N E b E | E b S | E S E | 1·00 | 0·92 | Inap. | ... | Str. 10. | Str. 10. | Do. 4. |
| 24 | ·132 | ·002 | 29·909 | 42·0 | 63·9 | 54·5 | 273 | 435 | 400 | 96 | 75 | 93 | E | E b S | E S E | Inap. | 1·10 | Calm | ... | Fog, a. m. | Cir. Str. 10. | Do. 10. |
| 25 | 29·900 | ·788 | ·827 | 52·0 | 70·5 | 60·6 | 349 | 541 | 441 | 87 | 74 | 84 | N E b E | S E | E | Calm | 0·02 | 0·78 | 0·336 | Cirr. Str. 10. | Do. 8. | Do. 8. |
| 26 | ·496 | ·377 | ·335 | 61·2 | 69·0 | 66·0 | 483 | 640 | 605 | 89 | 92 | 94 | S S E | S S W | S S W | 5·12 | 0·78 | 0·42 | 0·656 | Do. 8. | Rain. | Do. 8. |
| 27 | ·486 | ·513 | ·720 | 58·1 | 61·0 | 46·7 | 372 | 383 | 262 | 89 | 71 | 80 | N W b W | N W b W | N W b W | 1·26 | 0·27 | 1·43 | 0·010 | Str. 4. | Cirr. Str. 4. | Do. 6. |
| 28 | ·958 | ·951 | ·972 | 40·1 | 56·0 | 42·5 | 210 | 274 | 243 | 79 | 60 | 85 | N W b W | W b N | S W | 1·21 | Calm | Calm | ... | Clear. | Clear. | Clear. |
| 29 | 30·001 | 30 040 | ·885 | 32·0 | 68·0 | 46·6 | 192 | 422 | 282 | 96 | 62 | 86 | W | S | S b E | Calm | 2·14 | 0·14 | ... | Do. hoar frost. | Do. | Light Cirr. 4. |
| 30 | 29·700 | 29·665 | ·773 | 50·8 | 66·1 | 55·8 | 349 | 440 | 450 | 93 | 68 | 99 | S | S E | S E | 2·21 | 13·55 | 6·24 | 0·233 | Cir. Cum. Str. [3. | Cirr. Str. 8. | Rain. |

| | | |
|---|---|---|
| Barometer .... | Highest, the 23rd day | 30·161 |
| | Lowest, the 26th day | 29·335 |
| | Monthly Mean | 29·832 |
| | " Range | 0·826 |
| Thermometer | Highest, the 12th day | 87°·7 |
| | Lowest, the 28th day | 30°·4 |
| | Monthly Mean | 58°·55 |
| | " Range | 57°·3 |
| | Mean Humidity | ·903 |
| Greatest Intensity of the Sun's Rays | | 126°·2 |
| Lowest Point of Terrestrial Radiation | | 29°·3 |

Amount of Evaporation, 3·04 inches.

Rain fell on 12 days, amounting to 3·471 inches, and was accompanied by thunder on one day. Raining 42 hours. 29 minutes.

Most prevalent Wind, N.W.bW. Least prevalent Wind, E.

Most Windy Day, the 13th day; mean miles per hour, 12·25.

Least Windy Day, the 22nd; mean miles per hour, 0.00.

Aurora Borealis visible on 2 nights. Might have been seen on 12 nights.

Brilliant Meteor on the 11th day at 9·40 p.m. in S.E. passing from Algenib Pegasi to H Antini.

Meteor of moderate brightness on the 12th day at 9 p.m. in S.E. passing from E pisc: accident: to B Aquarii.

The electrical state of the atmosphere has been marked by rather feeble intensity, increased during each fall of rain.

Ozone was in rather large quantity during the month.

## Monthly Meteorological Register, Quebec, Canada East, August, 1855.

BY LIEUT. A. NOBLE, R.A., F.R.A.S., AND MR. WM. D. C. CAMPBELL.

*Latitude.* 46 *deg.* 49·2 *min. North; Longitude,* 71 *deg.* 16 *min. West. Elevation above the level of the Sea,—Feet.*

| Date. | Barometer corrected and reduced to 32 degrees, Fahr. | | | | Temperature of Air. | | | | Tension of Vapour. | | | | Humid'y of Air. | | | | Direction of Wind. | | | Velocity of Wind. | | | Rain in Inch. | Snow in Inch. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M | 2 P.M | 10 P.M | M'N | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10 P.M. | | | |
| 1 | 29·836 | 29·874 | 26·876 | 29·862 | 60·3 | 71·2 | 64·8 | 65·4 | 0·338 | 0·380 | 0·374 | 0·364 | 66 | 51 | 63 | 60 | W b S | E S E | E S E | 7·2 | 13·9 | 17·2 | ... | ... | |
| 2 | ·903 | ·933 | ·792 | ·876 | 61·4 | 82·1 | 69·9 | 71·1 | ·430 | ·447 | ·570 | ·482 | 81 | 42 | 81 | 68 | S | S | E | 6·2 | 3·8 | 11·3 | ·055 | ... | |
| 3 | ·784 | ·697 | ·606 | ·696 | 68·8 | 81·2 | 69·6 | 73·2 | ·578 | ·623 | ·608 | ·603 | 85 | 60 | 87 | 77 | S | W | S E | 9·3 | 11·3 | 10·0 | ·383 | ... | 3rd. Thunder and lightning. |
| 4 | ·467 | ·536 | ·622 | ·542 | 69·0 | 78·0 | 65·9 | 71·0 | ·625 | ·743 | ·475 | ·614 | 91 | 81 | 76 | 83 | N W | N W | N N E | 7·2 | 7·2 | 3·8 | ·072 | ... | |
| 5 | ·601 | ·501 | ·508 | ·557 | 62·8 | 73·8 | 64·2 | 66 9 | ·436 | ·246 | ·377 | ·353 | 78 | 31 | 64 | 58 | N W | N W | W | 5·2 | 11·3 | 3·8 | ... | ... | |
| 6 | ·506 | ·556 | ·610 | ·557 | 58·5 | 75·0 | 61·1 | 64·9 | ·353 | ·478 | ·249 | ·360 | 74 | 56 | 47 | 59 | N | N N W | N N W | 8·0 | 8·0 | 8·0 | ... | ... | |
| 7 | ·709 | ·723 | ·802 | ·745 | 53·0 | 63·8 | 54·1 | 57·0 | ·246 | ·273 | ·227 | ·249 | 62 | 47 | 56 | 55 | N N W | W | N N W | 3·8 | 13·8 | 8·0 | ... | ... | |
| 8 | ·872 | ·801 | ·601 | ·757 | 49·4 | 68·9 | 59·3 | 59·2 | ·280 | ·265 | ·434 | ·326 | 81 | 39 | 88 | 69 | S | S | S E | 2·0 | 2·0 | 5·2 | ·396 | ... | |
| 9 | ·386 | ·099 | 28·969 | ·151 | 63·8 | 61·5 | 63·8 | 63·0 | ·526 | ·486 | ·520 | ·511 | 91 | 91 | 90 | 91 | S E | S E | Calm. | 6·2 | 2·0 | 0·0 | ·792 | ... | |
| 10 | ·070 | ·197 | 29·448 | ·.38 | 58·7 | 61·1 | 55·8 | 58·4 | ·434 | ·336 | ·343 | ·371 | 90 | 64 | 80 | 78 | W | W | Calm. | 15·5 | 21·3 | 0·0 | ... | ... | |
| 11 | ·654 | ·797 | ·856 | ·769 | 52·7 | 63·5 | 58·2 | 58·1 | ·336 | ·373 | ·364 | ·358 | 86 | 65 | 77 | 76 | S S E | S S E | S S E | 5·2 | 3·8 | 6·2 | ... | ... | |
| 12 | ·879 | ·815 | ·682 | ·792 | 56·8 | 77·3 | 65·0 | 66·6 | ·401 | ·326 | ·299 | ·342 | 89 | 36 | 49 | 58 | N E | N E | W | 6·2 | 3·8 | 3·8 | ·851 | ... | |
| 13 | ·680 | ·619 | ·638 | ·646 | 62·1 | 75·2 | 63·9 | 67·1 | ·294 | ·394 | ·317 | ·335 | 53 | 47 | 55 | 52 | W | W | W | 13·4 | 17·9 | 14·3 | ... | ... | |
| 14 | ·735 | ·785 | ·823 | ·781 | 56·1 | 66·6 | 56·9 | 59·9 | ·274 | ·263 | ·269 | ·269 | 63 | 42 | 60 | 53 | S W | W | W | 5·2 | 11·5 | 5·2 | ... | ... | |
| 15 | ·835 | ·683 | ·569 | ·696 | 50·9 | 69·1 | 66·6 | 62·2 | ·299 | ·375 | ·390 | ·355 | 82 | 55 | 61 | 60 | S S W | Calm. | Calm. | 2 0 | 0·0 | 0·0 | 1·485 | ... | 15th and 16th. In 28 hours there fell 5·854 inch. of rain. |
| 16 | ·479 | ·376 | ·363 | ·406 | 63·9 | 64·5 | 65·1 | 64·5 | ·506 | ·59 | ·606 | ·567 | 88 | 100 | 100 | 96 | S W | W | W | 2·0 | 2·0 | 3·8 | 4·369 | ... | |
| 17 | ·346 | ·263 | ·448 | ·352 | 62·1 | 73·9 | 56·2 | 64·1 | ·518 | ·570 | ·303 | ·464 | 95 | 70 | 68 | 78 | W | W | W N W | 3·8 | 3·8 | 23·1 | ... | ... | |
| 18 | ·613 | ·665 | ·763 | ·680 | 53·0 | 62·2 | 54·3 | 56·5 | ·316 | ·283 | ·267 | ·289 | 80 | 52 | 65 | 66 | N N W | W | N N W | 12·4 | 19·7 | 12·9 | ·054 | ... | |
| 19 | ·942 | ·935 | ·932 | ·936 | 46·9 | 65·2 | 56·9 | 56·3 | ·269 | ·271 | ·302 | ·281 | 83 | 44 | 66 | 64 | N N W | W | W | 10·0 | 13·9 | 25·4 | ... | ... | |
| 20 | ·933 | ·896 | ·883 | ·904 | 52·4 | 66·4 | 62·9 | 60·6 | ·310 | ·409 | ·381 | ·367 | 80 | 70 | 68 | 73 | W | W | Calm. | 6·2 | 8·0 | 0·0 | ... | ... | |
| 21 | ·815 | ·708 | ·698 | ·740 | 58·8 | 76·6 | 71·2 | 68·9 | ·413 | ·463 | ·496 | ·457 | 85 | 52 | 67 | 68 | W | W | W | 13·9 | 13·9 | 13·9 | ·075 | ... | |
| 22 | ·739 | ·787 | ·692 | ·739 | 64·3 | 67·4 | 65·2 | 66 0 | ·550 | ·552 | ·508 | ·537 | 94 | 86 | 84 | 88 | W N W | Calm. | W | 16·0 | 0·0 | 5·2 | ·006 | ... | |
| 23 | ·614 | ·446 | ·394 | ·485 | 63·9 | 71·6 | 63·2 | 66·2 | ·517 | ·551 | ·576 | ·548 | 89 | 74 | 100 | 88 | E | E | W | 5·2 | 3·8 | 2·0 | ·752 | ... | |
| 24 | ·424 | ... | ... | ... | 60·7 | ... | ... | ... | ·505 | ... | ... | ... | 97 | ... | ... | ... | N N W | ... | N W | 17·9 | ... | ... | ... | ... | |
| 25 | ·825 | ·861 | ·822 | ·836 | 47·6 | 66·1 | 58·2 | 57·3 | ·287 | ·310 | ·384 | ·327 | 89 | 52 | 81 | 74 | N W | N W | N W | 3·8 | 3·8 | 5·2 | ·132 | ... | |
| 26 | ·676 | ·538 | ·907 | ·707 | 57·4 | 71·0 | 52·8 | 60·4 | ·395 | ·598 | ·229 | ·407 | 86 | 81 | 59 | 75 | N W | N W | N N W | 3·8 | 22·7 | 11·3 | ·567 | ... | |
| 27 | 30·005 | 29·952 | ·907 | ·955 | 42·1 | 59·5 | 51·1 | 50·9 | ·200 | ·261 | ·267 | ·243 | 75 | 53 | 80 | 69 | N W | N W | Calm. | 6·2 | 6·2 | 0·0 | ... | ... | |
| 28 | 29·902 | ·802 | ·776 | ·827 | 46·8 | 61·9 | 52·4 | 53·7 | ·235 | ·235 | ·320 | ·293 | 74 | 43 | 82 | 70 | Calm. | W | S S E | 0·0 | 3·8 | 3·8 | ... | ... | |
| 29 | ·660 | ·433 | ·350 | ·481 | 47·2 | 73·2 | 60·1 | 60·2 | ·254 | ·405 | ·435 | ·365 | 79 | 51 | 85 | 72 | Calm. | S W | W N W | 0·0 | 12·4 | 10·0 | ·349 | ... | |
| 30 | ·660 | ·842 | ·867 | ·790 | 46·3 | 53·9 | 45·0 | 48·4 | ·203 | ·185 | ·113 | ·167 | 66 | 45 | 33 | 48 | N W | W N W | W b N | 10·0 | 15·2 | 8·8 | ... | ... | |
| 31 | 30·012 | ·989 | ·960 | ·987 | 38·3 | 57·3 | 50·6 | 48·7 | ·152 | ·169 | ·174 | ·165 | 66 | 36 | 40 | 47 | N N W | N W | W N W | 8·0 | 8·8 | 3·8 | ... | ... | |
| M | 29·7046 | 29·6723 | 29·6721 | 29·6830 | 55·84 | 68·63 | 60·16 | 61·54 | 0·366 | 0·395 | 0·373 | 0·378 | 80 | 57 | 71 | 69 | | | | 6·30 | 8·32 | 7·53 | 10·338 | | |

| | |
|---|---|
| Maximum Barometer, 6 a.m. on the 31st | 30·012 |
| Minimum Barometer, 10 p.m. on the 9th | 28·969 |
| Monthly Range | 1·043 |
| Monthly Mean | 29·6830 |
| Maximum Thermometer on the 2nd | 85° 0 |
| Minimum Thermometer on the 31st | 38·3 |
| Monthly Range | 46·7 |
| Mean Maximum Thermometer | 71·75 |
| Mean Minimum Thermometer | 51·8 |
| Mean Daily Range | 19 95 |

| | |
|---|---|
| Mean Monthly Temperature | 61·54 |
| Greatest Daily Range of Thermometer on 29th | 29·°3 |
| Least Daily Range of Thermometer on 9th | 5°·3 |
| Warmest Day, 3rd. Mean Temperature | 73·2 |
| Coldest Day, 31st Mean Temperature | 43·7 |
| Climatic Difference | 29·5 |

Possible to see Aurora on 12 Nights.
Aurora visible on 9 Nights.
Total quantity of Rain, 10·338 inches.
Rain fell on 15 days.

## Month', Meteorological Register, Quebec, Canada East, September, 1855.

BY LIEUT. A. NOBLE, F.R.A.S., AND MR. WM. D. C. CAMPBELL.

*Latitude, 46 deg. 49·2 min. North; Longitude, 71 deg. 16 min. West. Elevation above the level of the Sea,—Feet.*

| Date. | Barometer corrected and reduced to 32 degrees, Fahr. | | | | Temperature of Air. | | | | Tension of Vapour. | | | | Humid'y of Air. | | | | Direction of Wind. | | | Velocity of Wind. | | | Rain in Inch. | Snow in Inch. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M. | 2 P.M. | 10 P.M. | MEAN. | 6 A.M. | 2 P.M. | 10 P.M. | M'N | 6 A.M. | 2 P.M. | 10 P.M. | 6 A.M. | 2 P.M. | 10 P.M. | | | |
| | | | | | ° | ° | | | | | | | | | | | | | | | | | | | |
| 1 | 29·741 | 29·590 | 29·491 | 29·607 | 49·3 | 54·3 | 57·4 | 53·8 | 0·319 | 0·375 | 0·464 | 0·386 | 92 | 90 | 100 | 94 | Calm. | Calm. | N W | 0·0 | 0·0 | 3·8 | 1·144 | ... | |
| 2 | ·508 | ·563 | ·827 | ·633 | 60·0 | 62·0 | 52·2 | 58·1 | ·480 | ·363 | ·243 | ·362 | 95 | 67 | 61 | 74 | W | N N W | N | 3·8 | 7·2 | 11·3 | ... | ... | |
| 3 | ·874 | ·864 | ·915 | ·885 | 46·1 | 60·0 | 53·0 | 53·0 | ·224 | ·283 | ·284 | ·264 | 74 | 57 | 72 | 68 | Calm. | E N E | E N E | 0·0 | 5·2 | 6·2 | ... | ... | |
| 4 | ·997 | ·988 | 30·034 | 30·006 | 48·0 | 65·4 | 54·1 | 55·8 | ·273 | ·250 | ·315 | ·279 | 82 | 41 | 77 | 67 | Calm. | E N E | W S W | 0·0 | 5·2 | 7·2 | ... | ... | |
| 5 | 30·083 | 30·011 | 005 | ·033 | 47·6 | 60·3 | 58·0 | 58·3 | ·282 | ·337 | ·361 | ·327 | 87 | 49 | 77 | 71 | S W | W S W | S S W | 3·8 | 6·2 | 5·2 | ... | ... | |
| 6 | ·038 | ·011 | ·029 | ·026 | 57·0 | 66·9 | 57·2 | 60·4 | ·412 | ·430 | ·426 | ·423 | 91 | 67 | 93 | 84 | W S W | E N E | E N E | 5·2 | 2·0 | 3·8 | ... | ... | |
| 7 | 29·974 | 29·803 | 29·678 | 29·818 | 52·2 | 67·4 | 63·8 | 61·1 | ·355 | ·474 | ·488 | ·439 | 93 | 73 | 85 | 84 | Calm. | W S W | N W | 0·0 | 3·8 | 12·4 | ... | ... | |
| 8 | ·649 | ·577 | ·528 | ·885 | 60·3 | 77·7 | 68·0 | 68·7 | ·416 | ·419 | ·593 | ·476 | 81 | 45 | 90 | 72 | W | W S W | W S W | 3·8 | 11·5 | 2·0 | ·052 | ... | |
| 9 | ·475 | ·443 | ·597 | ·505 | 66·4 | 74·9 | 61·9 | 67·7 | ·608 | ·390 | ·315 | ·438 | 97 | 47 | 58 | 67 | W S W | W N W | N W | 8·8 | 19·7 | 8·0 | ... | ... | |
| 10 | ·661 | ·661 | ·682 | ·668 | 56·0 | 69·8 | 60·1 | 62·0 | ·298 | ·331 | ·370 | ·333 | 68 | 47 | 72 | 62 | W N W | W | W S W | 7·2 | 7·2 | 3·8 | ... | ... | |
| 11 | ·697 | ·659 | ·633 | ·663 | 56·1 | 75·0 | 67·4 | 66·2 | ·356 | ·479 | ·508 | ·448 | 81 | 57 | 78 | 72 | W S W | W S W | Calm. | 8·0 | 8·8 | 0·0 | ·066 | ... | |
| 12 | ·513 | ·416 | ·385 | ·438 | 64·4 | 75·9 | 52·9 | 64·4 | ·633 | ·674 | ·371 | ·526 | 94 | 77 | 94 | 88 | Calm. | W S W | E | 0·0 | 8·8 | 10·0 | ·402 | ... | |
| 13 | ·499 | ·654 | ·888 | ·680 | 58·2 | 62·8 | 50·1 | 57·0 | ·276 | ·237 | ·200 | ·238 | 58 | 42 | 56 | 52 | N W | W | N N W | 11·3 | 17·9 | 16·0 | ... | ... | |
| 14 | 30·026 | ·960 | ·886 | ·957 | 45·0 | 56·2 | 46·1 | 49·1 | ·248 | ·258 | ·244 | ·250 | 84 | 59 | 80 | 74 | Calm. | N | W N W | 0·0 | 2·0 | 2·0 | ... | ... | |
| 15 | 29·857 | ·749 | ·650 | ·752 | 47·5 | 64·9 | 60·4 | 57·6 | ·227 | ·393 | ·385 | ·335 | 70 | 66 | 77 | 71 | Calm. | W | S W | 0·0 | 5·2 | 8·0 | ... | ... | |
| 16 | ·592 | ·624 | ·660 | ·625 | 59·5 | 63·9 | 49·0 | 54·1 | ·388 | ·344 | ·279 | ·337 | 78 | 85 | 81 | 81 | W S W | E N E | E N E | 7·2 | 16·0 | 16·3 | ·158 | ... | |
| 17 | ·734 | ·717 | ·670 | ·674 | 52·7 | 56·3 | 48·3 | 52·4 | ·295 | ·293 | ·301 | ·296 | 76 | 66 | 90 | 77 | W S W | W b N | N W b W | 3·8 | 7·2 | 8·8 | ·079 | ... | |
| 18 | ·515 | ·603 | ·718 | ·612 | 48·3 | 47·2 | 38·9 | 44·8 | ·195 | ·223 | ·108 | ·175 | 61 | 95 | 36 | 64 | N W | N W | N W | 6·2 | 12·4 | 10·0 | ... | ... | |
| 19 | ·847 | ·950 | 30·034 | ·944 | 36·1 | 47·2 | 37·9 | 40·4 | ·126 | ·144 | ·147 | ·139 | 59 | 45 | 65 | 56 | N N W | N N W | N N W | 22·7 | 17·9 | 7·2 | ... | ... | |
| 20 | 30·034 | ·844 | 29·777 | ·885 | 35·0 | 54·3 | 46·4 | 45·0 | ·165 | ·270 | ·258 | ·231 | 81 | 81 | 88 | 84 | W | W S W | W S W | 3·8 | 17·6 | 8·8 | ... | ... | |
| 21 | 29·779 | ·697 | ·711 | ·729 | 41·0 | 60·5 | 53·1 | 51·5 | ·234 | ·225 | ·296 | ·253 | 92 | 41 | 75 | 70 | W | S W | E | 3·0 | 13·4 | 11·3 | ·019 | ... | 21st. At 1 p.m. a halo 45° in diameter round the sun. |
| 22 | ·770 | ·846 | ·937 | ·851 | 47·9 | 48·5 | 46·2 | 47·5 | ·281 | ·277 | ·278 | ·279 | 86 | 83 | 90 | 86 | E | E N E | E N E | 16·0 | 16·0 | 13·9 | ... | ... | |
| 23 | 30·045 | 30·080 | 30·100 | 30·075 | 46·4 | 54·3 | 50·5 | 50·4 | ·265 | ·271 | ·320 | ·285 | 85 | 66 | 89 | 80 | E N E | S E | E | 3·8 | 3·8 | 8·8 | ... | ... | |
| 24 | ·141 | ·047 | ·011 | ·066 | 46·6 | 59·3 | 52·7 | 52·9 | ·281 | ·317 | ·330 | ·309 | 90 | 64 | 85 | 80 | Calm. | Calm. | Calm. | 0·0 | 0·0 | 0·0 | ·026 | ... | |
| 25 | 29·936 | 29·793 | 29·700 | 29·810 | 52·7 | 66·4 | 54·8 | 57·6 | ·351 | ·310 | ·388 | ·350 | 90 | 51 | 92 | 78 | Calm. | W S W | E | 0·0 | 6·2 | 2·0 | ... | ... | |
| 26 | ·621 | ·384 | ·289 | ·398 | 53·0 | 65·7 | 62·5 | 60·4 | ·374 | ·407 | ·533 | ·438 | 95 | 66 | 96 | 86 | E N E | E | Calm. | 3·8 | 3·8 | 0·0 | 11·84 | ... | |
| 27 | ·303 | ·389 | ·590 | ·427 | 49·6 | 61·9 | 48·6 | 53·4 | ·321 | ·329 | ·208 | ·286 | 92 | 61 | 62 | 72 | S W | N W | W b N | 8·8 | 10·0 | 5·2 | ... | ... | |
| 28 | ·735 | ·800 | ·926 | ·820 | 41·2 | 55·2 | 44·7 | 47·0 | ·174 | ·176 | ·224 | ·191 | 67 | 41 | 70 | 59 | N W | N W | N W | 6·2 | 13·4 | 11·3 | ... | ... | |
| 29 | 30·006 | ·935 | ·894 | ·945 | 38·6 | 58·4 | 49·5 | 48·8 | ·188 | ·215 | ·305 | ·236 | 80 | 45 | 88 | 71 | W S W | W | E | 5·2 | 2·0 | 2·0 | ... | ... | |
| 30 | ... | ·712 | ... | ... | ... | 60·8 | ... | ... | ... | ·276 | ... | ... | ... | 53 | ... | ... | ... | E N E | ... | ... | 16·0 | ... | ·594 | ... | |
| M | 29·777 | 29·747 | 29·695 | 29·739 | 50·44 | 61·74 | 53·30 | 55.16 | 0·308 | 0·327 | 0·329 | ·321 | 82 | 61 | 79 | 74 | | | | 4·91 | 8·64 | 7·08 | 3·724 | | |

| | |
|---|---|
| Maximum Barometer, 6 a.m. on the 24th | 30·141 |
| Minimum Barometer, 6 a.m. on the 27th | 29·303 |
| Monthly Range | ·838 |
| Monthly Mean | ... |
| Maximum Thermometer on the 8th | 81°·3 |
| Minimum Thermometer on the 19th | 34·7 |
| Monthly Range | 46·6 |
| Mean Maximum Thermometer | 63·93 |
| Mean Minimum Thermometer | 46·79 |
| Mean Daily Range | 17·14 |

| | |
|---|---|
| Mean Monthly Temperature | 55·15 |
| Greatest Daily Range of Temperature on the 12th | 26·3 |
| Least Daily Range of Temperature on the 22nd | 5·4 |
| Warmest Day, 8th. Mean Temperature | 68·7 |
| Coldest Day, 19th. Mean Temperature | 40·4 |
| Climatic Difference | 28·3 |

Possible to see Aurora on 10 nights. Aurora visible on 8 nights.
Total quantity of Rain, 3·724 inches.
Rain fell on 10 days.
No Snow fell.