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### THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Met at Montreal on the 12th of August. The Anglican Bishop having opened the proceedings with prayer, Prof. Caswell, Vice-President of the Association, rose to open the meeting. He said—I congratulate you on the attendance of so large a number of members at the opening of this the eleventh annual meeting. It is also a matter of congratulation that we are on this occasion outside the limits of the United States. (Hear.) In the onward march of science, little account is taken of the boundaries separating States and Kingdoms. (Applause.) The discovery of any new process in Science, is now speedily heralded over land and ocean, and the discoverer everywhere welcomed as a benefactor of his race. (Cheers.) We have before us a practical elucidation of the amenities of Science. We, of the United States, convened on British soil, little thinking we have passed beyond the protection of American law, are all recipients of the hospitality of this, one of the foremost cities of a noble Province under the British Constitution. (Hear.) We are, it is true, aliens to the British Constitution; but I must say that to my mind the proudest achievement of the British arms—and proud achievements there are, for ambition and glory—have less enduring glory in them than belong to those noble efforts for the advancement of civilization, which, no less than her commercial greatness, place old England in the van of nations. (Applause.) And at no period have these noble efforts been more praiseworthy than under the reign of the present illustrious Queen, (cheers,) whose virtues are alike the ornament of her sex and Crown. (Cheers.) There is, I think, a special fitness in my being here at this very time. At

the present moment England and America are shaking hands across the broad Atlantic; and that immense electric chain, which is to connect the old world with the new, is now being deposited along the deep bed of the ocean. (Applause.)

Sir Wm. E. LOGAN, F.R.S., then rose and said—One of the first duties belonging to the local Committee, is to bid the Association a hearty welcome. Any welcome I could give, in the name of the local Committee, will, I need hardly say, be given in much better terms by His Excellency the Head of the Government. Recognizing the importance of the movement and the interests attached to it, His Excellency had kindly consented to give a welcome not merely to Montreal, but to the whole of Canada; and not merely to the whole of Canada, but to all the British North American possessions. (Cheers.) Therefore I shall leave it to His Excellency to welcome you on this occasion.

His Excellency Sir WILLIAM EYRE rose amidst loud applause and addressed the assembly. He said—Ladies and gentlemen, it is not my desire or intention to detain you for more than a few minutes, as the Association is anxious to enter on the business of the day. But I should ill discharge my duty if, on behalf of Canada and myself, I did not extend a welcome and cordial thanks, to those present on this occasion. It is a source of gratification to see so many citizens of the United States present to day. (Cheers.) Time has been when so large an influx of American citizens would give rise to other emotions, perhaps, not unmixed with apprehension. (Loud laughter.) Thank God that time has now passed away. (Cheers.) And we can now unite for one common purpose, with no rivalry save such as is in accordance with a manly and generous emulation. (Hear.) Most of us, gentlemen, have enjoyed the hospitality of our neighbors on the other side of the line. And I may express a hope that we on this side, will not be deficient in our hospitality. (Hear, hear.) Therefore, I say it is a pleasure to us to find so many visitors among us on this occasion. Thanks to the cultivators and utilisers of science, we have ample means at our command for intercommunication. And when that stupendous structure which strides our noble river, shall be finished, the chain of communication shall be completed. His Excellency resumed his seat amidst loud applause.

The VICE-PRESIDENT introduced to the meeting Prof. Ramsay, Director of the Geological Survey of Great Britain,

Professor Ramsay said it gave him great pleasure to find himself on this side of the Atlantic, among his scientific friends; for he had made the acquaintance of many gentlemen there, who had been over in Great Britain attending the meetings of the British Association and similar objects. He had always found the most perfect brotherhood among scientific men. There was a unity in their objects—a complete single-hearted love of truth, which was their general characteristic. He should say that he regretted that the gentleman first deputed by the Geological Society to attend this meeting, Sir Roderick Murchison, had been prevented from doing so by feeble health. The choice of a substitute had fallen on him (Mr. R.) as he was about proceeding to Mont Blanc. But he at once gave up his contemplated trip, and prepared to set out on his mission to Canada, anticipating more pleasure and instruction from attending the meetings of this Association, than from his trip to Mont Blanc, and in this expectation he felt he would not be disappointed. (Cheers.)

Dr. SLEMIN, representative of the London Linnean Society, was next introduced, and addressed the meeting, expressing the sincere sympathy of that Society with the Association.

## SECOND DAY.

### ZODIACAL LIGHT.

Capt. CHAS. WILKES, of the U.S. Navy, read a paper on Zodiacal Light. He said it appeared to him that the cause of the Zodiacal Light was atmospherical, and its sources from within the tropics. The Sun's rays falling on the atmosphere perpendicularly were, it would seem, absorbed by the air, and this would account for the appearance of the phenomenon.

Rev. G. S. JONES next morning read a paper on the same subject. He had stayed eight months at Quito to make observations. He had made 123 and taken 115 sketches. His deductions were—

First, That the substance giving out the Zodiacal Light formed a complete circle. Several of his observations carried it round in a single night. On the 26th and 27th December, for instance, he had taken five observations. The first of those traced the light to within 16 degrees of the setting sun, the last to within 18 degrees of the rising sun: thus forming a complete circle with the exception of 34 degrees. Secondly, It is a great circle in the heavens, forming an angle of 3 deg. 20 min. with the ecliptic. As seen from the earth, it has a width of about 28 deg. Thirdly, It is a geocentric circle; for if it were heliocentric the laws of the reflection of light would require that the portions next the sun should reflect less light than those near the zenith of the spectator. These appearances were not visible. Again, that portion of the light near the horizon showed an affinity to the spectator's motions as he approached towards, or receded from the ring. And this could only happen in case of a body not very far off.

### VIBRATIONS OF WATER FALLS.

Professor SNELL read a paper on the vibrations of the fall over the dam at Holyoke, Massachusetts. He stated that this dam was 1,700 feet long, thirty feet high, with a thickness of water ranging from six inches to ten feet. An observer standing at either extremity of the sheet may perceive the air rushing in and out in puffs. In the case of some larger falls, as those of Niagara, two continuous currents may be perceived: one above going in—the other below coming out. Prof. Snell considered that the primary vibrating body at the Holyoke Dam is the body of air beneath the water—the space between the sheet and the dam acting as an immense organ-pipe, open at both ends.

### MISCELLANEOUS.

The following papers were then read:—Notes on measurement of a base line on Epping Plains, Washington Co., Maine, by Prof. A. D. Bache, Superintendent of the U. S. Coast Survey; on the Solar Eclipse of March 14-15, 1858, by Thomas Hill; on Arithmetical Complements, by the same; on System of Co-ordinates in Analytic Geometry, by the same; a note on the Gyroscope, by Prof. B. Peirce, of Harvard; on the Divers Weights employed in modern coinage, by J. H. Gibbon, Esq.

### STERNBERGIAE.

Dr. DAWSON, in section B, read a paper on the varieties and state of preservation of the *Sternbergia*. From the examination of specimens of this fossil recently added to his collection, the lecturer had been led to believe that there was some analogy between them and trees of a coniferous structure. A similar view had been advanced by Prof. Williamson, of Manchester, and was more fully established by the specimens alluded to, several of which were exhibited and their nature explained. This result, which was of a nature unexpected by Botanists, was still further confirmed by the construction of certain living plants in which the nature of the pith was found to be of a similar character to that which is supposed to form the *sternbergia* fossil, although the present coniferous trees have no such structure.

The next paper was on the Flexures of the Strata in the Broad top Coal Field in Pennsylvania, by J. P. Lesley.

### AZOIC ROCKS OF CANADA.

Sir WILLIAM LOGAN read a paper on the division of Azoic Rocks of Canada, into Huronian and Laurentian. He said—The subsilurian Azoic Rocks of Canada occupy an area of nearly a quarter of a million of square miles. Independent of their stratification, the parallelism that can be shown to exist between their lithological character and that of metamorphic rocks of a later age, leave no doubt on my mind that they are a series of very ancient sedimentary deposits in an altered condition. The further they are investigated, the greater is the evidence that they must be of very great thickness, and the more strongly is the conviction forced upon me that they are capable of division into stratigraphical groups; the superposition of which will be ultimately demonstrated, while the volume each will be found to possess, and the importance of the economic materials by which some of them will be characterized, will render it proper and convenient that they should be recognized by distinct names, and represented by different colours on the geological map. So early as the year 1845, as will be found by my report on the Ottawa District for the subsequent year, a division was drawn between that portion which consists of gneiss and its subordinate masses, and that portion consisting of gneiss interstratified with important bands of crystalline limestone. In the same report is mentioned among the Azoic Rocks a formation occurring on Lake Temiscaming, and consisting of silicious slates and slate conglomerates overlaid by pale sea green and slightly greenish white sandstone with quartzose conglomerates. The slate conglomerates are described as holding pebbles and boulders (sometimes one foot in diameter) derived from the subjacent gneiss, the boulders displaying red feldspar, translucent quartz, green hornblende and black mica, arranged in parallel layers, which present decrements according with the altitude in which the boulders were accidentally enclosed. From this it is evident that the slate conglomerate was not deposited until the subjacent formation had been converted into gneiss, and very probably greatly disturbed, for while the dip of the gneiss, up to the immediate vicinity of the slate conglomerate, was usually at high angles, that of the latter did not exceed nine degrees, and the sandstone above it was nearly horizontal. In the report transmitted to the Canadian Government in 1848 on the North Shore of Lake Huron, similar rocks are described as constituting the group, which is rendered of such economic importance from its association with copper bodies. The group consists of the same silicious slate and slate conglomerate, holding pebbles of syenite instead of gneiss, similar sandstone, some of the polished green, and similar quartzose conglomerate, in which blood-red jasper pebbles become largely mingled with those of white quartz, and in great mountain masses predominate over them. But the series is here much intersected and interstratified with green stone trap, which was not observed on Lake Temiscaming. These rocks were traced along the north shore of Lake Huron, from the vicinity of Sault Ste. Marie for 120 miles, and Mr. Murray ascertained that their limit on the Lake Simcoe occurred near Shebahnahning, where they were succeeded by the underlying group. The position in which the group was met with on Lake Temiscaming is 130 miles to the north east of Shebahnahning, and last year, Mr. Murray, in exploring the White Fish River, was enabled to trace the outcrop of the group characterized by slates, sandstones, agglomerates, green stones, and copper lodes, for sixty-five miles from Shebahnahning to the junction of the Maskinonge and Sturgeon, rivers tributary to Lake Nipissing. The general bearing of the outcrop is N.E., and an equal additional distance in the same direction, would strike the exposure on Lake Temiscaming. In the portion which Mr. Murray examined last year, the dip appears to be about N.W., often at a high angle, while that of the subjacent gneiss is more generally S.E., sometimes at a low angle, and in some places nearly horizontal. To the eastward of this outcrop Canada has an area of 200,000 square miles. This has yet been but imperfectly examined, but in so far as the investigation has proceeded no similar series of rocks has been met with in it; and it may safely be asserted that none exists between the base of the Lower Silurian and the gneiss from Shebahnahning to the Mingan Islands, a distance of more than 1,000 miles, and probably still farther to Labrador. The group on Lake Huron we have computed to be about 10,000 feet thick, and from its volume, its distinct lithological character, its clearly marked date posterior to the gneiss, and its economic importance as a copper bearing formation, it appears to me to require a distinct appellation and a separate colour on the map. Indeed, the investigation of Canadian Geology could not be conveniently carried on without it. We have in consequence given to the series the title of Huronian. A distinctive name being given to this portion of the Azoic rocks, renders it necessary to apply one to the remaining portion. The only local one that would be appropriate in Canada, is that derived from the Laurentide range of mountains which is composed of it from Lake Huron to Labrador. We have, therefore, designated it as the Laurentian series. These local names are, of course, only provisional, devised for the pur-

pose of avoiding paraphrastic or descriptive titles, the use of which has been found inconvenient, and they can be changed when more important developments, proved to be the equivalents of the series, are met with elsewhere.

#### MINERAL WATERS.

Mr. T. STERRY HUNT read a paper on Mineral Waters, and on the Origin of the Magnesian Rocks. He alluded first to the deposits or mineral springs, and especially of calcareous waters as having played an important part in the formation of rocks. The deposits of such waters are, however, generally destitute of carbonate of magnesia, which is held in solution by them, and only precipitated on evaporation. Carbonate of soda is very abundantly distributed in certain mineral waters, and these mingling with sea-water, or with mineral waters analogous to it in their nature, have at first the effect of eliminating the lime as a carbonate, leaving the greater part of the magnesia in solution, ready to be precipitated in part by evaporation, or more completely by the further addition of carbonate of soda. In this way dolomites may occasion deposits in the open sea, and may form, as they often do, the cementing material of conglomerate or coralline limestones, or they may be formed by the evaporation in limited basins or lagoons of waters holding carbonate of magnesia, dissolved in the manner above described; in the latter case, we can easily understand the precipitation of magnesian carbonate unmixed with lime. The interstratification of dolomites with pure limestones in the Silurian rocks of Canada were described as irreconcilable with the hitherto received theories of the origin of dolomites, and it was maintained that the hypothesis now proposed is the only one which meets the conditions of the problem.

#### SUBSIDENCE OF COAST.

Prof. COOK, of Rutgers' College, read a paper on a subsidence of the coast of New Jersey, and of some of the adjoining States. The object of this paper was to show that there is taking place a gradual subsidence of this portion of the coast, amounting to about two feet in a century. This is evident from the increasing depth of water in several harbours, from the discovery of stumps and entire trees beneath the surface in salt water marshes and other localities, which were apparently remaining *in situ*, and by the present position of the water, with respect to several mills erected many years ago.

THE NATURAL HISTORY SOCIETY CONVERSAZIONE was given in the evening in the Bonsecours Concert Hall, which was tastefully decorated with flags and the names of Watt, Laplace, Morse, Lavoisier, Brunel, DeWitt, Clinton, &c. Principal Dawson made a brief address, expressing the pleasure with which the Natural History Society welcomed the American Scientific Association. The people of Canada regarded themselves as forming the connecting link between the United States and England, and wished to hold out the hand of friendship to the representatives of the former, here in the outskirts of the dominions of John Bull. Science, from the necessity of the case, cannot be limited by the geographical boundaries. He did not regard the present meeting as the ultimatum of attainment, but looked forward to the time when not only the American, but the British Association would be convened upon Canadian soil. Prof. Caswell then introduced the retiring President of the Association, Professor Hall, of Albany, who proceeded to deliver an address upon the "Recent Progress of Geology and Paleontology in the United States."

#### THIRD DAY.

##### METAMORPHISM OF SEDIMENTARY ROCKS.

Mr. T. STERRY HUNT read a paper on the Metamorphism of the Sedimentary Rocks. This treatise evinced much research and ability. At its close Prof. Silliman, jun., expressed himself much pleased with the statement just read; it coincided, he was happy to say, with his views. Prof. Chapman expressed himself much pleased, as also did Mr. Ramsay.

Mr. B. STEEMAN read a paper on the Parthenogenesis of Animals and Plants.

##### DRESSING METALLIC ORE.

Prof. B. SILLIMAN, jun., gave an explanation by experiment of a new system of dressing metallic ores. The object of this communication was to describe the general principle of a system of ore dressing, devised and put in practice in the copper mines of the Bristol Mining Company in Connecticut, under the direction of Mr. Silliman. The main features of this system are, (1) the perfect separation of the finer portions of the product of stamping and crushing (commonly known as *sterne ores*) from the coarser portion without the aid of silver. (3.) The adoption of such mechanical arrangements as have rendered the whole process of ore dressing a continuous and self sustaining system, in which human labor bears an exceedingly small ratio to the results obtained compared with any system hitherto devised.

##### THE WINDS OF THE PACIFIC COAST.

Prof. BACHE read a paper, on the winds of the Pacific coast of the

United States. He exhibited diagrams showing at one view the direction of the wind as well as its quantity and the time at which it was likely to blow. The westerly winds were here most prevalent—just the reverse of what happened on the Atlantic coast. This was of course to be expected. Indeed no easterly winds blew at all during the summer months. To navigators the facts stated were exceedingly valuable. The difference between the winds of eastern and western coast of America was very great.

##### ELECTRICAL ACTION.

Prof. HENRY read the next paper. It was by a lady, Mrs. Foote. He prefaced it by some remarks to show that ladies were perfectly able to take part in philosophical discussions. He narrated some of the biography of Mrs. Somerville, who not only directed her household affairs but even made commentaries on Laplace. Mrs. Foote announced that electric action could be produced by the condensation of air. She exhausted a glass tube, in which a wire had been placed. When the air was condensed or rarified, electricity was produced. Mrs. Foote thought that the difference in the pressure of the air, as indicated by the barometer, at different times of the day, might be the cause of the difference in the electrical state of the atmosphere.

##### CLIMATE OF THE UNITED STATES.

Prof. HENRY read a paper of his own on the Physical conditions bearing on the climate of the United States. Several maps were exhibited by him. One showed the number of stations where meteorological observations were about being made in Upper Canada, and it was stated that the Chief Superintendent of Education and the Director of the Provincial Observatory were about to combine to have proper observations made, in connection with the Smithsonian institute at Washington. The heat of the sun, said the Professor, is the principal cause of wind. At the equator the mean temperature was 80 degrees. At the poles it was about 0. He observed that the heat evolved from the condensation of the vapor taken up in the equatorial regions was the principal cause of the motion of the air. Another map was also exhibited showing the direction of the currents of the Atlantic and Pacific Oceans. The warm current of the Pacific was shown beating against Vancouver's Island—thus accounting for the mild temperature of that place. Other maps delineated the isothermal lines on the American Continent. But the Prof. remarked that there was great difficulty in drawing these lines on a mountainous continent. The Alleghany Mountains, however, seemed to produce no effect on the climate, but the Rocky Mountains caused an extraordinary variation in temperature. The region about them was very warm. An extraordinary effect was produced by the great lakes, especially the eastern ones. The winter temperature in their neighborhood was shown to be much warmer than in a corresponding latitude further west. The summer temperature was not so high as it was further towards the interior of the continent. The moisture which supplied the Mississippi valley must come from the Gulf and the Atlantic. Thus, since the wind from the Gulf of Mexico receives from the motion of the earth a westerly direction, that portion of the great valleys of the rivers coming from the Rocky Mountains must be sterile. This sterility was much greater than was at all supposed. Indeed one half the territory of the United States may be thought entirely barren. A line from Lake Winnipeg, southward, would have to the east of it almost all the fertile land of the Union. Hence the speaker concluded, that in a few years, when all valuable new lands were taken up, more attention would have to be given to the cultivation of the soil along the Mississippi Valley, in the Eastern States, and near the Gulf of Mexico.

##### THE GULF STREAM.

Dr. WYNNE read a paper on the influence of the Gulf Stream upon the summer climates of the Atlantic Ocean. The recent examinations under the direction of the superintendent of the coast survey, show that the bottom of the Atlantic presents a range of mountains pursuing a similar course to the Apalachian chain. The effect of this range of submarine mountains on the temperature of the ocean is remarkable. It has been shown that the Gulf Stream is not one uniform mass of warm water, pursuing a N.E. direction, but a series of bands of warm water interspersed with smaller colder ones. The position of the submerged mountain chain also affects the temperature of the atmosphere along the coast. The greater part of the winds along the coast come from the S.W., thus blowing along the course of the Gulf Stream. But even hills of slight altitude on shore, affect the temperature by obstructing these winds. They can even be observed in travelling along the railways on the coast.

##### ETHNOLOGY.

In the section of Ethnology a paper was read by Prof. LESLEY on the word Celt.

Professor James D. DANA read a paper entitled "Thoughts on Species." He said he would divide his subject into—1. What is a species? 2. Are species permanent? 3. What is the basis of variations in species? 1. What is a species? It was common to define

species as a group comprising such individuals as are alike in fundamental qualities. But the essential idea of a species then is this:—"A species corresponds to a specific amount or condition of concentrated force, defined in the act or law of creation. 2. Permanence of species. In the animal kingdom there is a great aversion in nature to intermix, and it is emotional as well as physical. Man, by receiving a plastic body, in accordance with a law that species most capable of domestication should necessarily be most pliant, was fitted to take the whole earth as his dominion, and live under every zone. 3. Variations of species. Variation is a characteristic of all things finite, and is involved in the very conditions of existence. No substance can be wholly independent of every or any other body in the universe. Liability to variation is part of the law of species. Variations are not accidents, for nothing in nature is accidental; they are profound laws.

Prof. WILSON, of Toronto, read a paper "on the supposed Uniformity of Cranial Type throughout all varieties of the American Race." He stated that he had prepared his paper with considerable care, as it went to challenge opinions advanced by one recognised by all as the highest in rank among the Ethnologists of this continent—the late Dr Morton, of Philadelphia,—and which opinions had since been accepted as established data of the science by all the eminent writers of the American School of Ethnology. The paper, however, consisted in part of elaborate tables of comparative measurements and details. Professor Wilson gave a verbal extract of the general facts which he believed to follow as established results from the data he had accumulated. In this communication the opinions of Nott, Agassiz, and others, relative to the American Race, and to the whole question of unity and diversity of species, were carefully stated and discussed. Professor Wilson showed that all of these writers had taken for granted the uniformity of the cranial type of the aboriginal race or races of this continent, with the one exception of the Esquimaux, on the authority of Morton; and that if the premises thus assumed proved to be false, their conclusions must fall to the ground. He then showed by drawings, comparative measurements, and detailed statements, that Dr. Morton's generalizations utterly fail of application within the Canadian frontier, and that so far from the Esquimaux being the one sole Mongolic exception, the older Indian races of Canada much more nearly approached in physical conformation to the sole assumed American Arctic Mongol than to the central typical American.

#### SIR E. MURCHISON ON CRYSTALLINE ROCKS.

Sir WILLIAM LOGAN read a very valuable paper from Sir Roderick Murchison, on the Silurian Rocks in the North of Scotland.

In a letter to Sir William Logan, read before the Association, this distinguished English Geologist says: I beg to communicate to you and any geological contemporaries who may be present, the final determination of a question which has been much agitated in this country, and which has just been settled by a comparison with North American typical fossils, of lower silurian age. This question is:—What is the true place in the geological series of those great masses of crystalline or sub-crystalline stratified rocks, in the North Islands of Scotland, in some of which organic remains were discovered by Mr. Charles Peach, in 1855? That discovery induced me, in the same year, to revisit the localities in the north-west part of Sutherlandshire, to the east of Cape Wrath (Durness), in which the fossils had been detected. The results I arrived at in that excursion, in which I was accompanied by Professor James Nicol, were communicated at the meeting of the British Association at Glasgow, in September, 1855. I then reaffirmed the opinions I had formed in the year 1827, in company with Professor Sedgwick, as to the anteriority of all such quartz rocks, with intercalated limestones, to the old red sandstone or Devonian System; and judging from the facts that such crystalline and sub-crystalline strata reposed unconformably upon an ancient granitoid gneiss, and were flanked and surmounted transgressively by the ichthyolitic deposits of Caithness, I expressed my belief that, although very imperfect and difficult of absolute determination, the fossils there found by Mr. Peach were of lower silurian age. Within these few weeks Mr. C. Peach has found, in the same locality (Durness), other and better preserved fossils, which have, I rejoice to say, set the *questio vacata* at rest. Mr. Salter unhesitatingly compares these remains with those known to Mr. James Hall, yourself, and other North American Geologists, as occupying the true silurian position of the calciferous sand rocks and base of the Trenton limestones. To the geologists of the Old Country this determination is of the deepest interest, for it gives them a key to unravel the real age of large masses of the quartzites limestones, chloritic and clay slates, mica schists and quasic gneissic rocks (sometimes more, sometimes less metamorphosed) which occupy vast wild tracts of the Highlands of Scotland. He thus concludes:—"The occurrence in the south of Scotland of the *maclurea magna* of Hall, of the *isotelus gigas* derkey in Ireland, and of the fossils of your calciferous sand rocks in our Scottish Highlands, are all most satisfactory proofs that the order in Canada and the country of our kinsmen is, with certain modifications, the same as in the ancient realm of Caractacus.

In the Geological Section papers were also read by Berthold Sieman,

on the Parthenogenesis of Animals and Plants; by T. Sterry Hunt, on the Metamorphism of the Sedimentary Rocks. Professor Chapman made a very favorable impression. His papers were on the classification of minerals, the disposition of plated metals and mechanical agencies, and some experiments in further elucidation of the objects of the salt condition of the sea. Among the other papers read was one on Species of Trilobite from the Potsdam Sandstone of New York, by J. D. Dana.

#### OBITUARIES OF EX-PRESIDENTS.

In the evening Mr. GOULD read an interesting memoir of Professor J. W. Bailey, who last year had been elected President of the Association, but who had died in February. Professor Olmstead, of Yale College, also read a memoir of W. C. Redfield, the first President, whose fame chiefly rested upon his discoveries of the alleged theory of the rotary movement of storms.

#### FOURTH DAY.

##### ARROW-HEAD INSCRIPTIONS.

Rev. J. H. McILVAINE read a paper on Arrow-head or Wedge inscriptions. By far the greater number of these inscriptions were, he said, found scattered over the whole of that vast empire of 127 Provinces or countries, extending from the Indus to the Nile, over which the Ahasuerus of the Book of Esther reigned. From recent discoveries they afford a hope to the Philologist that he will yet be able to decipher the history of those mighty empires which flourished from Nimrod's time to that of Darius. These characters are found inscribed on various objects—on pillars, gems, stone, doorways, and vast marble slabs, eight or ten feet wide and high, with which the chambers had been faced. They were also found inscribed on vast rocks, in their natural positions, smoothed down into tablets, the sides of the everlasting hills being thus inscribed with these imperishable records of a mighty race. By far the greatest amount of these inscriptions is found in Mesopotamia. In one room cylinders covered with this writing were found stored away in such abundance as leads to the supposition that it is the "House of Rolls" similar to that mentioned by Ezra, where the sacred archives were kept. These inscriptions are written characters composed of one sole element, the arrow-head, variously repeated and combined. The combinations of the characters were simplified in the course of ages to form letters accommodated to the different phonetic utterances of the several races holding the supremacy of Western and Central Asia, until we find it in its last and simplest form, on the monuments of the Persian race. These inscriptions when found on the rock tablets are trilingual, and it is remarkable that the three languages of these records are always distributed among the three great families into which modern philology and ethnology have classed all the various branches of the human race. These three languages found on the trilingual tablets may be called the Persian, Babylonian, and Turanian or Tartar. The last was supposed to be the language of the ancient Medes. The Lecturer next proceeded to give an account of the discovery and interpretation of these languages. Their transcription has been wholly within the present century. Professor Grottegend, of Gottingen, made the first discovery, in 1802. He then succeeded in decyphering the names Cyrus, Hystaspes, Darius, and Xerxes. By this a correct determination of at least one-third of the alphabet was obtained. Soon after, Professor Rusk discovered the letters "M" and "N." Then all progress was arrested for some 20 years, and it was not till 1826 that twelve new characters were supplied by Professor Lassen. Some ten years afterwards Eugene Berhuuf, a French savant, arrived at several other important results. It is thus apparent that much progress has been made in detached inscriptions by continental scholars before England took any part in the matter; but when at last she did so her achievements were splendid. She sent forth a host of eminent discoverers, including Dr. Hincks, Mr. Norris and Colonel Rawlinson. The discoveries of the latter gentleman have certainly something of the wonderful in them.

##### UNIVERSAL LANGUAGE.

Prof. WILSON, of Toronto, then read a paper by Professor Hugo Reid, of Halifax, on the subject of the contriving of a universal language. The paper repeated the many arguments which have been often advanced in favor of the adoption by the world of a universal language, which all could understand. He thought for the purpose there were two languages preëminently suitable—the French and English. Of these two the English was perhaps the most suitable, from being at once the most extensively planted throughout the world, and also from having a more simple grammar, natural arrangement of genders, &c.

##### FOSSILS OF THE ST. LAWRENCE.

Dr. DAWSON, of Montreal, read a paper on the river pliocene fossils of the St. Lawrence. He exhibited a collection of shells found in various localities in the valley. These were mostly littoral shells, and a number of them was found in the Montreal mountain, at an elevation of 470 feet above Lake St. Peter, showing that a shore had

once been there. The only place where the shells were found at a similar elevation above the water was on the Ottawa, where Sir W. Logan had found them at 410 feet above the water level. This level corresponded very accurately with the highest sea beaches found on Lake Ontario, showing that formerly there had probably been a connection between the sea of the St. Lawrence valley and that of Ontario, unbroken by rapids, &c., as far as the falls of Niagara at least. This sea had probably not had any direct communication with the Hudson's Bay. There was another old sea shore on the Montreal mountain, at the height of only a hundred feet above the St. Lawrence. Below this was clay, without shells, which had evidently been deposited in deep water. These formations indicate a subsidence of the land, and then an elevation. Mr. Dawson said he found the sea-beds on the mountain corresponded in height with the deposit of shells at Beauport, and that on the Ottawa, where fossil fishes were found. The sea basin which it indicated had been comparatively limited; apparently nothing more than an extension upwards of the Gulf of St. Lawrence.

#### FLUCTUATIONS OF LEVEL IN THE NORTH AMERICAN LAKES.

Prof. WHITTLESEY (Cleveland) read a paper with the above title. He had been observing the fluctuations of level in Erie and Huron since 1836. He had procured daily information as to the level of the water—and sometimes even tri-daily. Three different and distinct kinds of fluctuations had been observed—secular, annual, and local or temporary. The secular variations were those which took place in the mean level of the lakes during a series of years. It was owing probably to the difference in the mere amount of rain-fall during the period; for the lakes might be regarded as a great river, which took years to rise and fall—just as the Orinoco or the Mississippi took months. The greatest range of secular fluctuations was four feet six inches, taking the yearly mean as a datum of calculation. Then as to the amount of fluctuation from temporary causes—the greatest in Lake Erie, between June, 1818, and August, 1819, was seven feet. On Lake Huron there were indications on timber now growing that the variation had been twelve feet, but since 1839 the difference had been only nine feet. On Superior, since 1845, it had been three feet. On Ontario the greatest range was four feet nine inches. He could find no indications that the popular belief was correct that all lakes rose periodically in a term of five, seven or nine years. (In confirmation he read from the register of Detroit and Cleveland.) The annual variation did not reach its maximum and minimum at the same time in different lakes. Superior was highest in September, lowest in February and March. Erie and Ontario were highest in June, lowest in February and March. The lateness of the thaw in Superior and neighbouring streams was perhaps the cause of the lateness of its filling up. He would next speak of the irregular, temporary and fitful pulsations which so frequently occurred, and which had attracted the notice even of the earliest explorers. They were certainly remarkable, for sometimes on a calm day they would be found to rise suddenly and beat regularly upon the shore. This occurred in all conditions of the atmosphere, by night as well as by day, in calm and in stormy weather, and lasted but from four to ten hours at a time. They occurred in all the great lakes, and even in the small lakes of New York, and for aught that was known they might even occur on the sea coast. They occurred in summer, spring and autumn, and possibly in winter, although on account of the ice they had not been observed. There was no apparent connection between the waves and the northern lights, although he thought they probably were connected with electric (rather than barometric) causes. They were now frequent in Superior, perhaps on account of the proximity of that lake to mountain ranges.

#### PHYSICAL BREAK IN BRITISH ROCKS.

Mr. RAMSAY (England) read a paper on the Physical Break, and the Break as the occasion of the destruction of life, in the British Rocks. He wished to do away with the old idea that there had been violent changes, destroying all life, and followed by new creations. But between various strata in Britain there was such an extraordinary break in the species and genera of organic remains, that he hoped to receive suggestions which would tend to explain it. He exhibited some very fine diagrams. It appeared that Britain had not been entirely submerged during the glacial period, as Canada seemed to have been. But it was evident that in Britain the climate had at one time been so cold that glaciers had descended to the level of the sea; and the amelioration had evidently been gradual.

#### FIFTH DAY.

Prof. C. WHITTLESEY read a paper on the Ancient Mining Operations of Lake Superior. On the southern coast is a promontory and behind this lies the principal mining region. The copper is found as native metal in pieces weighing from one to five hundred tons. There is abundant evidence that these mines have been worked by an ancient people, and that all the instruments they used were beat out cold. They did not seem to have any idea of melting them, indeed we cannot

find any trace that these ancients knew anything of melting copper. In examining these works, we find large cavities, about 30 feet deep, which these ancient people have worked. They are now occupied by wild beasts. Some of the instruments used by those people in their operations were made of cedar wood, and others of copper. He believed there was abundant evidence that upwards of one thousand years ago the mines of Lake Superior were worked, and that the people who did so had the same amount of civilization as the people who at that time inhabited the State of Ohio, as we find they used the same implements as the inhabitants on Lake Superior.

#### INDIAN PAINTINGS AND ANTIQUITIES.

Prof. WILSON read a very interesting paper on the collection of Indian Paintings and Antiquities exhibited by Mr. Paul Kane, at the request of the Local Committee. The collection he stated was extremely valuable and interesting. The tribes of the several important divisions of the North American Indians were faithfully portrayed in their manners and customs here. Of the Chippawas, Assiniboines, Flat-heads and Esquimaux, they had many and curious remains. There were also specimens of sculptured pipes belonging to the Babene Indians of Vancouver's Island. They were most elaborately executed, and some five or six feet long. One of these pipes contained representations of ships, rigging, &c., evidently sculptured by some native artist, on returning from a visit to Europe. It is highly interesting as showing the great powers and love of imitation of the native. Yet though so proficient in this art, this tribe is said to be more ignorant and degraded than many around it. The tribe of Babeens differ remarkably from others in their mode of sepulture, of male and female. The remains of the former are scaffolded while those of the latter are burnt. As respects the Flat-heads it is worthy of note that they are superior to the other tribes, and have them in subjection. The Flat-head is as it were a sign of peerage, and no slave is allowed to flatten the head of his children. The process does not at all seem to injure the intellect.

#### LAWS OF DESCENT AMONG THE IROQUOIS INDIANS.

Mr. L. H. MORGAN read a paper on this subject, describing the singular and complicated method of the descent of property and titles among the North American Indians, the inheritance always passing by the female instead of the male line. He mentioned several causes which might be considered to account for this peculiar institution; but one was probably paramount—the desire for independence, and the wish to prevent any family from becoming strong enough to obtain sovereignty—a thing altogether alien to the manners of the hunter state of mankind, and which had never in fact been discovered among the Indian inhabitants of the continent, all of which were governed by oligarchies maintained, but limited in power by means of this form of inheritance, and by the confederacy of several tribes—a form of policy which existed everywhere in North America. Mexico might be cited as an exception; but if the institutions of the Mexicans had been thoroughly investigated it would probably be found that they were identical with those of the Iroquois. Institutions of this kind were remarkably permanent, and it would be very useful, in order to determine questions in ethnology, to ascertain what other sections had had institutions of the same kind. He had ascertained that they existed in South America, and in parts at least of the islands of the South Pacific.

#### FORMATION OF CONTINENTS.

Prof. PIERCE read a note on the formation of Continents by the action of the Sun. He remarked that the principal lines of the continent were great circles, tangent to the polar circle. This was especially the case with the coast of the Pacific ocean. He illustrated this on the terrestrial globe. He then pointed out the same fact as regarded the eastern coast of Africa, the eastern coast of Hindostan, the eastern coast of Asia, the eastern coast of South America, the western coast of Hindostan, the line of the Eastern Archipelago, the western coast of America, and (perhaps) the western coast of Africa. Any one may perceive the remarkable facts by elevating the pole of the terrestrial globe 2½ degrees above the horizon and then causing the globe to revolve. The northern line of South America, a portion of the coast of Africa, a portion of the Central American coast, most of the Pacific Islands, &c., were portions of great circles, tangent to the tropics. Professor Pierce said this seemed to indicate that the sun had something to do with the formation of continents. Indeed the sun had very great influence even now, and when, at the formation of the earth, the mass was in a fluid state, the difference of one or two degrees might make all the difference whether congelation should take place at one time during the day or not. And the action of the sun, in allowing the mass to cool or grow warm, to congeal or solidify, would cause a tendency to the formation of lines of cleavage in the mass of the earth. These lines of cleavage were all that geologists required to enable them to account for the formation of chains of mountains and lines of coasts. The solidifying of certain portions of certain continents would account for the formation of currents. This would proba-

bly account for the solidifying of Europe. And this would again account for the very irregular surface of that continent.

#### CHRYSOHITE IN BASALT.

The paper "on the occurrence of Chrysolite in Basalt," by O. P. HUBBARD, elicited this extraordinary fact, mentioned by Prof. Dana, that the Chrysolite occurring in the Basaltic rocks of the Connecticut Valley, is just the same in its features as that thrown out in the recent eruptions of the volcano of Hawaii.

#### PHYSICAL STRUCTURE OF AFRICA.

Prof. GUYOT read a very interesting paper "on the Physical Structure of the continent of Africa." The whole continent was divided into Southern highlands and Northern lowlands. But with Northern lowlands there was a central depression on which was Lake Ngami, and these waters form a part of these which feed the River Nile. The Eastern ranges of mountains were the swell which influenced the whole continent. Even the Sahara was 1500 feet above the sea, and it determined the flow of the Niger and connecting streams. But between the northern and southern portions of the continent was a great depression—covered with tropical forest trees, and the abode of countless wild animals. There was not a single large low plain in Africa. It was the only continent in which there were none. He found a correspondence of form between Africa, South America and Australia, indicating a correspondence of formative force. There was, however, a remarkable difference in the climate of South America and Africa. The tide winds blew from the east. They made the east coast of Africa moist, but the Eastern mountains absorbed the moisture, and the interior was left dry. In South America the reverse was the case.

#### ANCIENT CURRENTS OF DEPOSITION.

The next paper was by Prof. HALL, "on the direction of Ancient Currents of Deposition." He remarked that the constituents of all the American mountain chains were sedimentary and stratified rocks. He thought that the currents which brought down these sediments came from the North-east and were directed towards the South-west. This he inferred because the thickness of sediment was greater in the North-east. In Gaspé the sedimentary rocks were much thicker than in the Mississippi valley; and for this and other reasons he believed that the Appalachian chain of mountains was no more uplifted than any other part of the continent. In confirmation he would observe that whereas the thickness of lower silurian rocks in that region had been measured to be 17,000 feet, the mountains were nowhere higher than 7,000.

#### AURORA BOREALIS.

Prof. OLMSTED, of Yale College, read a paper upon the Electrical Hypothesis of the Aurora Borealis. He said that in a paper published by the Smithsonian Institute he had presented a synopsis of the facts exhibited in the remarkable series of Auroras which commenced in 1827, and lasted for more than 20 years. He had discussed the question of the origin and cause of the Aurora Borealis, and contrary to the opinion which ascribes it to terrestrial agents, as electricity or magnetism, he argued that the origin of this phenomenon is cosmical, the matter of which it is composed being derived from the planetary spaces. This was inferred from the following reasons. First, from the great extent of the exhibitions, sometimes spreading from east to west for many thousand miles, and reaching to a height of a hundred miles and more, quite above the region of atmospheric precipitations; secondly, from the fact that in places differing many degrees of longitude, the different stages of the Aurora occur at the same hour of the night, indicating that the earth in its diurnal revolution comes successively under the nearest point of the auroral body situated in space; thirdly, from the velocity of the motions being too small for light, but too great to result from any known terrestrial agent; fourthly, from the periodicity of the Aurora, especially its secular periodicity, appearing at long but nearly equal intervals in a grand series of exhibitions, which increase to a maximum and then diminish in number and intensity, until the phenomenon in its grander forms vanishes from the nocturnal heavens. Prof. Olmsted, in conclusion, said, that some of those who have admitted the inadequacy of any electric hypothesis hitherto advanced to account for the origin of the Aurora Borealis, have ascribed the phenomenon to magnetism. It must be admitted, that magnetism has some connection with the Aurora. The disturbance of the magnetic needle, the relation of the auroral column to the magnetic meridian, the formation of the crown around the pole of the dipping needle, and the influence on the magnetic telegraph, sometimes observed during the prevalence of a great auroral exhibition,—these facts plainly indicate the existence of such a connection. But it may still be uncertain whether this relation is that of cause and effect. These facts merely prove that the Aurora has magnetic properties; they prove nothing with respect to its origin, which is the main point in question. Scarcely any hypothesis alleged to account for a phenomenon of nature is so poor as not to explain some part of the facts. Electricity and magnetism may severally account for some of the phenomena of the Aurora Borealis, but there are other facts which

neither of them touches, particularly the production of the material itself, the extent of the exhibitions, or their periodicity. Each of these facts, however, is fully accounted for by assigning to the Aurora a cosmical origin.

#### INDUCTION APPARATUS.

Mr. E. S. RITCHIE, read a paper on an improved construction of Ruhmkoeff's Induction Apparatus. This instrument, which is the result of the labours of Faraday, Henry and others, is designed to show the connection between galvanism and frictional electricity. Mr. Ritchie's improvement consists in winding the wire so that it shall lie in disks at right angles to the helix, instead of hollow cylinders. He had also introduced a mechanical break, to be moved by the operator, instead of leaving the current itself to effect the break.

#### MISCELLANEOUS.

Prof. A. D. BACHE read a paper on the Height of the Tides of the Atlantic coast of the United States. By means of diagrams and a pasteboard model he showed the relation between the height of the tide and the contour of the coast.

Mr. J. R. NICHOLS made some observations respecting a Steam Boiler explosion at Haverill, Mass. The peculiarity of the case was, that the boiler was one of three connected by a steam pipe, that it exploded forty-five minutes after the works had ceased, and while the safety valve appeared to be in a proper state. The force of the explosion, too, was altogether unprecedented. Its explanation was given.

The members of the Scientific Association were entertained in the evening at the University of McGill College. Sir William Logan and Principal Dawson made some remarks upon the geology of the country about Montreal; and some beautiful electrical experiments were performed by Mr. E. S. Ritchie, designed to illustrate his improvement, yesterday described, of Ruhmkoeff's Induction Apparatus.

Mr. T. STERRY HUNT'S paper on "the Intrusive Rocks of the Montreal District," was next in order, but he curtailed his remarks, anticipating that they might be repeated in the paper which Sir W. Logan contemplated reading.

#### SIXTH DAY.

##### ISLAND OF ANEITEUM.

Dr. J. W. DAWSON made some remarks on some Ethnological specimens from the Island of Aneiteum, New Hebrides. He said that a large part of the Ethnological questions which attracted attention had reference to the lower varieties of the human race. It is also a curious fact that resemblances are found between different tribes, widely separated from each other. The Island of Aneiteum contains a population of about four thousand persons, of a race supposed to be intermediate between that of New Guinea and Polynesia. The people present great differences of physiognomy, some presenting the negro type, others the Malayan, while still others have profiles characteristic of the Semitic race. The negro type, however, generally prevails. Their stature is small, their temperament active, and they display considerable intelligence. The chiefs take great pride in wearing hair of the utmost possible length, and a large portion of their time and that of their wives is devoted to the care of it. The most interesting facts connected with this people relate to their religious views. The religious notions of any rude people are very frequently misrepresented by travellers and missionaries, from the fact that the outward symbols are taken as the whole of their religion. The actual gods of the people of Aneiteum are spiritual beings. One of them is regarded as the supreme divinity, to whom the others are subject. The tradition is that the whole island belongs to the superior god, he having pulled it up from the depths of the ocean, while fishing one day. This belief may have connection with the volcanic origin of the islands. The people worship these gods through the medium of stones, the greater part of which are fragments of trap containing crystals of hornblende. They select those containing vesicular cavities, and the idea seems to have been that the god resided in the cavity. In this may be observed a similarity to the monolithic shrines found in the penetralia of Egyptian temples. Other stones presenting a peculiarity of form, cylindrical or conical, were made the symbols of their deities. Among them are also found *medicine bags* like those of the North American Indians, filled with charms, designed to protect the wearer from harm. This people have proved themselves capable of a somewhat rapid progress in civilization. Many of them now profess Christianity, and several of the arts have been introduced. Mr. Dawson exhibited a specimen of a book which had been printed in the island by native workmen.

##### BANK NOTES.

Prof. B. SILLIMAN, Jun., of Yale College, made some observations upon Bank Notes, and the means adopted for prevention of counterfeiting. He spoke first of the great importance of having some safeguard against counterfeiting, particularly in a country like this, where so much wealth is represented by paper currency. Since the invention

of the photographic process there is no security in the old practice. Formerly the chief reliance was placed in the fineness of the engraving, and the combination of many kinds of work. But now every line can be accurately copied, however elaborate and intricate may be the execution. An attempt was next made to attain security against counterfeits by printing a part of the note in red ink, which is one of those negative colours which is reproduced by the photographic process as black. This precaution has, however, been found unavailing, from the fact that there is no red ink so far as chemists know which can not be removed without injury to the paper. The three methods by which bank notes are counterfeited are the photographic process, the anastatic, and the lithographic. The anastatic consists in transferring the design to zinc, as the lithographic in forming it upon stone. Against the actual reproduction of notes there can be no safe-guard, for whatever has been executed by one man can be copied by another. For protection against this danger, the only reliance is the incorruptible integrity of the bank note engravers. Attempts have been made to so combine colours that when photographed one shall neutralize the other. Notes have been printed in blue under the idea that as this colour is reproduced as black in the camera, the effect would be the same as though the note had been made with black and white. If, then, it was understood that the genuine were blue, the imitation would be readily detected. It is found, however, that deep blue presents such a contrast to white, that it partially reproduced. A process was invented by Mr. Seropyan, an Armenian residing in this country, which is one of the most effectual safeguards against counterfeiting. He proposes to print the notes in two colours, between which there is no photographic contrast. The colours which he employs are light blue and buff yellow. The inartistic appearance of these notes constitutes a great objection to them. For producing a fine artistic effect there is nothing like carton ink on a white surface. His design was to make use of two kinds of ink, both of which should be fugitive, and one more so than the other. Notes have been printed with sesquioxide of chromium, which resists all attempts at removal without destroying the paper. This invention originated in this Province, and seems to promise security.

#### TABLES OF MORTALITY.

Mr. E. B. ELLIOT, of Boston, read a paper on the laws of human mortality, as derived from the statistics of Massachusetts. A great difficulty is experienced in obtaining accurate results from the want of care in the keeping of the records. He took the returns from the most carefully kept registers, and compared them with England. This is the most healthy among European countries, the mortality being one in forty-six. Sweden comes next, then France, Belgium, Prussia, Austria, and finally Russia. In this latter country the mortality is one in twenty-eight. It appears that the vitality in Massachusetts up to the age of nineteen, is much greater than in any country of Europe. From nineteen to forty the mortality in Massachusetts is greater than in England or Prussia. From forty to the end of life, the vitality is the same in all three countries.

#### MODERN COINAGE.

Dr. GIBBON read a paper on the Divers Weights in Modern Coinage. It was principally devoted to the Avoirdupois weight. This kind of weight is said to have had its origin among the Babylonians, and to have been carried from thence to Spain. In the 14th century no less than 150 mints were opened in Spain, the nobles coining their own money like princes. This led to a general deterioration of the standard. The real Avoirdupois is certainly said to be one of the most ancient weights in history. The Hebrews traded in coin of shekels, &c., arranged after this weight. In the buying of the cave by Abraham and the sale of Joseph it is mentioned. In the latter case Joseph is said to have been sold for twenty of silver—the word "pieces" being an interpolation. And wherever gold or silver is mentioned, of old, it is always understood to be of Avoirdupois weight. Coins were first, it is said, issued from the temples in Rome—the image being designed for an indorsement of the coin as to its purity and weight. It has been denied that coin was known to the ancient Hebrews—but such a supposition is unsupported by scripture. True, the Hebrews may not have coined it, but then it circulated amongst them, being obtained from the surrounding nations. It is, too, recorded, that Jonah paid his passage on the journey to Tarshish.

#### WEIGHTS AND MEASURES.

Mr. G. M. DEXTER read a paper on Weights and Measures. He first dwelt upon the inconvenience of the present system, as being incongruous and devoid of any reliable standard of comparison. A system of weights and measures should embrace not only uniformity, but a standard, which can be resorted to as a test of verification, without recourse to scientific operations. It must furnish the means of comparing, with facility, a new system with the old one, to enable individuals of the most common capacity to know the exact proportion between the two. For facility of calculation, it is also desirable that the decimal system should be applicable, but without sacrificing

simplicity or usefulness. The common standard of measure, as now known, is the English foot, or one-third of a brass rod preserved in the English Exchequer, called a yard. A copy of this rod was obtained from England by the United States, and is preserved with great care at Washington.

#### GRAPTOSA.

Mr. RAMSAY read Mr. W. J. Salter's paper on Graptosa, a new genus of Polygoa, allied to the Graptolites.

#### FOSSILS.

Mr. E. EMMONS read a paper on the Fossils of the Slates and Sandstone of North Carolina. The speaker produced several specimens of these fossils, which he exhibited in illustration of his remarks. The lower sandstone in this instance he stated to be some 3000 feet thick, while the upper was 4000 or 5000 feet.

#### CONNECTICUT RIVER SANDSTONE.

Prof. HITCHCOCK read a paper on the Age and Dip of the Connecticut River Sandstone and the intercalations of the associated Trap.

#### COFFEE.

The next paper was "the enquiry into the cause of a peculiar discoloration of coffee, which had been stored in the same building with guano." From the paper it appeared that warehousemen must be exceedingly careful not to store coffee and guano in the same room in moist weather.

Mr. WHITTESLEY read a paper setting forth that coal instead of being of vegetable origin, was as much mineral as the shales and substances enclosing it.

Professor PIERCE read a paper on the Conservation of Force.

#### MISCELLANEOUS.

Lieut. HUNT, U.S.A., presented a paper upon the idea of Physical and Metaphysical Infinity.

In this section, a paper was first read by Mr. C. ROOSEVELT, entitled "The Universal Science," which consisted of a series of observations on political economy.

#### SEVENTH DAY.

##### GEOLOGICAL SURVEY OF ENGLAND.

Mr. A. C. RAMSAY, Director of the Geological Survey of Great Britain, gave an explanation of the general plan and mode of conducting this survey. He said that it had been thought by many of his friends here, that a description of the general mode of conducting the Geological Survey of the United Kingdom, might be of interest, especially since upon this continent, so many great surveys are going on in this Province and the United States, and when a new survey, that of Nova Scotia, is about to be undertaken. The Geological Survey of Great Britain was commenced more than twenty years ago, by Sir Henry De La Beche, who offered to commence it at his own expense. He began in Cornwall, because in this district there were found so many metals. Having conducted it for some time at his own expense, he received a little assistance from the Government. One or two officers connected with the Ordnance department, were allowed to afford him help. This, however, was found to be altogether insufficient. Operations were next undertaken in the coal fields of South Wales. At this time, a small grant was received from the Government. Here the officers of the survey first made the acquaintance of Sir Wm. Logan, who had amused his leisure with the construction of a map of the coal fields, upon so admirable a system, that it was adopted by Sir Henry De La Beche. Sir Wm. Logan having accomplished a large amount of work, gave it all to the government surveyors. A large staff of geologists was now organized and the work prosecuted with more rapidity. Sir H. De La Beche pursued the system of searching out young men who evinced abilities and taste for these studies. These he took with himself into the field and trained them in practical work, examining the results of their labours and correcting errors, until they became as experienced as himself. The Geological Survey of the United Kingdom was, in 1840, divided into two parts, that of Ireland being superintended by Captain James, while Mr. Ramsay was appointed to conduct that of Great Britain. Each has under his direction a staff of assistants. When the Houses of Parliament were destroyed, and it became necessary to re-construct them, a commission was appointed to collect specimens of the building stone of the country, and to examine buildings which had been made from them many years before, in order to ascertain the effect of time upon them. Sir H. De La Beche was one of the commissioners. Specimens were brought together from all the quarries of the Kingdom. The collection appearing valuable, Government was asked to furnish a place where they could be deposited. The request was complied with, and subsequently a commodious building was erected for containing specimens of all ores, fossils, and building materials of Great Britain. People have been astonished to find how various and rich are the building materials which are to be found around them. It

was thought that it would be advantageous to have a mining college. Several professorships were accordingly established, and lectures upon various subjects connected with geology are regularly delivered. From this school those are taken who have attained the best certificates, who are appointed assistants upon the Geological Survey. Mr. Ramsay, as Director of the Survey for Great Britain, has thirteen assistants, of whom three are experienced geologists, eight assistant geologists, and two are employed in the collection of fossils. When a new man comes upon the field he is first assigned work upon the secondary strata, as being most easy to trace. He next investigates the tertiary, which are more obscure; and finally is transferred to the palæozoic, where his training is finished. In Ireland the same system is pursued; but as this country embraces fewer formations, only eight assistants are employed. In addition to the staff before mentioned, there are two palæontologists, who receive, arrange, and label fossils, and who will also come into the field to give assistance when any difficulty arises, for it is not to be expected that every man will be proficient in each department. The maps with which the surveyors work are those of the Ordnance department. These are constructed on the scale of one inch to a mile. Every surveyor takes a map of the district on which he is employed and traces upon it the lines of the strata. To show the multiplicity of the lines M. Ramsay pointed out a quarter sheet upon which eighty lines were traced, every one of which was walked over so far as practicable. In delineating the several formations 125 colors and shades of colors are employed, each denoting a different stratum. A map having been constructed and approved, horizontal sections are constructed on the scale of six inches to a mile. Levels are taken and the exact contour of the country is accurately delineated. In the coal measures no lines are drawn except those indicating the several beds, lest proprietors should be misled by them. In the north of England, in Ireland and Scotland, a new topographical survey has been commenced upon the scale of six inches to a mile. These afford increased facilities for the accurate exhibition of the geological structure. These maps show the contour of the country, having one line on the sea level, another twenty five feet higher, and so on to the level of the hill tops. The Geological Survey of Great Britain has served as a school from which geologists have gone to conduct the surveys of other countries. The Superintendent of the geological survey of India, together with his assistants, came from the Government schools. There is also an off-shoot at the Cape of Good Hope, and the Island of Trinidad. The minute style of the survey practised in England cannot be followed in other countries, as the United States, where accurate topographical surveys have not been made. The Government and people of England are now so well aware of the importance and value of the geological survey, that it would be impossible to stop it. Should any party, or faction attempt to do so, there would be a general outcry against it, and its continuance would be insisted upon. Engineers and miners take such an interest in the investigations, that five thousand sheets of the maps are annually sold, although they are quite expensive. Not only are those relating to the coal measures sought, but others also of a purely scientific character. The people are now becoming aware that the position of England in the scale of nations, depends, in a great degree, upon her wealth. Accordingly, all the means necessary to its development are willingly granted, and double the allowance would be afforded if it were asked for. There is some difficulty in obtaining a sufficient number of suitable men. At the present rate of progress, thirty years would be required to complete the work.

#### METRICAL SYSTEM OF FRANCE.

Mr. GIBBON of the U. S. Mint read a paper on the Metrical system of France. In France each province had, formerly, its own system of weights and measures. Within the last century and a half, three conventions were held in Germany to regulate the standard of weights and coinage; for there each petty principality determined and coined its own monies and weights. And owing to the great diversities thus called into existence, the greatest confusion prevailed. A similar diversity, he might also remark, prevailed in England, France and elsewhere, in relation to measurement, several distinct standards being made use of in the different countries. The metrical system, as now adopted in France was generally acknowledged to be a good one because it was thoroughly decimal. It was introduced into several of the European countries, and always found to operate beneficially. It had, too, received a partial introduction into the United States. Persons of all professions were eager, in England, and elsewhere—where the system was not yet adopted—to have this system generally adopted, as calculated to promote the arts and manufactures, facilitate the education of youth, and promote the common language of arithmetical uniformity throughout the world. To effect an intelligible adjustment of gold and silver coinage among nations would much reduce the expenses of the coinage and vastly increase its utility. Wherever it has been tried hitherto—as in

Bavaria for instance, interest and convenience succeeded in overthrowing all prejudice in the matter.

#### DR. RAE'S ARCTIC TRAVELS.

Dr. RAE, the celebrated Arctic explorer, being present, was requested by some of his friends to address the members of the Association respecting his travels. In complying, the Doctor then exhibited some relics of Sir John Franklin's party. He had been he stated, employed by the British Government for four years in searching for traces of Sir John Franklin and his party. And on his expedition last year he had found these relics of the party, when least he expected, to find anything. They were sufficient to induce him to believe the party had been lost. But he did not believe they had been, as was supposed, murdered by the Esquimaux. The Esquimaux informed him that a party of white men had died, when he obtained relics, and others which he had transmitted to the British Government. Franklin's party could not, he believed, have been murdered west of the McKenzie's River; and he was induced to believe so from the statements of the Esquimaux on the East of that river. The party might probably have perished owing to their preserved meats becoming putrid—as some similarly prepared had been found to become—and their provisions failing them. Among other relics, Dr. Rae obtained from an Esquimaux, two leaves of a Bible. He had also obtained a piece of wood on which the name W. Stanley had been cut, and which he had traced to the maker in London. That none of the bodies have been found might be accounted for by their being carried away by the melting of the ice—or, perhaps, they had been drowned. From what he had seen he believed that Franklin and his party having wintered the first year at Beechy Island; had attempted to carry out his plan by coming down Peel's Sound to near King William's land, and endeavored to cross Behring's straits and abandoned his ships after the fifth year. Captain Mc Clintock who went out under the auspices of Lady Franklin, lately discovered, among other things, that Sir John must have left his ships. The Esquimaux said they had books given them by the party, but thinking them of no use had given them to their children by whom they had been destroyed. (After some further details Dr. Rae concluded amidst much applause.)

#### CONCLUSION—GENERAL MEETING.

A general meeting of the members of the Association took place in the Court House at five p.m. Some preliminary business having been disposed of, Professor Henry, of the Smithsonian Institute, then rose and proposed the resolution—That this Association highly appreciate and warmly reciprocate the friendly sentiments expressed at the opening of the session by His Excellency, General Sir William Eyre, Administrator of the Government. (Loud applause.) This resolution, he had no doubt, would be unanimously adopted. It was highly proper and complimentary to the Association to give to a gentleman of the character and position of Sir William Eyre the duty of welcoming this Association. He said it was proper, first on account of the profession of the gentleman selected. The military profession was intimately connected with science, as the perfection of the one depended mainly on the advancement of the other. Secondly, it was, he considered, proper, because of the objects of the Association and its character. It might not be permitted in an individual to sound his own praise, but it is permitted in a member of an association to speak of the character of the institution to which he belongs, and to exalt its importance. The object of this Association was the advancement of science—the discovery of the mode in which Divine Wisdom operates in producing the phenomena of Nature. And therefore the gentleman selected should have been a fit and proper person to welcome the Association. He was most happy to say that such a gentleman had been selected. (Cheers.) He would, in conclusion, vote the thanks of the Association to that gentleman. (Loud applause.)

The resolution being put was unanimously adopted.

Ex-President FILLMORE next rose, amid loud applause, and said: The pleasing duty has been assigned to me, and I would it had been assigned to one more capable, of presenting a resolution to the citizens of Montreal for the hospitalities which they have been pleased to extend to the Members of this Association. Next to the gratification we receive in the enjoyment of these hospitalities, is the pleasure we must feel in making a proper acknowledgment. I cannot doubt, therefore, but that this resolution would receive an unanimous and enthusiastic aye. (Cheers.) I apprehend that few of us coming from the United States, perhaps for the first time, and seeing this beautiful city, will not go away oppressed with feelings they never could have had without this visit. (Cheers.) For myself, I was here some ten years since, and must bear testimony to the change exhibited in that short space of time. Our Canadian brethren have, I perceive, caught a little of the spirit of enterprise which, perhaps, goes a little too far occasionally on the other side of the line. (Laughter.) But we will never envy them. We heartily bid them God speed. (Cheers.) In

conclusion, he proposed his resolution, and sat down amidst loud applause.

Thanks were then awarded to the Local Committee, the Natural History Society, President, Principals and Fellows of McGill College, and the British representative of the Society.

The votes of thanks were severally responded to.

#### OFFICERS OF THE ASSOCIATION.

The Chairman announced the selection by the Standing Committee of the following gentlemen as officers of the Association for the ensuing year:—

*President.*—Professor Jeffries Wyman, M.D., Cambridge, Mass.

*Vice-President.*—Professor J. E. Holbrook, M.D., Charleston, S. C.

*General Secretary.*—Professor Wm. Chavenet, M.D., Annapolis.

*Treasurer.*—Dr. A. L. Elwyn, Philadelphia.

The Association then finally adjourned, to meet again next year, in the city of Baltimore.

#### SUMMARY OF PROCEEDINGS.

Of the 127 papers announced in the programme for reading, about 100 were read, in the several sections. In section A, devoted to Mathematics and Physics, there were ten papers read the first day, five the second, eight the third, five the fourth, twelve the fifth, and ten the sixth and last—making in all fifty papers. In section B, in which subjects on Natural History, Geology and Chemistry were taken up, there were twenty-nine papers read. Five were read the first day, seven the second, four the third, seven the fourth, six the fifth, four the sixth. This section was subdivided into a section for the discussion of Ethnological, Statistical and Politico-economical subjects. This subdivision did not take place till the second day, when four papers were read, three on the third day, four on the fourth, nine on the fifth, and three on the sixth. As there was not time, several of the papers on the programme were not read, but were referred to the Printing Committee.—[Prepared from the reports of the *Leader* and *Globe*.]

#### SKETCH OF SIR WILLIAM LOGAN, LL.D., F.R.S.

Before taking a final leave of matters connected with the recent Scientific Meeting at Montreal, it may not be inappropriate to give you such details as I have been able to collect concerning the history of our distinguished countryman, Sir William Logan.

William Edmund Logan was born in Montreal, of Scotch parentage. He was at an early age sent to Scotland, where he received his education, first at the High School of Edinburgh, and afterwards at the University of the same city, where he graduated. After returning to Canada for a short time, where his attention was drawn to the geological characteristics of the country, he again crossed the Atlantic, and took up his residence in South Wales, at Swansea, where, for seven or eight years, between 1830 and 1840, he was engaged in partly directing the operation of a large copper smelting company. The nature of this pursuit increased his taste for geological studies. He made himself thoroughly acquainted with the then known principles of the science,—frequently made observations in the open field, and when he became cognizant of the main features of the country, devoted all his leisure time to the delineation of a geological map of the Glamorganshire coal fields. This map is so accurate that when Sir Henry de la Beche, the Director of the Geological Survey of Great Britain, made the acquaintance of Mr. Logan of Swansea, and was informed of the extent of his labors, he immediately expressed a wish to become possessed of it. Mr. Logan generously acceded to the wish, and the map, illustrated by beautiful horizontal and vertical sections, was transferred to the Government authorities, and by them incorporated with their own surveys. For a year after this, M. Logan continued to afford valuable assistance to Sir Henry de la Beche in the capacity of an amateur geologist.

In 1840 or 1841, Mr. Logan gave up all connection with the company he had previously assisted to direct, and was appointed to carry out the geological survey of Canada, which the Canadian Government had been induced to commence. In 1842, he began operations, and in the same year secured the co-operation of Mr. Murray, as first assistant, whose experience had been gained in the field under Sir Henry de la Beche, previously alluded to. The Canadian survey has already led to great results; but is far from finished yet. The severe labor of conducting it is hardly dreamt of by the "gentlemen who sit at home at ease." Year after year camping out in the open air in all weathers, with little society save that of the Indian guides and canoe makers, the little band of geologists have steadily labored on.

In 1851 the Canadian Government sent Mr. Logan to the World's Exhibition in Hyde Park, London, England, in charge of the Canadian Geological Collection, which had been made by himself or under his immediate direction. It was exhibited with great skill and judgment, displaying to the best advantage the mineral resources of

Canada. The labor of arranging the specimens was very great, and so enthusiastic was Mr. Logan, that he frequently sallied out at eight or ten in the morning, and would work for twelve hours without waiting to take refreshment. He had the satisfaction of knowing that his countrymen appreciated his services. Medals in profession were allotted to Canada, and the Royal Society of London elected Mr. Logan a Fellow—the highest attainable British scientific distinction.

M. Logan also had charge of the Canadian department of the Exhibition of Paris in 1855. The specimens were here much more numerous, and made a much stronger impression in Europe than even those sent to the Exhibition of 1851. All the gold and silver medals that it were possible for any one department to obtain, here fell to the share of Canada. The Emperor Napoleon gave the cross of the Legion of Honor to Mr. Logan as an acknowledgment of his merits, and also to Mr. T. Sterry Hunt. Moreover, on Mr. Logan's return to England, as a reward for his great scientific eminence and extraordinary services (especially towards the Province of Canada in bringing her mineral wealth so prominently before the world) he received the honor of knighthood at the hands of his Queen.

Since that time he has been busily employed on the geological survey of this country. How high an appreciation is felt of his worth in Britain may be known by the fact that when the Nova Scotians asked for a fit person to conduct their survey, soon to be commenced, they were referred to Sir William as one who could find them the man for the occasion. How highly the Americans estimate his acquirements was very evident at the late meeting of the Association for the Advancement of Science, at which every one seemed to refer to his opinions as not to be controverted. It is to be regretted that his exertions, which powerfully contributed to render the meeting so successful as it has been, brought on an attack of illness which prevented his taking an active part in the proceedings. It remains for us to hope that the indisposition will be but temporary.—*Quebec Correspondence of the Hamilton Spectator.*

#### CANADIAN GEOLOGICAL MUSEUM, MONTREAL.

With what success the establishment of our Provincial Geological Survey has been attended is in general imperfectly known. Those who have attended the present session of the Association have been enabled to form some adequate idea of the value of this survey. Through its agency, men like Sir William Logan and Mr. T. Sterry Hunt have usually been found upholding the fame of Canada, but specially so at the present juncture. And they have done so most creditably. They have not only contributed many valuable papers, but have shown a thorough comprehension of the subjects in all their bearings. The more they were questioned by the members present, the sounder their views appeared. This much may at least be said of the Provincial Geologist. America boasts of many eminent professors in this science. But, without any undue disparagement, it can scarcely be said of her that she possesses any superiority over us in this respect.

Little is generally known of the geological museum. Many of the oldest inhabitants have known nothing of its whereabouts. A brief notice of it will not, therefore, be out of place. It is situated in the building occupied as the Crown Lands Department before the Government was burned out of Montreal. It is divided into three compartments—the rooms on the ground floor being denominated the Economic Department; those on the second floor of the Lower Silurian Fossils; and those on the upper story the upper Silurian. The arrangement of this museum is really admirable, and has drawn forth the highest encomiums of its visitors. Not only have its general divisions been clearly and scientifically arranged as a whole, but each subdivision, each case of that subdivision, and each article exhibited, has been arranged and labelled with the utmost care and exactitude. It is, all together, just such a collection as is calculated to produce the highest feelings of pleasure in a geologist. No graceless labelling or malarrangement is apparent look where you will. All things have been arranged neatly and in order. Each label contains a specification of the name of the article, the name of the township in which found, that of the concession, of the lot, of the owner of the lot, and also of the referee. To give any thing like a comprehensive sketch of such a museum is an effort beyond my very limited time just now. The merest notice of a portion of its treasures is all I can give. In the Lower, or Economic Department, specimens of gold, agates, jaspers, copper, iron, marble, granite, slate and whetstone are abundant. The gold was contributed by the Canada Gold Mining Company of Fief St. Charles, Aubin de l'Isle, and is given in nuggets as well as gold dust. The copper pyrites are from the Bruce Mines, and are pronounced very good specimens. The district round Lake Huron furnished the jasper bars, while the Lake Superior district yielded the agates. Both stones are very beautiful, and are much prized. Of the lithographic stone some qualities from Marmora were exhibited. One of these is the specimen which was exhibited at the Paris Exhibition, and on which the autographs of the several

governors of Canada have been engraved. The varieties of slate were numerous, and said to be of very good quality. The whetstones have been principally found at Madoc; and the gossips will have it that on their first discovery one of those 'cute Yankees, who seem always on the *qui vive*, heard of the discovery, and purchasing a lot of the material in its raw state, made his way back to the States. Shortly afterwards he sent over the stones ready wrought to Canada, where he sold them, realizing a very handsome profit from the speculation. The marble exhibited is in great variety, and of a fine quality. Much of it is from the Eastern townships. From Marmora, specimens of the serpentine marble were obtained.

Among recent geological discoveries in Canada that of the Burrstones, of Grenville, are not the least important. At present we import our burrstones principally from France. We import a few from Belgium. But those of the former country are decidedly pre-eminent. There is however, one serious drawback connected with this discovery, which may ultimately render it almost useless. I allude to the difficulty of getting at the burstone. It has been, so far, found only in rocks, extending downward in veins to the depth of eight or ten feet, in some instances. It is thus extremely difficult to get at. The rock must first be blasted, and like processes gone through, of a very expensive nature in the present condition of the labor market. Owing to these causes it is feared that it cannot be sold sufficiently cheap to compete advantageously with the imported article. Probably however, veins of a much more come-at-able nature may yet be discovered, and the stones be thus brought into general use.—*Montreal Correspondence of the Leader.*

#### SPEECH OF LORD CARLISLE AT THE DUBLIN MEETING OF THE BRITISH ASSOCIATION.

The Lord Lieutenant on rising was received with warm applause. His Excellency said,—Mr. President, ladies, and gentlemen, after the able and admirable address to which you have listened with such close attention, I feel that the intrusion of any other accents in your ears, under whatever pretext, or beneath the shelter of whatever authority, must seem an impertinence. Happily, we are now under another sceptre more exalted even than that whose delegated authority I am in this land commissioned to wield—(applause)—the sceptre of science, to which there is neither any Royalty or Viceregal road—("Hear," and laughter)—a sceptre which has its own functionaries and its own hierarchy, so nobly represented here. (Applause.) I know, however, that I act in strict conformity with the dispositions and sympathies of the gracious and enlightened mistress whom I represent and serve—I know I act congenially to all the best instincts of the people at whose head for the time I am placed, when I bid in their stead a sincere and hearty welcome to the British Institution upon Irish soil within the walls of their ancient and famous capital. (Applause.) This is not the first time, as you are reminded by your eminent president, that the city of Dublin has been honoured by a visit of the eminent body whom it now sees re-assembled here with such lively pleasure. The first visit took place nearly a quarter of a century ago. Both the host and guest have since had their day of varied fortune, marked on the whole by a decided character of progress. (Applause.) And while the British Association may count with great pride the extended numbers it has gathered within its folds, and point to the precious trophies which have illustrated its advancing career, I feel, at least in behalf of the noble sister art of architecture, I am justified in anticipating that when your sections shall be collected to-morrow within the new edifice which since your last visit has been raised by the wise-hearted liberality of the ancient university of the city, you will be disposed to admit that the accommodation provided is not unworthy even of such inmates and such an occasion—*Dignis invitant Pallada templis.* (Applause.) Of the special attributes and operations of the association I of course leave it entirely to its accredited and appointed organs to speak, as has already been done so signally well in the opening address, and as will be further developed and exemplified in the progress of the week we are now about to commence. It may be allowed to me, and, unqualified as I wholly am to mix myself in such proceedings, yet to feel a peculiar interest in the credit and welfare of an institution at whose birth I was permitted to assist, and whose noontday of vigour and usefulness it is now my still higher privilege to witness. (Applause.) I am confident that I now discharge an office which will be approved by all who have listened to the excellent address of your president, in moving that it be now printed; and to all the members of the association I beg to offer my cordial wishes that they may enjoy a successful, a useful, and a happy meeting. (Loud applause.)

#### IMPORTANT MOVEMENT FOR THE PROMOTION OF SOCIAL SCIENCE.

Lord Brougham has consented to preside and to deliver the inaugural address, at the formation of an association which is about to be

established for the purpose of bringing together the supporters of the various efforts which are now being made for social improvement, and to elucidate by discussion the connection between each, and the mutual assistance they may render to each other. The new movement will partake, to some extent, of the character of the educational conference recently held in London, over which the Prince Consort presided; various branches of social science being referred to "sections" or "departments" conducted by gentlemen who have paid attention to the subjects. The inaugural meeting will be held in the Town Hall, Birmingham, October the 12th, when Lord Brougham will deliver the introductory address. The meeting will then be divided into five departments, in each of which papers will be read and discussions taken on the following subjects: 1. Jurisprudence and amendment of the law. 2. Education. 3. Punishment and reformation. 4. Public health. 5. Social economy.—*Daily News.*

### Papers on Practical Education.

#### OBJECTIONS TO CORPORAL PUNISHMENT IN SCHOOLS.

It is a striking fact that, for upwards of two thousand years, all the illustrious promoters and reformers of education have strongly deprecated Corporal Punishment. It is true, in Sparta, the *Pædonomos*, or master, was always followed by the *Mastigophoroi*, or lashbearers,—these latter being selected from young men, and charged with the castigation of the offenders of the various classes. In refined Athens, however, school discipline seems to have been very mild;—in the period after Alexander, so mild, that the sophist philologer was decried as a man of extraordinary violence, because—a thing unheard of before!—he had awakened by a blow one of his sleeping pupils.

In Rome, discipline was for a considerable time very severe. The *ferula*, or rod, was the usual instrument of chastisement with which children, in inferior schools, were beaten on their hands. The *flagellum* was more rarely used, and almost only against *slaves*. But the more civilization and true humane principles spread among the Romans, the more the application of Corporal Punishment was opposed by powerful voices. Quintilianus and Plutarch, the oracles of educational wisdom in their age, have put forth in this respect opinions which are well worth quoting here more amply.

Opinion of *Quintilianus* (l. i. c. 4):—

"There is one thing I cannot patiently bear, although custom authorises it, that is—to whip children. This chastisement appears to me low and servile; and certainly, at another age, it would be a cruel outrage. Moreover, an ill-natured child, that is not touched by censure and reproof, will soon be hardened by blows, like the vilest slave.....If you have no other means of reducing a child to obedience, what shall you do when your pupil is grown up? For, then, he has nothing more to fear in this direction, and, yet, he will enter upon a career far more difficult."

Opinion of *Plutarch* (de Puerorum Educat.):—

"One ought to induce children to do their duty, not by cruel and humiliating punishment, which is more proper for slaves than for freemen, but by mildness and persuasion. Bad treatment renders them obstinate, stupifies them, and converts to them study into an object of horror."

To these opinions I add that of *Terence* (*Adelphi*, Act. I. Sc.2.):—

"In my opinion it is a woful mistake, to believe that authority, supported by fear, is more solid and more durable than that founded on esteem...He who does his duty, only forced by chastisement, keeps to his work only so long as he believes himself to be observed; as soon as he thinks himself out of the reach of observation, he returns to his old inclination. He, whom you attach by acts of kindness, fulfils his duties heartily. He endeavours to show his gratitude for your tenderness; and whether you be present or absent, he will be the same. It becomes a father to accustom his son to behave well, more from his own impulse than from fear for another....He who is not able to bring about such a result should avow that he does not know how to govern children."

Quintilianus, Plutarch, and Terence, assuredly never thought that so many centuries afterwards, their noble and generous views would be quoted against a system which they had to combat in their days.

During the dark epoch of the middle ages, and the period immediately following them, Corporal Punishment became once more the rule. The barbarian principle of those times, that human nature is radically wicked, greatly contributed to keep this mode of correcting in practice.

*Luther* relates how he and his fellow pupils trembled when their master spoke to them. His words seemed to them always pregnant with blows.

*Erasmus* (De pueris stat. et liberal. instit.) expresses his feelings on the school discipline of his times in the following rather strong words:—

“Now imagine, worthy Sir, how many of the most splendid talents are destroyed by these executioners, who, themselves uncultivated, are yet puffed up with the conceit of their learning. These morose, violent, abominable men deal out blows even for their mere pleasure, for they are of such a mean character that it is a sport to them to torment others. This kind of men ought to be butchers and flayers, but not the tutors of youth. And certainly nobody torments boys in a more cruel manner than those who possess nothing that can enlarge the knowledge of the pupil. Of course what else should such men do in the school, but pass the day in beating and scolding?”

*Montaigne* describes, in his *Essays*, a School of his time in the following words:—

“Approach the threshold of a schoolroom, and you hear nothing but cries of tortured children, and of masters excited with rage. What an idea, to awaken in those tender and timid creatures delight for their lessons by means of brutal force! Away with this pernicious and damnable theory of the rod!”

The modern Reformers in Education on the Continent everywhere substitute for the method of teaching with cane and rod, the more scientific, and at the same time more humane, methods of correction. Corporal Punishment is strictly prohibited in the schools of France, as well as in the greater part of Germany. Even in the few districts of Germany, where it still exists (although it is rarely applied, and never against pupils above the age of fourteen), the public feeling is much opposed to the practice.

The schools in these countries are very large: nevertheless discipline is strict and effectual,—even more effectual than in English schools, notwithstanding the more turbulent and excitable temper of French boys. It may also not be amiss to remark that, both in France and Germany, the master is not only more esteemed by society in general, but also more loved and respected by his pupils; and this their feeling of respect is genuine—not influenced by the cane.

I do not think that, in such schools as Eton, and with almost grown up youths, Corporal Punishment is used in any part of Europe not even in Russia. But in England also it becomes more and more rare, and will at length disappear with another torture, with which it is intimately connected, viz., with the terrible art of cramming, of which a French author says,—“If I think of the manner I was taught, it seems to me that they put my head into a bag, and made me march by means of the rod, chastising me whenever I did not see my way.” There are at present many excellent Schools in England where the cane is never used; however, they bear out triumphantly any comparison with other educational establishments.

I trust the time will come at last when England is to give up a practise more Chinese than English in its character. China, in fact, may boast of using the bamboo, not only as the great mainstay of government, but also as the prop of the educational system. The Chinese pupil who does not know his lesson, is placed on a small bench, and receives from eight to ten blows with the stick. This procedure is very frequent. The graduates have the privilege of being whipped, not by the public Mandarins, but by special ones, who have the rank of their masters. Often at an examination, when both the father and the son contend for office, the former receives Corporal Punishment as a corrective of his ignorance, whilst the latter, the son is rewarded. There is equality before the bamboo, no partiality being shown to class, rank, or age; and we must give the Chinese the credit of being consequent.

After having thus described, in a few words, the use of this kind of punishment of by-gone times, and the esteem in which it stands among the principal nations of Europe, allow me to allude briefly to another point, of paramount importance, and without which this communication would be very incomplete—I mean the *effect of the whip on health and morality*.

Is Corporal Punishment injurious to health? To this question I boldly answer that, in certain cases, it becomes even a danger to life, if the person who undergoes it suffers from disease, or a disposition to disease, or if the blows are given on those parts of the body which cover important organs, such as the head, the back, &c. It is on account of these reasons that persons condemned to the lash or cane in those countries where this kind of punishment is still flourishing, are always previously examined by a member of the medical profession.

But even if Corporal Punishment is used with care and precaution what is its general effect on the health of children?

Every student of Hygienic science knows that the brain of children—the seat of the moral and intellectual faculties—is of the most delicate structure, subject to numerous morbid influences, upon the presence or absence of which their future happiness often depends. Unfortunately, the existence of these influences has hitherto but too

frequently been ignored. If a child ate, drank, slept, and played, but had no desire of learning or exhibited a wrong moral disposition, he was never supposed to suffer from a disease, never thought of being treated accordingly, but only corrected with the cane and rod, often to the entire perdition of his character and faculties. I consider this a shame to our enlightened age.

The cause of most of the diseases is irritation on a certain point. For the brain, such causes are the most numerous, comprehending, as they do, not only physical, but also intellectual and moral irritations. Among the intellectual irritations we must rank all excessive work of the brain, all disgusting work, such as cramming, &c., which deeply affects the organ of the intellect, sometimes paralyzes it. On this point *Tissot*, in his work *de la Santé des Gens de Lettres*, says,—“I have seen children, who gave the greatest hope of progress, forced by hard and imprudent masters to excessive intellectual labour and the consequence was—epilepsy for a lifetime.

Moral affections of the brain are produced by painful, cruel, disgraceful, and unjust acts, such as Corporal Punishment, especially blows on the head. Such irritations excite the brain and affect the organ of moral faculties. Continual irritations of this kind often ruin a child. Beating and violence render him cowardly, stubborn, and servile, awakening in him hatred, horror, and disgust, both against the master, whom he regards as nothing better than a gaoler, and against the school, which he abhors as a prison. If he does what is required from him, he does it by fear. His sense of honour becomes weakened, and instead of having his heart filled with frankness, he becomes a hypocrite.

It is true, that in schools good order can only be maintained by a certain severity. This severity ought, however, to be kept within such reasonable limits as not to render study an object of nauseous aversion. In punishments, as *Montesquieu* says, we ought to follow nature, which has given to man the sense of *shame* as his greatest chastisement; and the bitterest part of punishment is the moral pain that is caused by this delicate sense. Violence and force, whether in acts or words, injures the education of a child, who is to be raised to honour and liberty: it is contrary to the real object of education which is, to awaken in children the softer feelings, and to induce them to the acquisition of wisdom and virtue. That which cannot be done by reason, prudence, and skill, is never done by force. Confidence, esteem, and friendship, are the best inducements to study, and these are not afforded by brutal, but by moral force. A firm, and at the same time benevolent master, is never obliged to employ his muscular power. The only means to have good pupils is to make them love study. “If you love study, you become learned,” says *Isocrates* who differs in this respect from the author of the article on Corporal punishment in your last Number, who says, “unbribered Bishops will be knownothings.”

These, are my views on the use of the cane. I have quoted in support of them a number of respected names, of the classic as well as of the middle and the modern ages. I should have wished to treat more amply the question, what sort of punishment may be substituted for the whip, which I deprecate; but I have already so much trespassed on your liberality that I can only refer, for the question alluded to, to numerous works of modern Reformers of Education,

CHARLES SCHAIBLE, Ph. D., &c.

London, July 17th, 1857.

[We advocate Corporal Punishment in Schools as a *remedy*, not as an *usage*, which Dr. Schaible justly condemns.—Ed. *Eng. Edu. Times*.]

## Miscellaneous.

### EFFECTS OF A WRONG WORD.

How much evil is perpetuated in families, and in general society, by one wrong word; every unkind word is wrong. Evil speaking is a quiver full of arrows, and every one of which is dipped in poison; and poisoned speech in rankling, burning and destroying. Set a guard upon the lips. Virtues should be engraved in brass, faults traced in water. A suspicious look, a half-uttered, half-smothered hint, from a sister to a brother in respect to his wife, has shook the whole household, and rocked to and fro the domestic state, and threatened the family happiness for months and years, if it have not entirely destroyed it. There is great force in what the poet says:—

“A whisper woke the air,  
A soft light tone, and low,  
Yet barbed with shame and woe;  
Ah! might it only perish there,  
Nor further go.  
But no! a quick and eager ear  
Caught up the little meaning sound;  
Another voice has breathed it clear,

And so it wandered round  
From ear to lip, from lip to ear,  
Until it reached a gentle heart,  
That throbb'd from all the world apart—  
And that it broke.

It was the only heart it found,  
The only heart 'twas meant to find,  
When first its accents woke;  
It reached that gentle heart at last,  
And that it broke.

Low as it seemed to others' ears,  
It came a thunder crash to hers—  
That fragile girl, so fair and gay.  
'Tis said, a lovely humming-bird,  
That, dreaming, in a lily lay,  
Was killed, but by the gun's report,  
Some idle boy had fired in sport;  
So exquisitely frail its frame,  
The very sound a death-blow came.  
And thus her heart, unused to shame,  
Shined in its lily too;  
Her light and happy heart that beat  
With love and hope, so fast and sweet,  
When first that cruel word it heard,  
It fluttered like a frightened bird;  
Then shut its wings and sighed,  
And with a silent shudder died."

### BAD SPELLING AND ITS CONSEQUENCES.

Some years ago a teacher presented himself as a candidate for the mastership of a school, of which the salary was fifteen hundred dollars. His qualifications were deemed satisfactory in all respects, *except in spelling*. On account of this deficiency he was rejected. See, now, what ignorance in this elementary branch cost him. In ten years his salary would have amounted to fifteen thousand dollars, throwing out of the calculation the increase which by good investment might have accrued from interest. Besides, the salary of the same school has since been advanced to two thousand dollars. But he might have remained in the position twice or three times ten years, as other teachers in the same place have done, and that large amount might, consequently, have been increased in proportion.

A gentleman of excellent reputation as a scholar was proposed to fill a professorship in one of our New England colleges, not many years since; but in his correspondence, so much bad spelling was found, that his name was dropped, and an honorable position was lost by him. The corporation of the college concluded that, however high his qualifications as a professor might be in general literature, the orthography of his correspondence would not add much to the reputation of the institution.

A prominent manufacturer, in a neighboring town, received a business letter from an individual who had contracted to supply him with a large quantity of stock; but so badly was it spelled, and so illegible the penmanship, that the receiver found it nearly impossible to decipher the meaning. An immediate decision must be given in reply; and yet, so obscure was the expression that it was impossible to determine what should be the answer. Delay would be sure to bring loss; a wrong decision would lead to a still more serious result. Perplexed with uncertainty, throwing down the letter, he declared that this should be the last business transaction between him and the writer of such an illiterate communication; for, said he, "I am liable to lose more in this trade alone, than I can make in a lifetime of business with him."

A gentleman who had been a book-keeper some years, offered himself as a candidate for the office of secretary to an insurance company. Although a man of estimable character, possessed of many excellent qualifications, he failed of being elected because he was in the habit of leaving words misspelled on his books. The position would require him to attend to a portion of the correspondence of the office, and it was thought incorrect spelling would not insure the company a very excellent reputation from their method of doing business, whatever amount might be transacted.

Inability to spell correctly exposes one to pecuniary loss. It is, moreover, an obstacle to an advancement to honorable station. Such instances as those recited above are satisfactory proofs; but that this defect in one's education is productive of mortification and mischief, is illustrated by the following actual occurrences.

A young teacher had received assistance from a friend in obtaining a school, and wrote a letter overflowing with gratitude to his benefactor, but closed it thus:—Please *except* (accept?) my thanks for your kind favors in my behalf."

Another individual addressed his friend thus—"My dear sur," (sir?).

So, in the one case, the grateful emotions of a young man are nullified by a solitary, perverse word; in the other, the writer unwittingly applies to his friend the epithet which the follower of Mahomet uses,

when he would degrade his Christian neighbor to the lowest point his language will admit.

We were about to write a brief homily on the science of spelling as a coda to the foregoing, but for the present refrain, with the hope that a few cases like the foregoing will awaken attention to the importance of the subject, and we can expend our logic to better advantage hereafter.

In the mean time, we invite everybody to furnish facts, *veritable* facts, tending to the same point, the accumulation of which will carry with them a weight not easy to be resisted.—*Massachusetts Teacher*.

A. P.

### A CANADIAN SCHOOL INCIDENT.

My third attempt at teaching school was in the Parish of St. A., C. E. I had been engaged in the ordinary duties of a common school for three or four weeks, when, on a very cold, bright day in January, a group of children arrived rather earlier than the usual hour; they were all new pupils except one. This was pleasing to me. As the children approached I heard sobbing, and upon opening the door the lad who had previously attended the school entered, leading by the hand a little girl, about seven years of age. Her eyes were large and blue; her hair, which was too fair to be golden, hung around her neck in little ringlets; her cheeks were red, though partly concealed by frozen tears. Her complexion was very fair and her features of an exquisite mould. Her cousin Charley was about twelve years of age, tall and well formed; his eyes were black and his hair was of the same color; his features were regular, and indicative of intellect as well as benevolence. As Charley entered he said, "This is Cousin Polly; she's coming to school, please sir, and I told her you wouldn't whip her if she is a good girl; she's crying with the cold." With a little chafing of the cold hands and the aid of a good fire, Polly soon became comfortable. After this introduction, Polly, Charley and myself were very good friends; time glided pleasantly away, for we had a most agreeable assemblage of youth, and, with one exception, a pleasant school room. The exception was, that two of our windows overlooked the highway, and thus presented a tempting attraction to violate the rules of discipline by looking at passers-by in the time of study. The winter was nearly over, and I had become strongly attached to Charley and Cousin Polly, for they were docile and obedient, seemingly full of affection for me as well as for each other. I had never had occasion to chastise either of them during the term; indeed I had to be cautious about addressing them in a hasty or excited manner, else they would have burst into tears immediately, and to speak harshly to them would be worse than whipping some children. One day, near the close of the term, I had been disturbed several times while attending classes by the scholars seated near the windows already mentioned; they would rise from their seats to look at any vehicle which might be passing. After having been interrupted three times while engaged with a class, and as often remonstrating, I lost patience, and said that I should fettle the first one who arose again to look out of the windows. After this announcement all were very quiet for some time, but before I had concluded the exercises of my class I heard a noise, and looking around I saw Polly standing upon a desk and stretching past two girls to look out of the window. Here was a case. All eyes were upon me. I had described a certain kind of punishment, and pledged my word to inflict it upon the one who should violate the rule. Polly was the last one I deemed likely to be guilty, and the last person in the school whom I wished to punish in such a manner; but now my only alternative was to break my word or to punish Polly. I called her to me; she came with tears in her eyes. I asked her why she wept? She said she was sorry she had forgotten the rule; that she had been told by Fanny Only that her Pa and Ma were coming for her in the sleigh, and she got up to look out without thinking. I replied, "If I should not punish you as I said, I would be guilty of an untruth, which is sinful, and I should lose your respect and esteem, as well as that of your schoolmates." "Oh dear! yes; you must punish me," said Polly, with a gush of tears, "but I feel so bad because I cannot help it now!" and she held out her hand. I stood up as though I was about to inflict the expected blows, when Charley approached, and holding out his hand, said "Please, master, whip me and don't whip Polly." From this little incident I learned two things about teaching: first, never to pledge myself to any particular kind of punishment beforehand; and second, that children often shed tears because their error is past recall, or, in the words of Polly, "because they cannot help it," when their teachers suppose they are crying for fear of the punishment.

Mount Forest, Upper Canada, 1877.

M. Y. Y.

A DIAMOND IN YOUR HANDS.—The soul of the scholar, is not that a diamond? A diamond before which the gems of India and Brazil turn pale? Is it not more valuable than the whole world? more precious than rubies? Is not each galaxy of stars that glitters in the sky as very dust or dross compared with the soul of that little one? How it peers through his eyes! How it sparkles in his features!

We said it was basely coated with a worthless incrustation; and is it not deformed by sin, original and actual? Have not these completely hid its brilliancy and buried it in obscure darkness? Oh! how hath Satan's thrall disfigured the precious gem! Teacher, shall it remain neglected and despised? Shall it still be smothered and enshrouded by the crust of sin and vice? Shall it remain in the possession and service of him whose chief desire is to crush, and ruin, and destroy it? Shall it be trodden under foot of the powers of darkness, numbered with the worthless pebbles of the world, and perish in the general fire? Or shall it be one of the "jewels" which Christ, in the day of his coming, shall gather up? Teacher, you must supply the answer. Yours it is to bring to light its dazzling beauties; 'tis yours to lead the young immortal to the fountain of divine mercy, to the Lamb of God who shall wash him in His all-cleansing blood. 'Tis yours to take him to the feet of Jesus, who will "turn his hand upon him," will purely purge away his dross, and take away all his sin; he will "refine him as silver is refined," and will make him as gold seven times purified. Snatch him from the devouring flame, and by God's free grace he shall richly radiate in heaven, shall add to the refulgence of the crown of glory which decks the brow of heaven's High Majesty.—*Wray's Sabbath School Teacher.*

VENTILATION.—AIR POISON.—People have often said that no difference can be detected in the analysis of pure and impure air. This is one of the vulgar errors difficult to dislodge from the public brain. The fact is, that the condensed air of a crowded room gives a deposit which, if allowed to remain for a few days, forms a solid, thick glutinous mass, having a strong odour of animal matter. If examined by a microscope, it is seen to undergo a remarkable change. First of all, it is converted into a vegetable growth, and this is followed by the production of animalcules; a decisive proof that it must contain organic matter, otherwise it could not nourish organic beings. This was the result arrived at by Dr. Angus Smith, in his beautiful experiments on the air and water of towns; wherein he showed how the lungs and skin gave out organic matter, which is in itself a deadly poison, producing headache, sickness, disease or epidemic, according to its strength. Why, if "a few drops of the liquid matter, obtained by a condensation of the air of a foul locality, introduced into the veins of a dog, can produce death with the usual phenomena of a typhus fever," what incalculable evil must it not produce on those human beings who breathe it again and again, rendered fouler and less capable of sustaining life with each breath drawn! Such contamination of the air, and consequent hot-bed of fever and epidemic, it is in the power of man easily to remove. Ventilation and cleanliness will do all, so far as the abolition of this evil goes, and ventilation and cleanliness are not miracles to be prayed for, but certain results of common obedience to the laws of God.—*Dickens.*

#### SKETCHES IN NATURAL HISTORY.

(Continued from page 109.)

##### IV. MINO, THE TALKING BIRD OF JAVA.

Wonders will never cease. How few persons have heard a bird talk in plain, good English! We have all heard pretty Poll when she says "Good morning;" but pretty Poll has no command of language,—she is not an adept in etymology, syntax, or prosody,—she cannot talk syllogistically, like the talking bird of Java—she cannot, like him, give three propositions—as for example, "My name is Mino—Mino is a pretty bird—How do you do?" We are aware that the present Queen of England once had a parrot that said "Good morning, Vic.," but never could pronounce the words "Queen Victoria," and on account of an unfinished education was suddenly neglected, or turned over to the unstrappers of Windsor.

There is a talking bird now living in modern Athens that has either been remarkably well educated, or has intuitively caught the true spirit of the literary atmosphere we are all permitted to breathe, and this bird talks common sense in good, plain English. He is a rare curiosity; and we do not believe that our old friend Audubon would have sent a bullet through Mino's head, even for the sake of enriching his superb ornithology with another beautiful specimen, especially if Mino had said to the distinguished ornithologist, in his winning and good natured manner, "Good morning, sir."

We saw the talking bird, Mino, at his home, No. 74, Tremont Street, a few days since, and were much astonished and pleased. It is difficult to give an adequate description of him. He is about the size of the American crow-blackbird, although a little heavier. His length from the tip of the bill to the end of the tail feathers, is about twelve inches. He has a yellow bill, one inch in length. His plumage is remarkably beautiful, when it glistens in the rays of the sun. It is a very rich variegated purple and green. The wings are nearly black, with white bars near the ends. The feathers on the head are short, fine, and thick, and resemble the richest gloss of dark velvet. He has a long and beautiful lappel of bright yellow, extending from each side of the back of his head to the nape of his neck. There is

also a small oblong mark on each side of his head. His legs and claws are yellow. His tongue is long, pointed at the end, broad in the throat, and flat,—thus differing from that of the parrot, which is round, short, and somewhat curved.

Mr. James Mann, the well-known taxidermist, of this city, informs us that the Mino birds, so called, are natives of Java, and that they are rare even in that island; moreover, that they seldom talk. They have a great appetite, and will eat voraciously cooked or raw meat, bread, potatoes, and fruit, although they appear to relish simple meal and milk. Mr. Mann possessed a Mino bird, some years ago, which could whistle and imitate different sounds, but it could not pronounce words.

The Mino bird in Tremont Street, the property of Mr. J. Chesley, has a fine tenor voice, and shows what may truly be termed intelligence. We have seen several persons looking admiringly at him, and have heard him say, in the most distinct manner, after he has gazed intently, apparently listening to the conversation,—“My name is Mino.” After waiting sometime, as if he expected a compliment to be bestowed upon him, he has raised his beautiful head, and proudly said,—“Mino is a pretty bird.”

If nobody offers any words of praise, he jumps about his large cage a few times, turns his back to the astonished spectators, and indignantly and emphatically says, in a sharp tone, “Go away! go away!” He then gives a loud and hearty guffaw, exactly like the “ha-ha-ha!” of a human being. Of course every person laughs at the droll bird, and the droll bird laughs again, and says, “Good morning.” When he sees his admirers disperse, he tells them, in the plainest language, to “Shut the door.” If he is asked his name in an affectionate manner, he will immediately reply, “My name is Mino: how do you do?” When he hears several persons conversing earnestly together, without taking any notice of him, he exclaims, “What are you talking for?” The words are so suddenly spoken, and the sound so closely resembles a human voice, that one is really inclined to reply that it is none of your business. But Mino is polite, well educated, and very amusing, although he is vain and fond of flattery.

Every phrase that we have given we heard Mino speak in the course of fifteen minutes. He could probably be so taught to extend his knowledge of the English language, that he could do all the talking at the next session of our legislature for nothing, and thus save considerable money to our tax-paying citizens. It is a fact that, when he is in the humour, he speaks the Malay language, *sotto voce*, and apparently for his own gratification. We hope that Mr. Elihu Burritt, the learned blacksmith, will listen to Mino's foreign lingo, and give us a translation of it, for, mayhap, some long lost lines of an ancient poet may yet be preserved to us by this very remarkable bird. He certainly manifests a degree of intelligence. He apparently takes pleasure in listening to conversation, and has extraordinary imitative power. If we had the enthusiasm of an Audubon, Wilson, Buffon, Cuvier, or Gould, we should place this bird in a rank above all other birds. The Mino lives to a greater age, and is said to be the only bird among the five thousand species known in the world that talks from the lungs, and perfectly imitates the human voice.—*Boston Traveller.*

### Educational Intelligence.

#### CANADA.

— EDUCATIONAL DEPARTMENT, LOWER CANADA.—During the recent meeting of the American Association, at Montreal, the writer had an opportunity, through the courtesy of the Chief Superintendent of Education and his principal officers, of visiting the Lower Canada Education Office, and McGill Normal and Model Schools. The offices of the department, in the old government house, are handsomely fitted up and in admirable working order. The council room and library are also appropriately furnished. The Library contains a very valuable collection of neatly bound French and English Educational works of reference, and a selection of works in general literature, etc. The McGill Normal and Model Schools are attached to the Education Office Building, and are fitted up and furnished in the same manner as are the corresponding schools in Upper Canada. Every thing indicated the zeal and ability with which the department is managed.—A visit to Quebec, also, furnished an opportunity, through the kindness of Rev. Mr. Horan and the Ecclesiastics of the Seminary, of seeing the Jacques Cartier Normal and Model Schools, and the Laval University. The visit to these institutions was a highly gratifying one. The arrangements of the Jacques Cartier School are excellent, and in one or two respects superior to our own. The Laval University, with its new and extensive additional buildings, its valuable library, interesting Museum, laboratory, and beautiful collection of philosophical instruments, is admirably adapted to promote the cause of higher education in Lower Canada.

## UNIVERSITY OF VICTORIA COLLEGE, COBOURG.

We beg to acknowledge the receipt of a neatly printed Gazette of this valuable institution. From it we take the following statistical summary

I. Graduates in Divinity, Arts and Medicine, 1849-57.....	82
II. Under graduates in the Faculty of Arts, 1856-7.....	33
Under-graduates in the Faculty of Medicine, 1856-7... ..	51
	— 84
III. Matriculants and Students of the Collegiate School, 1856-7... ..	268
IV. Students in first honor class, 1856-7.....	11
Students in second honor class, 1856-7.....	88
	— 99
V. Corporation and University Offices, 1856-7:—	
1. Members of the Board of Trustees.....	9
2. “ “ Visitors.....	5
3. “ “ Senate ex-officio.....	11
These three classes compose the University Senate.	— 25
4. Professors in the Faculty of Arts.....	5
Professors in the Faculty of Medicine.....	5
Governor .....	1
Tutors and Masters, &c.....	7
	— 18
5. General Travelling Agents, East and West of Toronto.....	2

The numbers attending the College at present are larger than ever. There are about 40 undergraduates in Arts.

Having given the course of study, &c., prescribed by the University of Toronto, we add the following similar information from the Victoria College Gazette:

## FACULTY OF ARTS.

*Matriculation.*

Candidates for Matriculation must be able to pass an examination in the following subjects, viz.:—Geography [Ancient and Modern]; Arithmetic; English Grammar; Parker's Elements of Natural Philosophy; Outlines of English History; Loomis' Elements of Algebra; Andrew's Latin Grammar; Andrew's Latin Reader; Cornelius Nepos; Anthon's Sallust, de Conjuratone Catilinæ; Arnold's First Book in Latin; Bullion's Greek Grammar, and Greek Reader.

After Matriculation the course of study embraces four years as prescribed below, on the satisfactory completion of which, students are admitted to the degree of Bachelor of Arts. Candidates may be admitted to advanced standing in the Course by passing an examination in all the studies preceding the year in which they propose to enter. No one, however, will be allowed to enter later than at the beginning of the senior year. Any student not intending to graduate, may pursue a partial or elective course, selecting such studies as his circumstances may allow and omitting the others.

## COURSE OF STUDY.

*Freshman Year.*

Anthon's Virgil Æneid, 6 Books; Lincoln's Livy; Anthon's Xenophon, Anabasis, 3 Books; Johnson's Herodotus; Loomis' Algebra, completed; Legendre's Geometry, first 4 Books; Smith's Greek and Roman Antiquities; Arnold's Latin Prose Composition; Arnold's Greek Prose Composition; Lectures and Lardner's Electricity, Magnetism, and Electro-Chemistry; Lectures and Johnson's Chemistry; Taylor's Universal History; Exercises in Elocution and English Composition.

*Sophomore Year.*

Anthon's Horace; Anthon's Cicero in Catilinam; Anthon's Homer, Iliad, 4 Books; Anthon's Xenophon, Memorabilia [Books I, II and IV]; Walker's Lucian; Arnold's Latin Prose Composition; Legendre's Geometry completed; Loomis' Mathematics, including trigonometry [plane and spherical] Mensuration, Surveying, Navigation, and Levelling; Cutter's Physiology; Whately's Rhetoric; Whately's Logic; Elocution and English Composition.

*Junior Year.*

Proudfoot's Plautus' Captives; Anthon's Tacitus' Germania and Agricola; Thatcher's Cicero de Officiis; Anthon's Euripides, Medea; Sophocles, Œdipus Rex; Owen's Thucydides, Book I; Greek Testament; French and Hebrew; Loomis' Analytical Geometry and Conic Sections; Smith and Olmsted's Mechanical Philosophy; Reid and Uphan's Mental Philosophy; Stewart's Active and Moral Powers; Exercises in Elocution and Composition. Students of the junior year have an option of Mathematics, French or Hebrew.

*Senior Year.*

Cicero de Oratore; Demosthenes de Corona; Lewis' Plato contra

Atheos; Olmsted's Optics and Astronomy; French and Hebrew; Paley and Butler's Evidences of Christianity; Paley's Natural Theology; Lectures on Botany, Zoology, Mineralogy and Geology; Exercises in Elocution and Composition.

**THE PREPARATORY DEPARTMENT.**—This department sustains to the University the relation of a Grammar School, and is designed to qualify pupils for the University Course, or to give them a thorough elementary training in any or all of the following subjects, namely.—Arithmetic, Geography, History, English Grammar, Book-keeping, Algebra, Natural Philosophy, the French, Latin and Greek Languages. Those presenting themselves for admission into this department must be twelve years of age and able to pass an examination in Geography and Arithmetic as far as fractions.

**THE MEDICAL FACULTY.**—This department will be conducted in Toronto as heretofore, and those who complete the prescribed curriculum, and pass a satisfactory examination, will receive the degree of Doctor of Medicine, from the Senate of the University. The lectures commence on the first day of October, and continue six months. Any further information required may be obtained by applying to the Dean of the Medical Faculty, the Hon. John Rolph, M.D., Gerrard Street, Toronto,

*Calendar for the Academic Year 1857-8.*

1857, August 20th—Fall Term commences. December 22nd—Fall Term ends. CHRISTMAS VACATION.—1858, January 13—Winter Term commences. May 26th—Academic Year ends. May 26th—Anniversary Exercises. SUMMER VACATION.—August 19th—Fall Term commences. The proper time for students to enter is at the opening of the Session in August.

**EXPENSES.**—Board, including furnished room, bed and bedding, and fuel, per week, 15s. Tuition, Preparatory Department, common English branches, per annum, £4. Tuition in all the higher branches, per annum, £6. Undergraduate course, per annum, £8. Incidentals, 10s. Washing and lights, extra. Payment is required for each term *in advance*.

**DISCIPLINE.**—Students connected with the College will be expected to conduct themselves with propriety, and to observe all regulations imposed by the President and Faculty. A record is kept of each student's deportment, and will be furnished to parents in special cases. Students, whose conduct or progress in study is unsatisfactory, will not be allowed to remain in the Institution.

**RELIGIOUS SERVICES.**—All Students are required to attend Divine Service on the Sabbath, at such Churches as their parents or guardians may prefer. They are also required to attend daily prayers, with the reading of the Holy Scriptures, in the College Chapel. An effort is thus made to secure a healthful moral and religious influence, but the inculcation of sectarian views will be avoided.

**MISCELLANEOUS REMARKS.**—No student entering on the last term of the year is allowed to leave before the annual examination, except for urgent reasons; and parents are reminded that the withdrawal of their sons before the end of the Session is exceedingly detrimental both to the students themselves and to the College. No one is received for less than a term. Parents are earnestly requested not to furnish their sons with *spending money*, or at least to do so *very sparingly*. Compliance with this rule is of the first importance, especially in the case of younger lads.

## THE BELLEVILLE SEMINARY.

A recent visit to the new M. E. Seminary at Belleville enables the writer to speak highly of its arrangements, teachers, and management. The zeal and liberality of its friends and the activity of the Rev. J. H. Johnson, A. M., its first principal, in promoting its establishment, are worthy of especial mention. The institution is, indeed, a gratifying monument of both. In outline, and internal arrangement, it is like Victoria College, Cobourg. When the adjoining grounds are laid out and planted it will be an ornament, as it is now a great benefit, to the Town of Belleville. We copy the following from a circular just issued by the Board of Management:—"The Belleville Seminary was opened for the reception of students, on Thursday, sixteenth day of July last. The second Session will commence on Thursday, fifth of November next, and close about the first of April following. A Term will consist of eleven weeks. This institution is located, as its name implies, in Belleville, a large and flourishing Town on the Bay of Quinte, accessible by water and the Grand Trunk Railroad, about fifty miles west of Kingston. The Seminary building stands on a beautiful eminence, just in the rear of the Town, commanding a view of the Town, the Bay, and the surrounding country. There is room

within its walls for the instruction of four hundred students. This Institution was originated by the Bay of Quinté Annual Conference of the Methodist Episcopal Church, and assumed by the General Conference, but has been erected by the joint efforts and sacrifices of all classes in Upper Canada. Though the property of the Methodist Episcopal Church, it is free from tests, and is not designed to inculcate sectarian tenets, all students being permitted to attend such places of worship as their parents or guardians direct. It is designed for both sexes, affording all the advantages of a classical, mathematical, and commercial education for young gentlemen; while young ladies will be instructed in both the ornamental and solid branches. The following persons compose the Faculty, and teach in the various departments, as here arranged:—Rev. J. H. Johnson, A.M., Principal, and Professor of Ethics, Belles Lettres, and Mental Philosophy Mr. J. N. Martin, A.M., Professor of the Latin and Greek Languages, and the Natural Sciences. Mr. A. Carman, A.B., Professor of Mathematics. Mr. Gilbert B. Goldsmith, English Teacher, and Assistant in the department of Natural Sciences. Miss Eliza A. Deaver, Preceptress, and Teacher of Drawing, Embroidery, and the French, German, Italian, and Spanish Languages. Miss Evaline T. Masury, Teacher of Music. There are two general departments, indicating the classification of pupils, called the Primary and Advanced Departments. The Primary Department includes the following branches:—Reading, Penmanship, Geography, English Grammar, Arithmetic, History, and Spelling. No pupil will be received unless he can read, and has already acquired some knowledge of Geography and Arithmetic. The advanced department will include the following, viz.:—Book-keeping, Algebra, Geometry and the higher Mathematics generally, Natural Philosophy, Chemistry, Geology, Mineralogy, Meteorology, Astronomy, Physiology, Botany, Zoology, Drawing, Embroidery, Music, the Latin, Greek, French, German, Italian, and Spanish languages, Mental and Moral Philosophy, and Natural Theology.

— QUALIFICATIONS FOR ADMISSION TO THE CIVIL SERVICE OF CANADA—  
POLITICAL DEPARTMENTS.—A late official *Gazette* contains an announcement of the qualifications required from applicants for public employments:—To write a good hand; to spell correctly; to write grammatically; to write correctly from dictation; to be conversant with the elementary rules of Arithmetic. To enable the board to judge for what branch of the Public Service any candidate is best qualified, he may be examined, should he desire it, in the following subjects or any one or more of them which he may select: Translating English into French or French into English, and writing from dictation in either language; Arithmetic as far as Decimal Fractions; Book-keeping; Elementary Geography; making abstracts of documents. Two referees will be required to answer the following questions, viz: Are you related to the Candidate, if so, what is the relationship? Are you well acquainted with the Candidate? From what circumstance does your knowledge of him arise? How long have you known him? Is he strictly honest, sober, intelligent and diligent? What do you know of his education and acquirements? So far as you can judge, is his character in all respects such as to qualify him for public employment?

— SCHOOL PIC-NIC, BELLEVILLE.—A Pic-Nic for 600 pupils connected with the Public Schools of Belleville was recently held in Fowler's Grove. There was excellent speaking on the occasion. From Dr. Hope's speech we select the following statistical and general remarks:—The inhabitants of the Town were called upon in the year 1851 to adopt our present system; they were told that it was economical,—that it would bring the largest number of children into our schools,—that it would provide a better class of School Teachers, &c. Now I propose to examine from the statement referred to, how far it has accomplished what its advocates claimed for it. First, what was the provision made for the education of the youth of the Town at the time our present system was adopted? Although Belleville was at least half a century old, it could not boast of a single school house. I very well remember the remarks of the Hon. P. S. White, that on walking round our Town he counted 27 Taverns, but that he could not discover a single School house. In the year 1849, the last year of the old rate-bill system, we had a school population of 707, and the number of children of all ages registered as attending school, was 273. The whole amount of money at the disposal of the Trustees for the payment of four teachers was £113, just £28 5s. each: and the schools were kept open only 6 months in the year. Now what do we find at present? The number of children of school age on the 1st of January last, was 823; this does not include the supporters of Separate Schools, which at present number 465.

The registered attendance at Grammar School for six months ending 30th June, was .....	129
Hospital School .....	175
School No. 1 .....	189
Do. No. 2 .....	175
Do. No. 3 .....	226
	<hr/>
	894

Daily attendance at the Grammar and Common Schools for the same period.

Grammar School .....	80
Hospital do .....	98
No. 1 do .....	82
No. 2 do .....	78
No. 3 do .....	128
	<hr/>
	461

Now if we add the number of children attending nine private schools principally very young children and young ladies studying Music, to the above.....

	172
	<hr/>
	633

We have 633 pupils out of 823 daily attending our schools! This I believe to be as large an attendance as is to be found in any village, town or city on this continent. The price per pupil as per register attendance at Grammar and Common Schools, with interest on £2,500 school property added.....£1 7 4  
Ditto daily attendance..... 2 7 5  
Now what would it cost to educate the same number of children in private schools?

The average price paid per scholar in 27 private schools in the State of New York, was \$15 20c., and the average price paid per scholar at the public schools in 25 of the principal towns and cities in the Union, was \$9 4 cents. This last statement will show whether our school officers have conducted our schools with economy or not. To educate the same number of children in the same branches of education in private schools, would cost,—

Grammar School, 129 at £6 .....	£774
Common Schools, 765 at £4 .....	3060
	<hr/>
	£3834
Expenditure in 1856 .....	1093
	<hr/>
Difference.....	£2731

Or as 27s. 4d. is to 85s. 9d.—or if we take the register attendance, the difference is as 47s. 5d. to 166s. 4d.

If we deduct the amount received from the Grammar School fund and the Legislative School grant, £343, we have only to raise by assessment 16s. 6½d. per scholar. To shew the prosperous condition of the Grammar School at present, he would read the following summary, handed him by Mr. Burdon:—"Registered attendance for 6 months ending 30th June, 1857,—129. Average daily attendance during said period, about 80. During these six months, two-thirds of the pupils studied what may be called the higher branches. 36, studied Classics; 44 Mathematics (Geometry and Algebra); 30, Book-keeping; 31, Meteorology; above 60, Natural philosophy; 37, Agricultural Chemistry; 43, Physiology, &c. When the weather is favorable, the Grammar School pupils attend very punctually. The application of the Free principle to the school does not seem to have produced any change in regard to regularity of attendance. Since the school was re-opened (two weeks ago) 106 pupils have joined it. Dr. Hope referred to a circular addressed by the Rev. Adam Townley to the Clergy and Lay delegates of the Diocese of Toronto, soliciting their co-operation in an attempt to break up our school system. The alleged grounds upon which he asked for their assistance were, the demoralizing effects upon the pupils attending the schools, and the enormous expense as compared with the practical and intellectual results. He thought the financial statement which he had given was sufficient refutation of the latter; and with regard to the former, he was prepared to state upon the authority of the chief Magistrate of the Town, and upon official Reports, that not a single pupil attending the Grammar or Common Schools had been arraigned before them for the commission of crime since our system had been in operation, now more than eight years. He contended that our schools had accomplished all that their warmest advocates claimed for them when established

—that the three essential requisites of good schools had been obtained,—good school houses, efficient teachers, and ample means to maintain them in uninterrupted operation.—*Abridged from a Belleville Paper.*

### Literary and Scientific Intelligence.

— THE AUSTRIAN VOYAGE OF CIRCUMNAVIGATION.—The first Austrian man-of-war intended to circumnavigate the world, the frigate Novara, left Trieste on the 30th of April, for Gibraltar. The Novara carries 1,800 tons weight and 30 guns; the deck is 147 feet long, and 42 in width. The vessel draws about 19 feet water. The Novara has 354 men on board, seven of whom belong to the scientific commission, and will principally be engaged in scientific pursuits. The astronomical, meteorological, and magnetical observations, however, will be made by the officers of the navy, under the command of Commodore Wullerstoff. Dr. Hochstetter, from the Geological Institution of the Austrian Empire, will be occupied with the geological and physical; Messrs. Fraunfele and Zelebor, with zoological; Drs. Schwarz and Tellinek, with botanical; and Dr. Scherzu with astrological and national-economical researches and investigations. The last of these gentlemen will also keep the journal of the expedition, and make the reports on its progress and results to the different political and scientific authorities at home. The expedition is likewise accompanied by a renowned Austrian painter, M. Selliny, who will be occupied in illustrating the most interesting points visited by the Novara, and likewise make drawings for different scientific purposes. Alexander Von Humboldt honoured the expedition with a beautiful memoir on the volcanoes of the South Sea and the western coast of South America, which he called, in his modest style, physical and geognostical remembrances (*Physikalische und Geognostische Erinnerungen.*) This most beautifully written memoir had been addressed to the leader of the expedition, Commodore Wullerstoff, an excellent naval officer, who was formerly professor of astronomy at Venice, a man of excellent qualities, and a sincere love for science, whose appointment to the command of the expedition must be called an exceedingly fortunate one. The Novara is accompanied by the corvette Carolina, and will be towed as far as Messina or Stromboli, according to circumstances, by the steamer Lucia, Captain Littrow, an Austrian man-of-war. In Rio Janerio, the corvette Carolina will leave the Novara, and probably visit the La Plata territory; while the Novara will take her course to the Cape of Good Hope, and to two remarkable little islands, St. Paul and Amsterdam, south-east from the Cape, lat. 38 deg. south, which are yet, in respect to their nocturnal history, totally unknown. We hope to be able to offer to our readers a full account of the visit of the frigate Novara at St. Paul and Amsterdam, from the pen of one of the members of the expedition.

### Departmental Notices.

*To Municipal and School Corporations in Upper Canada.*  
PUBLIC SCHOOL LIBRARIES.

The Chief Superintendent of Education is prepared to apportion *one hundred per cent.* upon all sums which shall be raised from local sources by Municipal Councils and School Corporations, for the establishment or increase of Public Libraries in Upper Canada, under the regulations provided according to law.

### PRIZES IN SCHOOLS.

The Chief Superintendent will grant one hundred per cent. upon all moneys transmitted to him by Municipalities or Boards of School Trustees for the purchase of books or reward cards for distribution as prizes in Grammar and Common Schools.

### SCHOOL MAPS AND APPARATUS.

The Legislature having granted annually, from the commencement of 1855, a sufficient sum of money to enable the Department to supply Maps and Apparatus (not text-books) to Grammar and Common Schools, upon the same terms as Library Books are now supplied to Trustees and Municipalities the Chief Superintendent of Education will be happy to add one hundred per cent. to any sum or sums, not less than five dollars, transmitted to the Department; and to forward Maps, Apparatus, Charts, and Diagrams to the value of the amount thus

augmented, upon receiving a list of the articles required by the Trustees. In all cases it will be necessary for any person, acting on behalf of the Trustees, to enclose or present a written authority to do so, verified by the corporate seal of the Trustees. A selection of articles to be sent can always be made by the Department, when so desired.

### PENSIONS—SPECIAL NOTICE TO TEACHERS.

Public notice is hereby given to all Teachers of Common Schools in Upper Canada, who may wish to avail themselves at any future time of the advantages of the Superannuated Common School Teachers' Fund, that it will be necessary for them to transmit to the Chief Superintendent, without delay, if they have not already done so, their annual subscription of \$4, commencing with 1854. The law authorizing the establishment of this fund provides, "*that no teacher shall be entitled to share in the said fund who shall not contribute to such fund at least at the rate of one pound per annum.*" This proviso of the law will be strictly enforced in all cases; and intimation is thus early given to all Teachers, who have not yet sent in their subscriptions, to enable them to comply with the law, and so prevent future misunderstanding or disappointment, when application is made to be placed as a pensioner on the fund.

### SCHOOL REGISTERS.

School Registers are supplied gratuitously, from the Department, to Grammar and Common School Trustees in Cities, Towns, Villages and Townships by the County Clerks—through the local Superintendents. Application should therefore be made direct to the local Superintendents for them, and not to the Department. The supply for the present year has been sent to the County Clerks.

### ILLUSTRATED GEOGRAPHY & HISTORY OF THE BRITISH COLONIES.

BY J. GEORGE HODGINS.

JUST PUBLISHED, an ILLUSTRATED GEOGRAPHY AND HISTORY OF BRITISH AMERICA, and of the other COLONIES of the Empire.

In addition to the usual Geographical information, this Geography contains a summary of the history of each of the British Dependencies in Europe, Asia, Africa, and America; a short sketch of the Indian Tribes of Canada; and biographical notices of eminent individuals whose names are associated with our earlier Colonial history, &c.

With seventy-four illustrations. Cloth, gilt, lettered. pp. 128. Price 50 cts. per copy, or \$5 per dozen.

Maclear & Co., Publishers, Toronto. May be obtained through any bookseller. Orders solicited.

Toronto, Sept. 12th, 1857.

### UPPER CANADA COLLEGE.

THE SENATE OF THE UNIVERSITY OF TORONTO having established a Mastership in Upper Canada College with a special view to instruction in the highest branches of the English Language and its Literature,—Candidates are invited to forward their testimonials to the Provincial Secretary, on or before the FIRST DAY OF DECEMBER NEXT.

The Emoluments are as follows:—Salary £300, Halifax currency, with his share of the Fees, amounting at present to about £60, and a free house

Toronto, August 27th, 1857.

### SCHOOL FURNITURE.

JACQUES & HAY continue to make School Desks and Chairs of the most approved patterns, and can execute orders promptly and at moderate prices. Samples may be seen at the Educational Depository. Toronto, March 3, 1857.

ADVERTISEMENTS inserted in the *Journal of Education* for one penny per word, which may be remitted in postage stamps, or otherwise.

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All communications to be addressed to Mr. J. GEORGE HODGINS, Education Office, Toronto.