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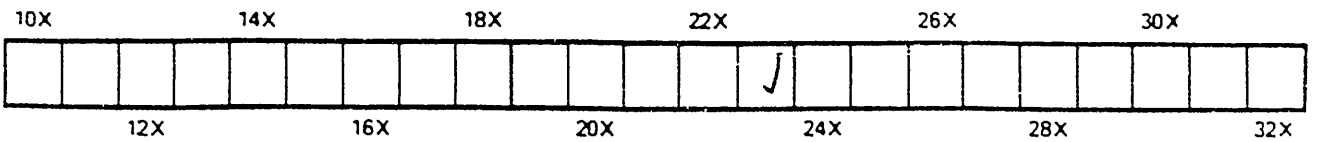

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THE PRESIDENT'S ADDRESS.

BY THE HON. J. H. HAGARTY, D.C.L.,
JUDGE OF THE COURT OF COMMON PLEAS.

Read before the Canadian Institute, January 18, 1862.

A master of English prose has told us how he found in an old writer, a quaint apologue, in which human life is symbolized by a vast board pierced with innumerable openings of every size and figure, —circular, square, obtuse and acute angled.

Every denizen of the earth has there his fitting opening—if he can only find it. But some maladroit influence has arranged the occupants, and, as the author says, feelingly, "How often do we see the round man in the three-cornered hole?"

The occupation of the chair this evening may possibly revive this pleasant fable in many memories, as it certainly has in mine. I can but console myself by the thought that, like thousands of others similarly situated, I am but in a secondary degree responsible for the misplacement.

The custom of the Society calls upon me for a few introductory remarks on assuming the position with which I have been honoured. The short space in which I intend to trespass on your patience, must be occupied in viewing the topics suggested by the occasion, from a

stand-point outside the charmed circle of Science and Art, so worthily occupied by our more distinguished members. I may be reproached for my deficiencies by the well-known saying of Finch, "The sparks of all the Sciences may be raked from the ashes of the Law," but we have few amongst us here to whom we can point as an illustration of this tribute to a profession—which first merited the compliment in Francis Bacon, and still claims it for Henry Brougham.

In a retrospect of the past year in any Institute for the Promotion of Science or Art throughout the vast domains of Britain, an earnest sorrow must find an early utterance for the unexpected calamity which has darkened the happy circle of our beloved Sovereign's home, and thrown a shadow over the light of Christmas hearths alike in the stately and the lowly "homes of England."

It seems as it were but a few short months since we saw the very manly and noble form of him who is departed, standing at the right hand of the Royal Presence, in the rich summer of life, surrounded by a pleasant band of children—or heard his voice in well-chosen, happily turned, if not eloquent, words, opening the proceedings of some gathering of educated minds for the advancement of the Arts and Sciences, or possibly with loftier aim, for the spread of education amongst the masses, to elevate the tone or ameliorate the condition of his fellow-men. Royalty has never given to the cultivated intellect of our country one so choicely adapted to preside over its councils—and it may be long, indeed, before its gatherings will be so gracefully honoured by the leadership of one so near the throne. And long will the memory of his calm and stately presence live in the minds of Englishmen, associated, possibly, with thoughts like these suggested by the portrait of one as prematurely lost :

"Yes; such as these the well-known lineaments—
Such the capacious front,
The comprehensive eye—
The open brow serene.
Such was the gentle countenance which bore
Of generous feeling, and of golden truth;
Sure Nature's sterling impress—never there
Unruly passion left
Its ominous marks infixed;
Nor the worst dye of evil habit set
An inward stain engrained.
Such were the lips whose genial playfulness
Enlivened peaceful hours of private life—
Whose gracious voice held thousands open-eared,
As from the heart it flowed, a living stream
Of Christian wisdom, pure and undefiled!"—*Southey.*

The enterprise and intellect of our country, now engaged in the stupendous task of preparing for the forthcoming exposition of the Science, the Art, nd the Industry of the world, have to mourn the loss of the zealous leader of their splendid adventure ; and through every educated Association in the land will thrill the same genuine sorrow for the untimely passing away of Albert of Saxe-Gotha.

It would be as idle as impertinent for me to attempt even a sketchy outline of the progress of Science and of Art during the past year. As I already hinted, I may but glance at the relation of my outside world to such themes. The position occupied by the professors of Scientific knowledge in relation to the cognate worlds of Thought, to social, theological, or ethical philosophy, is all-important in its bearing on their ultimate usefulness to mankind.

It may be well to notice the most prominent aspect of this relation during the past twelve months.

A very old controversy —never really closed—has been forced into unwonted vitality and bitterness, chiefly by the interest attached to the peculiar position of certain of the combatants, and the deep-seated jealousy of large masses of excellent people towards scientific research, has received a most powerful stimulant. It has been assumed by thousands, that in some way or another the labours and the results of scientific investigations are hostile to the truths of revelation.

The uneasiness has been chronic. From the labors of the great Florentine in deciphering the story of the midnight heavens to the latest explorations in the crust of this aged world—from the demonstration of the diurnal motion, to the finding of the flint implements in the Picardy gravel beds, we have the same jealous distrust—generally honest—too often querulous and unreasonable—always most offensive exhibited by minds from habit and capacity the least suited for the right understanding of matters of such surpassing magnitude.

Much of this is traceable to the nature of the enquiry. It is of the very essence of inductive science; the condition of all logical pursuit, that the investigation of every scientific problem must be conducted by a mind simply striving after truth—striving to discover what *is*, not what ought to be, or what it wishes to be, in order to support some preconceived theory or deep-seated prepossession. The philosophic mind of the highest order, bending itself to the task of investigating obscure phenomena, whether amongst heaven's stars or

earth's crust, must, to a great extent, ignore all preconceived opinions, and exert its keenest powers to collect, verify and register facts. Whether these facts, when ascertained, may tend to support or to weaken opinions and ideas—dear as life itself, possibly—to the heart of the investigator, is a matter which should be absent from his thoughts, as a dangerous enemy to the rigid impartiality with which his labors ought to be conducted.

It is of surpassing importance to us all, that Truth in all its purity should be unfolded to us; it is therefore of as paramount importance that those to whom we look for the precious revelation, should pursue their enquiries with a perfectly free glance—and with a judicial impartiality—unstained by the secret desire to find evidence to support a forgone conclusion.

Now, this principle is at the root of all scientific investigation, and also underlies much of the distrust that attends it. If we know that one man has strong opinions in favour of the Mosaic Cosmogony, and another is decidedly committed against it, we know enough of human nature to suspect the deductions which each may draw from his researches into a subject that as yet has hardly taken its place among the exacter Sciences. If we can find one whom we know to have started on his enquiry determined to see and register every phenomenon —one whom we can trust as not wilfully closing his eyes to appearances at least as striking as others that he records, lest they should bear against some previous theory or dogma, this man will be honoured by the earnest attention of every sound mind, and his report trusted as, with whatever imperfections, containing the honest record of things as he saw them.

We all know of the means pursued to get up evidence in support of particular theories. The history of Parliamentary "Blue Books" illustrates the practice. We have heard too often how such things are managed. A committee sits to take evidence on some subject of projected reform—sanitary, social or financial. It is true that all are invited to bear testimony, but practically the getting up of evidence is in the hands of a few, and those few almost always the persons most thoroughly committed to some particular specific for the evil sought to be remedied. We hear of cases where the determined theorist comes to enquire of men as to their knowledge of facts or conclusions from observation or experience. The witness whose opinions favored that of the applicant is carried off to testify; he who

ventured on the expression of a hostile conclusion is dismissed with an "Ah! that is not the kind of testimony we are in search of!"

Now, this is morally dishonest in the highest degree; but it is unfortunately too true, and the result is, the slight esteem in which the "Blue Book" philosophy is held by the world.

The true worshipper of truth rises naturally into a purer atmosphere. For our guidance through the past, for our hope and trust in the present and the future, we have illustrious labourers, who breathe a clearer ether than that inhaled by the great mass of noisy and mischievous theorists. The surest test of the true investigator is the absence of all bigoted adherence to theory—the readiness to surrender an opinion as against an admitted fact. All educated men—foreigners, possibly, even in a higher degree than Englishmen—reverence the name of Newton, none more so than those who turn with disgust from the panegyric which, in its blasphemous bombast, is so unworthy of its great subject. A recent criticism on his life and works gives us an anecdote (new at least to me), tending still higher to elevate him in our esteem.

"It was the noblest of his noble qualities that he rigidly and sternly bowed down his hypotheses to facts. When Bradley and others had observed a certain nutation of the earth, which they could not account for, and were thinking it destroyed entirely the Newtonian system, they were under the greatest difficulty how to break it to Sir Isaac, and proceeded to do so in the softest manner. What was his only answer? '*It may be so; there is no arguing against facts and experiments.*' The experimental and theoretical deflections of the moon differed only in the rates of 16 to 13, but this was enough to satisfy Newton that his principle did not admit of proof, and to induce him to lay aside his speculations; but the more accurate measurement of a degree effected by Picard, after an interval of many years, supplied the data which made the moon a true witness for the law of gravitation."

This is an equally beautiful and eloquent rebuke to the rash confidence of many of our blind guides, ever too ready to wrest, mistake, or ignore facts, that make against their darling hypotheses.

Amongst the most mischeivous tendencies of this, as well as of preceding ages, may be reckoned the extreme fondness for deducing a novel hypothesis, oftentimes directly opposed to some wide spread opinion—before the facts and phenomena have been thoroughly in-

vestigated. Ambition is eager to acquire laurels in some new field, to startle the world by some dazzling discovery. This is exemplified in every day experience by the sanguine acquirers of patent rights. Some small discovery, mechanical or otherwise is made, and the excited owner rushes to register his invention, and specifies its ability to produce new and startling results long sought for, never till now attained.

Too often the waxen wings on which the discovery is launched, melt away before the sun-light of experience or practical application.

I once heard the great geologist whose portrait adorns our walls, asked for his opinion as to certain appearances noticed by him. The simple force of his reply is worthy of note:—"I have been too busy for the past few years in searching for facts to form any theory." It might be well for many who pursue the like studies to imitate such wise reticence.

Let *facts* be sought after with keenest industry, let phenomena be noted, observations registered, calculations verified, notes compared. Let truth and truth alone be sought after, and let theories for a while be left to themselves. Each scientific explorer has to remember what is the essential condition of his pursuit. It is not to prove or to disprove any scheme of cosmogony—not to aid or to falsify revelation, but simply to seek for facts.

Compared with what remains totally unexplored, the limits which discovery has mapped out for our information are singularly contracted. The pen of Brewster has pointed out with great felicity the little that has been done, compared with the vast wonders yet veiled in the unvisited realms of discovery.

"The dry land upon our globe occupies only one-fourth of its superficies. How much of this fourth part have geologists been able to examine, and how small seems to be the area of stratification that has been explored? We venture to say, not one fiftieth part of the whole, and yet upon the results of so partial a survey there has been founded a startling generalization. * * The astronomers of the present day have penetrated far into the celestial depths, compared with those of the preceding age, descrying in the remotest space glorious creations, and establishing mighty laws. Like them may not geologists descend deeper into the abyss beneath, and discover in caverns yet unexplored the upheaved cemeteries of primordial times. The earth has yet to surrender its stronghold of gigantic secrets, and startling revelations

are yet to be read on sepulchres of stone. It is not from that distant bourne where the last ray of starlight trembles on the telescopic eye, that man is to receive the great secret of the world's birth, or of his future destiny. It is from the deep vaults to which primeval life has been consigned that the history of the dawn of life is to be composed.

Geologists have read that chronology backwards, and are deciphering downward its pale and perishing alphabet. They have reached the embryos of vegetable existence, the probable terminus of the formation that has buried them. But who can tell what sleeps beyond? The mortal coils of beings more lovely, more pure, more divine than man, may yet read to us the unexpected lesson, that we have not been the first and may not be the last of the intellectual race.*"

A noble passage—as profound as it is eloquent! and yet the man who could thus characterize "startling generalization" falls into the same original sin of science. On the most slender grounds, as is well known, he embraced as a certainty, the possibility of the doctrine of "more worlds than one," and stamped the theory of the Planets and Asteroids being inhabited, as "the creed of the Philosopher and the hope of the Christian." His coarse attack on Whewell for daring to doubt this, in the "Plurality of Worlds," is too well known as a melancholy example of the inveterate habit of theorizing. Those who feel pleasure in seeing such an onslaught well met and repelled, read with instructed satisfaction the temperate but irresistible answer of the accomplished Master of Trinity.

A very large class of minds shrink with undisguised dislike from every inquiry which may possibly clash with any firmly established doctrine or theory. This conservative feeling has done good service in its day, and must not be lightly despised, but it must not be pushed beyond legitimate bounds. The Brahmin dashed the microscope to the ground, and cursed the art which shewed him myriads of objects floating in a glass of his daily drink from his sacred Ganges. Our Newton was branded as an Arian heretic for questioning the genuineness of the celebrated half verse in St. John's epistle. Few scholars will now-a-days do battle for it. We can hardly afford to imitate the judicial blindness of the Brahmin. We must be careful, even in defence of things we consider sacred, not to imitate the assailants of Newton.

* More Worlds than One.

Everything, whatever may be its position in the veneration of the world, must in an age like this, stand the test of criticism. Its claims, in our belief, must be prepared for strict examination.

No faithful heart need fear the result—the dross will shrivel and wither in the fiery test—the pure gold will remain fairer than ever.

Hardly a year has elapsed since the now famous "Essays and Reviews," startled the sober minded world from its propriety. A hundred so called answers have fluttered in hot haste from the press, a wild storm of rebuke has come from many throats—none however so loud or so virulent as those whose owners had never read a line of the work in question. To the infinite profit of publisher and fame of authors, it has taken its place very high up in the "Index Expurgatorius." In common with many others who have taken the trouble to read the book, I think its publication will ultimately effect a large amount of good, and will succeed in pouring a flood of light on some of the questions suggested. Most of the views that have caused alarm, possess no novelty whatsoever, but as one of their most sensible opponents has happily said, "what is put forward as new lights is simply ancient darkness." Some of the as yet half investigated phenomena of Geology, are made to speak with far too certain a voice, as to the past history both of man, and the earth on which he stands, and onslaughts are made on popular opinions, on premises as yet, I humbly conceive, wholly insufficient to support the writers conclusions. But the real mischief which the book may possibly work, lies in the very unfair, though not unexpected use which the openly avowed opponents of Revelation have hastened to make of its too rash admissions and concessions.

The only legitimate object of introducing the notice of this work into these remarks lies in the intimate relation, which, in the world's judgment, exists between its conclusions and the labours of material science. A certain looseness of expression adopted by the Essayists has contributed largely to the formation of this opinion.

For one example out of many I may notice the loose language used in discussing the Mosaic Cosmogony, as possibly, "the speculations of a Hebrew Newton or Descartes." This expression, besides jarring unpleasantly on most ears, will not bear any critical examination, and is in fact as unjust to the Hebrew Lawgiver as to the modern astronomer.

A large portion of thinkers will possibly consider that the book, amongst other points of value, is sound in its enunciations of the true

canons of interpretation and critical analysis, applicable alike to sacred and secular composition. The most utterly unsatisfactory part of the book, and possibly that part to which scientific men will feel least indulgent, is the laboured article against miracles, where the writer speaks of all cultivated minds recognizing "the impossibility of any modification whatsoever in the existing conditions of material agents, unless through the invariable operation of a series of eternally impressed cousequences, following in some necessary chain of orderly connections, however imperfectly known to us;" and again, "The simple but grand truth of the law of Conservation and the stability of the heavenly motions, now well understood by all sound cosmical philosophers, is but the type of the universal, self-sustaining, and self-evolving powers which pervade all nature."

This is the key note of much to the same effect, and to my unspeculative mind the whole seems coloured by an inveterately hasty adoption of conclusions as being indisputable and universal, whilst still resting on very loosely established premises. The assumed "immutability of the laws of nature," is the ground work, and an exaggerated exultation of such "laws," and a practical depreciation of the power and will of the Lawgiver, the result. The writer last quoted has already passed from shadows to realities, and sees now mayhap with clearer vision, having long, like ourselves, "seen as through a glass darkly."

Most of my hearers have read the very nobly expressed article on the "*Immutability of Nature,*" in a late periodical. The phrase itself is denounced as "not only involving a violation of the first laws of accurate inductive reasoning, but charged with most perilous conclusions to Christion Faith unless it be carefully modified." Again, "Incautious language is the dry-rot of the world. The historians and philosophers of physical science remind us in every page, of the power of words, mere words—warn us, how they necessarily contain the sporules of mighty principles, how they give to those principles wings to fly, and filaments to root them in the earth, and a power of propagation able to cover the whole field of truth with the most noxious weeds, so that when once their hold is taken it is almost hopeless to eradicate them," and very appositely is the great name of Newton made to repeat how God acts in what is called Nature. "*Secundum leges accuratas ut naturæ totius fundamentum et causa, constanter coöperans, nisi ubi aliter agere bonum est,*" according to uniform laws except when it be good for Him to act otherwise.

As I have already remarked a flood of light is being turned upon many of the subjects thus peculiarly brought before the public.

The full discussion thus elicited will, amongst other good effects, serve to dissipate an uneasy feeling which prevailed extensively, of the vast superiority of German critical analysis and explorations of the text of the sacred writings.

It seemed almost conceded that no names could be found to weigh against the established reputations of the Bauers, De Wettes, and Strausses. General readers may feel somewhat reassured by the mention of such names as Hengstenberg and Max Müller, and others brought prominently forward of late, as occupying very different, although equally honourable places among German philologists.

Science has not been false to her great mission on earth, and has advanced torch in hand to explore and light up many of the dark caverns of which the black mouths alone have been exhibited to us, by those, who seem rather to delight in pointing out darkness than in striving to explore it. Patient research has journeyed toilsomely through lonely and savage lands to trace out perishing characters of the elder days, on Idumean tomb, Egyptian obelisk, or Assyrian trophy. It has called to its aid a wondrous handmaiden, the photographic art, to copy the ancient letters as in a mirror, and patiently has it unravelled the strange alphabet, hieroglyphic, or Cufic or Cuneiform, till the world was shewn the cotemporaneous record of a Sesostris or a Nebuchadnezzar.

The Bampton Lecturer for 1859, Mr. George Rawlinson, has given us a noble contribution to the Christian Evidences, wholly drawn from the sources of profane history, and the recent decipherings of Egyptian, Babylonian, Persian, and Assyrian records. I cannot refrain from giving two brief examples of these interesting testimonies, if only ta shew how truly worthy of perusal is such a work in such an age. Those who wished to impugn the book of Daniel, are wont to point out that while the prophet makes Belshazzar the last King of Babylon and slain at its capture, the historian Berosus gives Nabonadius as the last native king, that he was absent from the city at its capture and was not slain but taken prisoner by Cyrus. This was embarrassing. But Sir Henry Rawlinson, the gifted brother of the lecturer, found an inscription in 1854, at Mugheir, the ancient, "Ur of the Chaldees," stating that Nabonadius the last King, during the later years of his reign, associated with him in the throne his son "Bil-shar-uzur," and allowed him the royal title. There can be little doubt, he adds, that

it was this prince who conducted the defence of Babylon and was there slain.

Again, we all know the strange wild story of Nebuchadnezzar's madness as told in Daniel. Among the records of this great King's reign a most remarkable inscription, known as the "Standard Inscription," has been found which offers grave matter to the thoughtful. It is written in the first person by the King himself, and tells us that during some considerable time—four years apparently—all his great works were at a stand, he did not build high places, he did not lay up treasures, he did not sing the praises of his Lord, Merodach, he did not offer him sacrifices, he did not keep up the works of irrigation. No explanation is given or cause assigned. But I must not trespass too much on your indulgence in pursuing this, to me at least, singularly attractive theme.

The marvels of Science will always possess a fascination and attraction for a large class of youthful minds. The blue depths of the midnight heavens will attract some, the chronicles of earth's life, cut deeply in her rugged pages will call others to read their story. Modern skill and appliances can unfold marvels from the common sights of nature. "If the stars," says Emerson, "had looked out upon the night but once in a thousand years, how the legend would have gone from father to son, of the City of God thus revealed unto man."

If the vast field of heaven were in like manner unfolded to man's observation as the astronomer has it before him in telescopic vision, the moon mapped out into mountain chasm and arid valley; the planets glorified in size and splendour, girt with luminous bands and "satellites burning in a lucid ring," as glowing a tale of enchantment could be framed for the wonder of the world.

And startling are the hints of things probable, though as yet unproved, occasionally suggested to us. Photography suggests that the image of every scene on which the eye has rested, remains painted on the retina, a vast picture gallery for memory to unlock and gaze on at pleasure. It is hinted to us that nothing once received by the ear is ever lost, but is stamped upon the brain to be recalled or used at will, or to be brought back at the touch of some secret spring. Or, more startling still, that every sound, everything spoken, never dies, but goes forth in a widening circle among the waves of space; that the great cry that went up in the Egyptian midnight, that the

lamentations of Ramah may yet be wailing among distant stars, giving a terrible significance to the old warning that man has to account for every idle word at a future reckoning.

All these marvels, facts and fancies, must attract the active and imaginative minds of our day. It is a matter of vital moment that those who are laudably jealous for the cause of revealed religion, should not needlessly place themselves in opposition to the fullest and freest enquiry, and the most impartial search for facts and phenomena on the part of science.

"Every good gift and every perfect gift cometh down from Him with whom is no variableness or shadow of turning." He who richly endowed the mind of a Newton to elucidate his laws, of a Butler to deduce profound analogies from His courses in nature, has not, we may trust Him, given choice gifts of perception and demonstration to our Murchisons, Lyells, Millers or Logans to dishonour his works or to falsify aught that he has revealed to his creatures. Let us have faith in our great truths, and not do them or ourselves the foolish injustice of treating them as dependant on the truth or falsehood of any received theory of Astronomy, Cosmogony or Chronology.

No record of æons and æons of ages brought up from the deep heart of earth; no trace of man's work, or of his bones in ancient gravel-bed or protozoic formation, will ever induce the world to surrender its heritage of glorious truths under the New Dispensation. The most sceptical has failed to give any plausible origin, apart from direct inspiration, for the wonderous system that rose pure, and white, and lucid,—a veritable City of God, shining in stainless beauty and majesty, like His Spirit over the dark waters of an effete and perishing Paganism, of blank Atheism, or pantheistic extravagance. Men will not surrender the "Father's house of many mansions," for Stygian rivers and Elysian meadows, or Islands of the Blessed, that shine so drearily in Horatian song or Platonic vision.

Even those who cling most closely to their favorite "Immutability of Nature," and speak doubtingly of miracle and portent, still cherish in their heart the great home-truths of Revelation. These great beacon lights of Time and Eternity still shine, and ever will shine, over the waste of speculative doubt and hinted impossibility, even as when the multitude of the heavenly host, the long drawn lines of Seraphim and Archangel, effulgent in the white light of Paradise, were swallowed up in the black depths of night, and the quiet stars unmoved

in their stately beauty, looked down on the dazzled eyes of the believing Shepherds.

A very large number of persons, members and non-members of Scientific bodies, take an increasing interest in the result of Scientific research, and would gladly become familiar with the alphabet of the system. They are generally deterred by the new language proposed to them as a condition of the desired knowledge. Ignorance of Greek, a very common disease with the masses, is a terrible difficulty in the very threshold; and without the persevering student, who knows nothing of the powers of that wondrously plastic tongue, has to fatigue his memory with thousands of (to him) most unmeaning and formidable compound terms. The variation of a vowel, the mistake of a dipthong, being occasionally so fatal to accuracy as to send the poor groper among the Infusoria into the startling company of Plesiosauria or Pachyderms. The Greek of Sophocles or Æschylus has even to undergo some comic violence in its adaptation to the anatomy and economical habits of the animal and vegetable kingdoms. Scientific nomenclature is, doubtless, a necessity, and without it there could be little communion of labour or thought among the learned of many lands. Still, one may be permitted to regret, that to the increasing millions who speak that pleasant English tongue, "whose sound" (as has been grandly said) "has gone into all lands, and whose words to the ends of the earth," we cannot as yet teach the marvels of science, the wondrous story of the mutations of their own earth, and unfold its mineral and floral wealth, as readily as we teach them the history of man or the elements of morals or religion.

We are sadly in want of truly popular explanations of scientific research. The mere English scholar turns up a so-called *popular* treatise to learn something of an animal, he is enlightened by finding that it is perhaps a graminivorous pachyderm, or some fossilized relic that is "crustacean, semi-calcarious, striated, cordiform, and is never found in palæozoic formations." A pleasant writer says, "Even the 'hand books' and 'outlines' intended for general readers and docile beginners, abound in words of such puzzling obscurity (not to mention the abstruse speculations frequently implied in their very mention) that one would think the English public was made up of pundits, and been reared in the nursery in the circle of the Sciences." What, in the name of Linnæus, he will ask, can be meant by the sub-Kingdom 'Cœlenterata?' His knowledge of Greek, be it ever so extensive, will

not carry him far in this fog. It is all very well to talk of a sub-Kingdom of 'hollow-gutted animals,' but what *are* they?" And again speaking of a most meritorious book by an excellent author, 'If in the next edition he would only bear in mind that even students are anything but familiar with many of the technical terms so profusely scattered unexplained through his pages, that even students are not all Grecians, and that a knowledge of Greek very often lends little or no assistance to one who does not already know the meaning of the term as applied in the special case, he will greatly improve his book. We are perfectly aware of the necessity of technical torms, Science is impossible without a strict nomenclature; but we are also aware that if many writers are misunderstood because they do not attend sufficiently to those exigencies of technical expression, many also are thrown aside unread, because they will say nothing in their mother tongue.

"Every one knows the dreadful kind of mathematical writer or speaker, who "rushes into the differential calculus on the slightest provocation." And we could name more than one biologist who rushes into Greek, and spurns the plainer and more expressive English, as if his scientific reputation depended on his not saying anything in common language."

The past year has witnessed the usual gatherings of the philosophic and scientific intellects of the age. If not marked by any special originality, they have developed more clearly than ever the strong practical tendency of the age, to subordinate all the energies and appliances of Science, invention, and association, to the correcting of social evils and the elevation and purification of man. The British Association has heard from their Fairbairn a grand epitome of the progress of material science. The Dublin Social Congress has elicited, with much crude speculation, a large amount of practical suggestions for future operations. Death has done his usual work. Besides the Royal Prince, whose departure we have already noticed, he has taken away another of the thoughtful Teutonic blood. Baron Bunsen, in the full exercise of his splendid labours, has passed away, declaring with his last breath his profound belief in that Revelation he has so often been accused of assailing. Sir Francis Palgrave, whose profound antiquarian knowledge will long serve to lighten the labours of the student of the Past, has been taken from us. Elizabeth Barrett Browning has passed away from a wide circle of admirers; and thousands to whom the name of Italy brings back grand memories of ancient

dominion, or gentler thoughts of preeminence in those Arts that delight the eye and elevate the soul, will hardly forget that the year just past has witnessed the death of Camille Cavour.

"It is a pleasant thought," says Charles Kingsley, "to feel surer, day by day, that one is not needed—that science moves forward swift and sure under a higher guidance than our own—that the sacred torch-race never can stand still, that He has taken the lamp out of old and failing hands, only to put it into young and brave ones who will not falter till they reach the goal."

Yet a few words more and I have done. The war-cloud that has risen so threateningly in our southern horizon has lately, in some degree "turned out a silver lining on the night," and the mild arts of peace may perhaps still be allowed to flourish, unchilled by the breath of War. The rising cloud may somewhat dim the cheering sunshine of our prosperity; but its shadow will fall upon a land alive with citizen-soldiers prepared to defend its soil to the last; satisfied with its political position, unprepared for changes in its allegiance. We have lived long enough to refuse to turn from the chaste and gracious form of our Constitutional Liberty to the worship of the base counterfeit which has been raised on this Continent in the stead of the veritable Goddess.

> Know ye not then the Harlot? Know ye not
> The shameless forehead, the obdurate eye,
> The meretricious mien,
> The loose, unmodest garb with slaughter foul?
> Your Fathers knew her! When the nations round
> Received her maddening spell,
> And called her—Liberty—
> And in that name proclaim'd
> A jubilee for Guilt!

Listen to some memorable words written sixty years ago:—

"Thanks to our sullen resistance to innovation—thanks to the cold sluggishness of our national character, we still have the stamp of our forefathers—we have not lost the generosity and dignity of thinking of the 14th century, nor as yet have we been subtlelized ourselves into savages—we are not the converts of Rousseau—we are not the disciples of Voltaire—Helvetius has made no progress amongst us—atheists are not our preachers—madmen are not our lawgivers—we know that we have made no discoveries, and we think that no discoveries are to be made in morality—not many in the great principles of government nor in the ideas of liberty, which were understood long before we were born, as well as they will be after the grave has heaped

the mould upon our presumption and the silent tomb imposed its law on our pert loquacity.

"In England we have not yet been completely embowelled of our natural entrails—we still feel within us and we cherish and cultivate those inbred sentiments which are the faithful guardians, the acting monitors of our duty, the true supporters of all liberal and manly morals. We have not yet been drawn and trussed in order that we may be filled like stuffed birds in a museum with chaff and rags, and paltry, blurred shreds of paper about the rights of man. We preserve the whole of our feelings still native and entire, unsophisticated by pedantry and infidelity. We have real hearts of flesh and blood beating in our bosoms. We fear God, we look up with honor to Kings, with affection to Parliaments, with duty to magistrates, with reverence to priests. Why? Because when such ideas are brought before our eyes, it is natural to be affected, because all other feelings are false and spurious and tend to corrupt our minds, to vitiate our primary morals, to render us unfit for rational liberty, and by teaching us a servile, licentious, and abandoned insolence to be our low sport for a few holidays, to make us perfectly fit for, and justly deserving of, slavery throughout the whole course of our lives."

The ring of the true metal sounds through these almost prophetic words. I need hardly name the writer as Edmund Burke. We can have no fear for the result of any contest into which the lust of conquest or outrages in our national honor may plunge us. "An unjust war is the greatest of iniquities—a just and defensive war the last and greatest appeal to the God of truth."

And now let these very discursive remarks draw to a close, not in mine own weak words, but in the lofty strains of one of our truest Poets, when he told his countrymen, threatenened with invasion :—

It is not to be thought of—that the flood
Of British freedom, which to the open sea
Of the world's praise, from dark antiquity
Hath flowed with pomp of waters unwithstood—
Roused though it be full often to a mood
Which spurns the check of salutary hands—
That this most famous stream in bogs and sands
Should perish—and to evil and to good
Be lost for ever.—In our halls is hung
Armoury of the invincible knights of old;
We must be free or die, who speak the tongue
That Shakspeare spake, the faith and morals hold
That Milton held. In everything we are sprung
From Earth's first blood, have titles manifold!

NOTES ON THE CHOLERA SEASONS OF 1832 AND 1834.

BY REV. C. DADE, M.A.

The following paper contains the results of personal observations taken during the Cholera Seasons of 1832 and 1834, in the City of Toronto. The subject does not involve medical considerations, but is considered as bearing upon the connection between atmospheric conditions and æsthetic phenomena. During the period above alluded to I kept a careful record of the weather and its prevailing features, the observations being mainly thermometric.

The year 1832 must ever be considered as a most memorable one in the annals of Canada, and it was fraught with lamentation, and mourning, and woe. We were visited with domestic discord and foreign invasion. In both, blood was freely poured forth; but what comparison is there between the victims of the sword and of that fell destroyer, which spared neither age nor sex, and against whose desolating attacks vain was the help of man. The appearance of the cholera on the American continent was an event which inspired not only universal dread but almost universal curiosity. We had traced it in its course from east to west, resembling in this all other pestilences of modern and ancient times, and there seemed but little doubt that in its onward career it would reach the shores of the far western world. There seemed to be a fairer opportunity of determining the nature and origin of the disease than at any previous period, and thus with varied feelings of awe and expectation men awaited the arrival of the terrible visitant. Rumours and surmises were soon converted into certainty, for on June 8th, 1832, the first case of cholera occurred in Quebec. To use the expressive language of the poet,

> "Like a thunder peal,
> One morn a rumour turned the city pale.
> And staring on each other, fearful men
> Uttered with faltering voice, one word—the Plague!"

The first subjects were emigrants, and were exposed to no other source of infection than the filthy state of their lodgings in that focus of abominations, the Lower Town of Quebec, stated by the board of Health to be a "low, dirty, ill-ventilated part of the City, crowded with emigrants of the lowest description." The pestilence having thus

got foothold, spread rapidly, and reached York, the capital of Upper Canada, June 19th. This place at the time might be considered as a spot peculiarly set apart for the abode of the destroyer. All the deadly elements which engender and foster disease and death were then in active operation. The Quarterly Reviewer of the day pronounced the "three stinking cities of Europe to have been, Lisbon, Edinburgh and Geneva," and if those of the New World had been classed in the same unsavoury category, "Little York," as it was then called, would no doubt have occupied a prominent place. The genius of filth, if such there be, reigned predominant both in public and private. Crowded and loathsome hovels, cellars with putrid and stagnant water, dunghills with animal and vegetable garba_ _eeking in the scorching rays of the summer's sun, these deadly agents everywhere spread their contaminating influence. The curse of strong drink aggravated the horrors of the devouring pestilence, and the filthy and intemperate were its most numerous and earliest victims; but having once taken hold, it gradually seized upon individuals of all classes, till at length neither age, constitution, habit, or condition, seemed to furnish any exemption. The popular opinion which prevailed of its being contagious not a little contributed to the general consternation. It would be foreign* to our purpose to enter into this controversy, which has many great names on both sides, for who shall decide when doctors disagree. One thing however was certain, that while contagionists and non-contagionists were battling the question, the disease, whether infectious, contagious, or a compound of both or neither, spread with unabated violence, and well nigh baffled all the skill of man. It will not be out of the way to mention an apparent exception. The 79th Highlanders were then quartered in the garrison, and their surgeon, Dr. Short, had been so successful in the

* An able communication, signed Q. H. Y., was addressed to the *Quebec Mercury*, which seems to have been the production of Dr. Henry, author of that amusing book, "Recollections of a Staff Surgeon." The Dr.'s experience of the disease, as it occurred in the East Indies, was extensive. He says, "The great secret in treating the disease is to get at it in time. I was for nine months in charge of 1500 men, natives, in 1819. My mode of management was this. Each Serang (head of a gang) was provided with a bottle of brandy and laudanum, mixed in the proper proportions, and a measure exactly a dose for an adult; his instructions were to give the patient a dose and run with all speed for me; if he came in time I gave him a rupee, if he neglected his duty he was treated to a sound whacking with a bamboo, and thus with two strong motives, the hope of reward and the fear of punishment, I was speedily apprised of the danger, and thus, though many were attacked, I did not lose a single patient." Again, "Is cholera contagious? The *Quarterly Review* says it is, I say it is not;" and he proceeds to give a number of "unquestionable facts" in proof of his assertion.

preventive measures adopted, that in August the Board of Health published the following statement: "To satisfy the most sceptical on this subject they consider the importance of it will fully excuse them for subjoining the information so kindly permitted by Dr. Short, Surgeon of the 79th Regiment, to disclose for our guidance the course pursued in the York garrison, and which has been attended with such happy results, not one case of cholera having therein occurred." Here follows a detailed account from the Dr. of the method adopted, which it is unnecessary to insert here, and though the precautions, &c., used under a military régime, could not be of universal application, yet they plainly prove how efficacious secondary agents may be in alleviating the direst visitations. Meanwhile the Town of York presented a most melancholy spectacle. Business was well nigh suspended, the prevailing panic keeping away all visitors from the country; and one might almost say, that the stillness of death reigned in its deserted streets, traversed continually by the cholera carts conveying the dead to the grave and the dying to the hospital.

It was impossible at the time, and still more so now, to find anything like an accurate estimate of the number of cholera victims, and the relative proportion of the cured and the dead. The reports of the Board of Health published at the time, cannot be considered more than an approximation. It was then a subject of complaint that several medical practitioners furnished either imperfect details or none at all. Numbers were buried by their friends without any record being kept, and many were the victims of quackery and out of the pale of medical practice, so that the only accessible reports were necessarily extremely defective, falling probably nearly half below the truth as regards the number of cases, and much more as to the number of deaths. The Board sat daily from 3 to 5 p. m., and left nothing undone within their power which could either arrest the progress of the pestilence or mitigate its rigour. The following are specimens of their reports:—

"York, Aug. 3rd, 1832.

Cases remaining in Hospital	32
New cases	14
Cured	3
Died	3
Remaining	40

August 7th, 1832.

Cases remaining	40
New cases	19
Cured	8
Died	11

Total number of cases reported since the commencement, 239; deaths, 105. No report from four medical practitioners.

In Montreal, where the ravages of the pestilence were more terrific according to its population than in any other part of the globe, the number of cases, in August, was 284, and burials 149.

Total number of cases each week during the cholera months of June, July, and August:—

June 2	4833	July 21	2787
" 9	10599	" 28	1353
" 16	2316	Aug. 4	94
" 23	2478	" 11	3931
" 30	1654	" 18	909
July 7	2407	" 25	540
" 14	3126		

From this it is evident that the statistics of the cholera of 1832 in York are more a subject of conjecture than otherwise. It was said at the time, and it was not going beyond the mark, that the population of the town, then consisting of about 6000 persons, was at least decimated. In the City of Montreal alone the interments from June 10th to Sept. 1st were 2820, and according to the estimate of the Chief Agent at Quebec, no less than 2350 of the emigrants of 1832 fell victims to the disease. The emigration of that year was unprecedently great:—

1829,	15,945
1830,	28,000
1831,	50,254
1832,	51,746

The crowded state of steamboats and other vessels, the peculiarly exposed state of the poorer emigrants to the varying temperature, scorching sun, and chilling rain, together with the debilitating effects in many cases of a long sea voyage, all these causes told with fatal effect, and aggravated the malignity of the appalling malady.

We now proceed to enquire whether there were any peculiar features in the seasons of these two years of plague, viz.: 1832 and 1834, calculated to increase or diminish its virulence. It has been said that cholera is more independent of climatic influences than any other disease whatever. The ravages of the yellow fever, for instance, are confined to a particular region, and if the traveller escapes infection and reaches a certain height he is safe. Thus it has never visited the City of Mexico, though the coast and neighborhood is its chosen abode, but the cholera devastated both alike. Still no one can deny that the effects of this as well as all other diseases must be modified by the varying circumstances of climate and locality. The latter was abundantly proved by undoubted facts, and the former is equally certain. All those deadly agents which, if they do not actually engender, foster disease, are mitigated or heightened by any deviation from the normal state and character of the season. The filthy elements in which Little York, in common with Montreal and Quebec, abounded, were made more active agents of disease and death by scorching suns, heavy rains, great evaporation, and sudden and violent fluctuations of temperature. Therefore the various atmospheric phenomena which precede and accompany the visitation of a pestilence are surely deserving of notice. "Coming events cast their shadows before," both in the natural as well as the moral world, and he must be a shallow observer who fails to note their indications.

In the bygone ages of ignorance and superstition any terrible visitations were supposed to be heralded by supernatural appearances in the heavens above and in the earth beneath. Such ideas are now exploded, "They live no longer in the light of reason." But though the pestilence walketh in darkness it gives sufficient tokens of its approach, and without entering more fully into this part of the subject it has been said, that whenever it has arrived deviations from the usual conditions of the season in temperature and other features marked its advent and progress To enquire whether this was the case in Canada is the object of the following remarks, founded upon indisputable facts of which the infant science of meteorology stands so much in need, and the collection of which therefore, humble as the task may be, is surely advisable.

We will commence with December, 1831, a most remarkable month, and as I can testify from personal observation, unequalled for thirty-two years at least. The mean temperature of this month at 8 a. m.,

=12·6; nor did this low temperature arise from great extremes, but rather from a continuous state of uniform cold, the mercury never rising above the freezing point. With such weather on this side of the Atlantic the cholera was devastating the North of England, under the circumstances of mild, open weather and humid atmosphere.

Days.	8 A. M.	5 P. M.	9 A. M.	Days.	8 A. M.	5 P. M.	9 A. M.	At the Royal Phil. Society, London.
1	14	14	48	17	12	2	52	.....
2	6	14	50	18	5	....	53	.....
3	12	20	51	19	17	22	50	.....
4	12	....	50	20	17	23	51	.....
5	5	....	51	21	29	13	52	.....
6	14	19	52	22	—6	9	49	.....
7	11	19	53	23	13	25	49	.....
8	18	25	54	24	32	33	46	.....
9	3	15	56	25	14	24	43	.....
10	7	17	55	26	20	23	43	.....
11	23	24	56	27	11	19	44	.....
12	8	13	56	28	19	25	44	.....
13	9	12	56	29	19	17	45	.....
14	—2	14	56	30	15	19	46	.....
15	4	10	55	31	14	24	45	.....
16	18	20	54					.....

M. T. at 8 a.m., 12·6; Monthly range, 39; Rain, 0; Snow, 9; E. 6; W. 29; Daily range, max. 35. The column marked "9 A.M.," indicates the corresponding temperature in London, England.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.
M. T.....	19	16·7	28.0	38	48·7	62.7	67.1	6.38	55.7
R.....	51	65	53	43	35	29	29	29	32
r.....	37	30	35	25	16	23	20	19	21
Mr.....	15	14	10	8	4	....	10	6	....
E.....	10	11	11	12	18	....	6	10	12
S. W.....	6	4	10	10	9	....	15	15	....
Rain.....	2	3	2	8	8	8	12	9	10
Snow.....	4	9	4	1	0	0	0	0	0
Th.....	0	0	1	0	0	1	4	2	2

In this table M. T. denotes the mean temperature at 8 a. m.; R. the range of the mercury for the month; *r*. diurnal ditto; between Ms. of 8 and 12. It may here be remarked that the monthly means alone would convey a very inadequate idea of a climate like that of Canada,

subject to such great and sudden fluctuations, for the same result is produced by a series of uniform temperatures, or high extremes balancing one another. Therefore in considering the actual season of cholera, a reference will be made to other and minuter calculations. Meanwhile it will be sufficient to say of the earlier part of 1832, that the spring was remarkably cold, dry, and backward, and unfavorable to vegetation.

The month of June, in which the cholera commenced, exhibited no very remarkable anomalies, although there were sudden variations of temperature, as *e.g.* from 78° on the 17th to 57°, 53°, 57°, on the three following days. In July and August the ravages of the disease were the most severe.

The first nine days of July were hot, succeeded by five below the mean, with northerly winds and showers. The character of the month was cool and variable, rain fell on twelve days, and the diurnal range exceeded 20. In August the thermometer was once at 49° 84m., and once only above 80°. As to electric phenomena, there were few thunderstorms, and none of peculiar severity. So that upon a review of the season of 1832 we should say, that the spring was backward, the summer cool, and thermic anomalies, as the phrase goes, by no means uncommon.

In September the pestilence gradually abated, and by the end of the month disappeared, leaving behind it traces of its desolating career which were not likely to be forgotten. Many a valuable life was sacrificed, "there was truly a great cry in the land," of the widow and the orphan thrown destitute on the world. To instance one case out of thousands. In one family, by the death of two brothers and a brother-in-law, mechanics in good employment, seventeen children were left orphans entirely without the means of support. In Quebec alone there were supposed to be at least 1000 of these unfortunate, destitute objects. The sympathy, however, of the charitable was not wanting, and in York a liberal contribution was raised for the widows and orphans of cholera victims, and public and private benevolence was actively employed in alleviating the calamities which every where met the eye. So passed the year 1832, the most disastrous in the annals of Canada.

In 1833 there was a freedom from disease, and the Province began to recover from the blow which had paralyzed its energies. Trade revived, and the stream of emigration again set in upon our shores.

The Town of York was now transformed into the City of Toronto, and received the blessing of a Corporation of City Fathers, bent upon improvements and reform. New brooms sweep clean. Streets were cleansed, sewers dug, middens abolished, groggeries mitigated, and mire and mud superseded by plank and McAdam. Many a venerable nuisance was swept away, and the terror caused by the recent visitation gave rise to many wholesome and sanitary precautions. Though much remained to be done, much no doubt was done, though the disciples of the McClarty school were still too numerous to permit all the purifications necessary. We now come to the year 1834, which was marked by the second visitation of the dreadful pestilence. An inspection of the annexed tables will shew that this season was both remarkable in itself, and formed a strong contrast to the preceding year of plague. It will be well to give a brief sketch to illustrate the subject.

1834.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
M. T.....	16.4	27.3	30.6	.43	52.3	60.8	70.8	65.7	55.2
R.....	43	40	42	45	53	36	25	37	49
r.....	26	35	23	23	18	22	20	18	25
N. W.....	11	8	6	6	4	4	2	4	5
E.	12	16	11	18	16	16	14	11	15
W.....	8	4	14	6	11	10	15	16	10
Rain.....	3	4	5	12	9	12	12	9	11
Snow.....	6	3	5	2	1	0	0	0	0
Thun.....	0	1	1	1	4	1	8	6	1
Plur.	..	.73	1.38	2.21	1.97	3.17	3.68	1.35	1.77

1832.	Bel. 0.	0–10	10–20	20–32	32–40	40–50	50–60	60–70	70–80	80–90
Janua'y.	2	7	5	13	4	..	..	..	..	..
Feb....	3	6	9	10	1	..	..	..	..	..
March..	1	4	2	9	10	5	..	..	..	..
April...	..	..	..	5	15	8	2	..	..	..
May	..	..	..	..	2	18	10	1	..	..
June ...	..	..	..	..	..	..	10	18	2	..
July	..	..	..	..	..	..	2	19	10	..
August.	..	..	..	..	..	1	11	16	3	..
Sept	..	..	..	..	..	6	18	6	..	..
Total ..	6	17	16	37	32	38	53	60	15	..

1834.	Bel. 0.	0–10	10–20	20–32	32–40	40–50	50–60	60–70	70–80	80–90
Janua'y.	1	6	16	7	1	..	..	..	..	..
Feb....	..	1	6	12	8	1	..	..	..	..
March..	..	1	4	13	9	4	..	..	..	..
April ..	..	..	..	5	6	13	6	..	..	..
May ...	..	..	..	1	4	10	6	9	1	..
June ...	..	..	..	..	..	..	14	16	..	..
July....	..	..	..	..	..	..	..	16	14	1
August.	..	..	..	..	..	..	6	16	9	..
Sept ...	..	..	..	..	2	7	13	8	..	..
Total ..	1	8	26	38	30	35	45	65	24	1

These tables give a comparative view to every tenth degree of the temperature at 8 a. m., in the cholera years of 1832 and 1834.

January, 1834, was a month of low temperature, the mercury at 8 a. m. being only once above the freezing point at 8 a. m. Max. 41° min. –2.

February. A mild month. On the 22nd a storm of thunder and lightning, ther. 42°, succeeded by flurries of snow, and ther. 18°.

March. High temperature. Bay of Toronto free from ice on the 14th, nearly a month earlier than usual, On the 19th and 20th heavy rain and gale, thermometer 48°. Fall of rain, 1.21, succeeded by cold, clear weather, snow, and ther. 18°.

April. A month of high temperature, therm. 61° on the 13th at noon, 66° on the 16th, high range. One thunder storm. Cold and variable towards end.

In May there was snow on the 13th, therm. 33°. Four days of thunder. Cold and variable first half of the month, and the highest temperature 72° at 8 a. m. on the 24th.

June. A cool month, therm. only once above 70°, viz., 77° noon of the 9th. Considerable fall of rain.

The remembrance of the desolating scourge had in a great measure faded from the minds of many when the afflicting news arrived, that the cholera was once more amongst us. Not a few indulged a too confident hope that the plague was stayed for ever, and even in the height of its fury, it seemed to lull for a while, like the hurricane, only to burst forth again with redoubled violence. It was imagined that the disease was of a milder type at this its second arrival, and one thing is certain, that it did not inspire that dread and consterna-

tion which so strongly marked its former visit. People had become familiarized with its most shocking features, the character of the disease was better unde stood, many precautionary measures, before neglected, were adopted, but it may well be questioned whether it abated any thing of its former malignity. It was remarked at the time, and indeed it is a familiar truth as regards all similar visitations, that nothing does so effectually predispose the system to the attacks of disease as that fear and anxiety which naturally attended the first appearance of a malady marked by such terrible characteristics. Ward, in his travels in Mexico, speaking of the yellow fever, observes, that "a predestinarian would have a much better chance of escaping than one over anxious," and this was specially verified as regards the cholera. We observe that physicians, clergymen, nurses, and others, who were constantly in communication with the dying and the dead, almost invariably escaped, while many no doubt fell victims solely from the influence of panic. In the former, familiarity with scenes of horror, divested them of that morbid sensitiveness which as much as any other cause invited the attacks of the destroyer. Consequently the alarm which accompanied the former visitation having in a great measure subsided, the cholera of 1834 was thought to be of less malignant quality. And yet the facts of the case would scarcely seem to warrant the conclusion. The first case of cholera in 1834, at Quebec, occurred on July 11th, and in Toronto July 28th, and in less than one month, viz., by August 22nd, the number of deaths in Toronto amounted to 423; an extraordinary mortality, when it is considered how many of the inhabitants had left the City. We now revert to the consideration of the two months in which the cholera prevailed, July and August.

July was a month of high temperature, abounding in sultry days, heavy showers, great consequent evaporation, and remarkable for the number of thunderstorms, many of great severity. From 21st to 26th was a continued series of these storms, accompanied by 3.25 in. of rain; and so far from the pestilence being mitigated, as some have argued, by these agents, it seemed to burst forth with fresh fury. The heavy showers and burning sun roused into active operation many a deleterious influence, which under other circumstances might have remained dormant.

August resembled July, though somewhat lower in temperature. On September 12th was a white frost.

Comparing then the seasons of 1832 and 1834, commencing with

January and ending with September, we obtain the following results, speaking in general terms, but an inspection of the tables will furnish more minute particulars. (*Vide*, pp. 24–5.)

1832 was a season of backward spring, cool summer, moderate rain. 1834 in every particular the reverse. But in electric phenomena the greatest difference is discernable; and as much has been said and written upon the supposed connexion of such agencies with epidemics, the results of two years differing so materially in these two particulars are worthy of notice. The total number of days of thunder in the first nine months of 1832 was 10, in 1834 was 23, and the latter of much greater severity. As was before observed, so far was the cholera from being abated by these thunderstorms, that it seemed to rage more furiously. Miriam, who has been indefatigable in his meteorological researches, observes, "It is frequently remarked that lightning cools the air. Our records of lightning and our hourly records of temperature of the atmosphere, compared together, shew that a great majority of thunderstorms in summer are immediately followed by an increase of temperature." This coincides with our own experience of 1834, as was before observed.

In concluding this subject we may observe, that this year was of itself not only remarkable for electric phenomena, but was likewise ushered in by one of the most remarkable ever witnessed. I allude to the meteors of November, 1833. The weather previous had been mild and showery, and on the night of the 12th, and nearly to the dawn of day, the sky was illumined with millions of meteors, darting from the zenith to the horizon like sky-rockets, thick as the flakes of a snow-storm. In one instance a meteor exploded with considerable noise, leaving behind it a brilliant train of light which lasted some minutes. This splendid celestial exhibition was seen in North and South America and in the West Indies.

The following table, extracted from the New York *Spectator*, exhibits the ratio of deaths above the average for July, 1832:

1 to 2	same as usual.
2 to 5	4
5 to 10	4
10 to 20	8
20 to 30	12
30 to 40	14

40 to 50	12
50 to 60	16
60 to 70	8
70 to 80	8
80 to 90	8

We see from this statement that in the classes between the ages of 20 and 60, the proportion swells twelve to sixteen times the mortality of average. In the classes beyond that age it sinks again to eight, and in children varies from 0 to 4. Cholera no doubt made the greatest havoc among the dissolute and intemperate. Few confirmed drunkards live beyond the age of sixty, and if the above calculations are reliable, the table above strongly confirms this opinion.

To conclude, whether this epidemic is independent or not of climate and its conditions, one thing is certain, both with respect to it and other diseases, that human agency is far more actively engaged than many are willing to admit. Experience of the past has abundantly testified that many evils which are man's heritage may be greatly aggravated or alleviated, and even the mortality which cannot be altogether averted may be signally diminished. Had the sanitary measures which are now in fashion, imperfect as they still are, been in existence in 1832; could some Hercules have purified that Augean stable, muddy York,—closed the groggeries, ventilated the dwellings, and applied all our modern disinfectionals of 1861,—the pestilence would have been stripped of much of its horrors, and many a valuable life would have been saved which was sacrificed to the neglect of those means of prevention which were in the reach of all.

NOTES ON LATIN INSCRIPTIONS FOUND IN BRITAIN.

PART IX.

BY THE REV. JOHN M^C^AUL, LL.D.,
PRESIDENT OF UNIVERSITY COLLEGE, TORONTO.

57. The concluding article of Part VIII. was devoted to the examination of the simpler forms of inscription on the pigs of lead found in Britain. To the remarks, which have been offered there, it seems unnecessary to add more than the observation that those pigs exhibit

the three constructions, which were used in such inscriptions, viz. : the nominative, the genitive, and the ablative. In n. (2) TI · CLAVDIVS · CAESAR · AVG · P · M · TRIB · P · VIII · IMP · XVI · DE · BRITAN, we have the nominative, indicating, as I think, that the object was taken as spoil: in n. (8) IMP · CAES · DOMITIANO · AVG · COS · VII. we have the* ablative indicating the time, scil. from September 13 to December 31, A.D. 81; and in n. (11) IMP · HADRIANI · AVG · and n. (12) IMP · DVOR · AVG · ANTONINI ‖ ET · VERI · ARMENIACORVM we have the genitive, indicating that the blocks were† the property of those emperors, being the produce of mines worked for their benefit. N. (7) IMP · DOMIT · AVG · GER · DE · CEANG · I have read in the nominative, conformably to the unquestionable construction of n. (2), whilst I have preferred regarding nn. (5 and 6) IMP · VESP · V : : T · IMP · III · COS and IMP · VESP · VII · T · IMP · V · COS in the ablative, indicating the time, although the DE · CEANG on their sides excited a doubt between that case and the nominative I shall now proceed to the consideration of the doubtful portions of the remaining inscriptions,‡ reserving for special

* Mr. Yates, in a valuable "Memoir on the mining operations of the Romans," *Proceedings of Somersetshire Arch. and Nat. Hist. Society, Taunton*, 1859, observes relative to this inscription: "I conceive that it should be read in the ablative case, *Imperatore Cæsare Domitiano Augusto consule septimum.* On this supposition the mine may have been worked by private hands." The first of these remarks is unquestionably correct: *Domitiano*, followed by *Cos.* VII., is certainly not the dative. The latter is probable, as it is questionable whether under the emperors any mines were worked except for their benefit, or that of the individuals who rented them.

† Thus Mr. Yates, *On the mining operations, &c.*, p. 2, observes.—"The retention of mines by government may account for the inscription found on pigs of lead, such as IMP · HADRIANI · AVG, in the genitive case, showing that they belonged to the Emperor. In other instances the name of an individual, occurring in the genitive, shows that he rented his mine from the government, *e. g.*, L · ARVCONI · VERECVNDI. This implies that the lead was the property of Lucius Aruconius Verecundus." In article 48 I have noticed an inscription, having the name in the nominative, on a block, the product, as I believe, of a rented mine.

‡ From Mr. Yates' Memoir, pp. 21, 22, 23, I learn that two pigs of the Emperor Severus, probably imported from Britain, have been found in France, one at Lillebonne, the ancient Julia Bona, and the other at Sassenay near Chalons-sur-Saone, not far from a Roman road, which led to the coast opposite Britain. On one of these are the inscriptions LVICVC and DL'P. M. Canat, President of the Historical and Archæological Society of Chalons, in a Memoir on the subject, does not attempt to interpret the first of these, but infers from the accent in the second, whereby L and P are separated, that the letters denote numbers, and thus interprets DL'P as meaning 550 pounds in weight, P standing, as is common, for *Pondo*. But as this does not at all correspond with the actual weight of the pig, he "conjectures that it [*Pondo?*] here denoted the *semis* or *half-libra*." In this way the marked and the actual weights agree within 2 kilogrammes and 8 hectogrammes, "the loss of which may very well be ascribed to accident, waste, or abrasion." There is no authority, so far as

notice n. (1) BRITANNIC**AVG II, and n. (9) CAESAR***** VADON, which are imperfect, also n. (4) NERONIS AVG·EX KIAN IIII COS BRIT, which is unique. These doubtful portions are (*a*) *LVT—in

(3) TI · CL · TR · LVT · BR · EX · ARG

(10) IMP · CAES · HADRIANI · AVG · MET · LVT

(14) C · IVL · PROTI · BRIT · LVT · EX · ARG · ;

(*a*) MET · LVT ·—in n. 10; (*a*) METAL · LVTVD ·—in n.

(13) L · ARVCONI · VERECVNDI · METAL · LVTVD · ;

(*b*) EX · ARG ·—in nn. (1) and (14); and (*c*) TR · and BR ·—in n. (3).

(*a*) LVT ·, MET · LVT ·, METAL · LVTVD ·—As these readings seem to be unquestionably correct, I shall offer no criticism on the interpretations, which have been given, of erroneous readings, such as POT · for LVT · in n. (3), MEM · L · VI for MET · LVT in n. (10), and LVND for LVTVD in n. (13), but shall limit my remarks to the explanations, which have been proposed, of the readings as given above. Mr. Crane, *Archæologia*, xiii. 405, regards LVT. in n. (3) as standing for LVTVM, and reads the whole inscription thus: "*Ti*[berii] *Cl*[audii] *tr*[ibutum] *lut*[um] *Br*[itannico] *ex arg*[ento]—the tribute of Tiberius Claudius paid out of British money."

Lysons, *History of Derbyshire*, p. ccvi., traces LVT · and LVTVD · to LVTVDARVM, the Roman Station mentioned by *Ravennas* as next to *Derventio*, and believed to be represented by the modern *Chesterfield*.

Mr. Bateman, *Vestiges of the Antiquities of Derbyshire*, p. 135, observes:—

"These inscriptions, [nn. (3), (10), and (13)] have given rise to various conjectures, and accordingly to a great display of erudition; but if we allow the LVT · and the LVTVD · to be the contractions of LVTVDARVM, the name of a Roman station next in order, according to Ravennas, to Derventio, or Little Chester, and which is supposed to be Chesterfield, much of the difficulty will vanish. The first [n. (10)] will then be found to bear the name of the Emperor

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I am aware, for the inference from the accent, nor for the use of P or *Pondo* as denoting the *semis* or *half-libra*. The accuracy of the readings seems to me very doubtful. Can it be that the letters given as LVICVC, are really LVT · CANG?

• Dr. Thurnam, *Historical Ethnology of Britain*, p. 100, *Cran. Brit., Dec.* 3, mentions "the inscription LVTVM EX ARGENT on various British pigs of lead of the date of Claudius and his successors." There is no authority, so far as I am aware, for this statement; pigs have been found bearing LVT ·, LVT · EX · ARG ·, and EX · ARGENT ·, but there is no example either of LVTVM EX ARGENT ·, or of LVTVM alone.

Hadrian, in connexion with the name of the metallic district, of which it is probable that Chesterfield was then, as Wicksworth has subsequently been considered, the regulating town; hence this inscription would mean no more than that the block of lead upon which it was stamped belonged to the Emperor Cæsar Hadrian Augustus, from the metallic district of Lutudarum. The second [n. (13)] would, under a similar interpretation, be stamped with the name of its owner, a proprietor of some mines, perhaps, or a merchant, Lucius Aruconius Verecundus, with the addition, as before, of the name of the mining district. The third inscription [n. (3)] appears to mean that the lead upon which it is impressed formed part of the tribute due to Tiberius Claudius from the mines (silver or lead) of the British Lutudæ or Lutudarum. These interpretations [which were first suggested by Mr. Lysons and Mr. Crane] are by far the most conformable to custom and common sense."

The suggestion of Mr. Lysons has also been adopted by Sir Henry Ellis, *Townley Gallery*, ii. p. 290; Mr. Way, *Jour. Arch. Inst.*, 1859, n. 61, p. 25; and apparently by Mr. Yates, *Mining Operations*, p. 10. Mr. C. R. Smith, *Journal Arch. Assoc.*, v. p. 228, is of opinion that LUT · is a contraction of LVTVM or LVITVM, signifying *washed* or *purified;* and he refers in illustration to the use of *elutia* in Plin. *Hist. Nat.* xxxiv. 16, where it is applied to the washing by water of tin from the vein in the gold mines of Spain and Portugal. Mr. Wright, *Celt, Roman, and Saxon*, p. 238, adopts this opinion as undoubtedly correct.

In favour of the interpretation received by Mr. Smith and Mr. Wright, may be cited the statement of Professor Phillips, whose authority on such points is justly esteemed of high value, that "he is strongly of opinion that much of the lead ore was collected from the surface by aid of water, artificially directed. The process, in fact, is described by Pliny, in terms so exactly applicable to the modern 'hushes' of Swaledale, that no doubt can remain of this custom, which is now esteemed rude and semi-barbarous, being of Roman or earlier date in Britain."—'*Ancient Metallurgy in Britain*,' *Journal Arch. Inst.* 1859, n. 61, p. 17.

As to MET · there is no difference of opinion, all agreeing in tracing it to *metallum*.

(*b*) EX · ARG ·—These letters are found, as we have already seen, in nn. (3) and (14), and an expansion of them appears on the side of the block, n. (4), in the form EX · ARGENT. Mr. Pegge, *Archæologia*, ix. p. 45, read them *ex argent*[*o*], and regarded them as denoting that the *silver* had been extracted from the lead. He cites in

illustration the remarks of Mr. Pennant, *Tour in Wales*, i. p. 58, but notice the difficulty that *ex argento* rather implies the extraction of lead from silver than of silver from lead. Dr. Gifford proposed *ex argent*[*aria*] and Sir Henry Ellis, *Townley Gallery*, ii. p. 291, suggests *ex argent*[*ariis*], the sense intended by each being, I presume, the same, although the number is different, scil. from the silver mine or mines. Sir Henry Ellis remarks—"The known richness of the English lead, with which silver has been sometimes found mixed in large quantities, may serve to explain the word *ex Argentariis*."

Mr. Roach Smith, *Journal of Arch. Assoc.* v. p. 228, remarks—"*Ex argent.* refers to the separation of the silver from the ore."

Mr. Wright, *Celt, Roman, and Saxon*, p. 238, observes:

"EX ARG· or EX ARGENT. is explained by a passage of Pliny, who informs us that lead ores are found under two different forms, either in veins by itself or mixed with silver. The latter had to go through a more complicated process of extraction, which is referred to by the words of the inscription—*Lutum ex argento*—and which it seems the Romano-British Metallurgist considered it necessary to specify."

In Prof. Phillips' paper, "*Ancient Metallurgy in Britain*," pp. 17, 19, we find the following statement on this point:

"The Romans employed lead in pipes (*fistulæ*) and sheets, which were soldered with alloy, as already mentioned. The lead was previously refined and its silver removed; the silver, indeed, being often the object of the enterprise."

"The mines of Middleton and Youlgreave (Aldgroove) in Derbyshire, from which the Lutudæ sent not only lead but 'exargentate' (that is to say refined) lead from which the silver had been removed, use to this day the pig of the same weight of 1½ cwt. of similar shape and similar mark to that of eighteen hundred years' antiquity."

Mr. Yates, *Mining Operations*, p. 19, remarks:

"The letters are supposed to stand for *ex argento*, and to intimate that the lead was extracted from silver. This seems to be the true explanation, although, I think, we might read EX ARGENT[IFODINIS]. Even in the present day, we find that where the galena contains a large proportion of silver, as is frequently the case in the British Isles, the mines are not called lead mines, but silver mines. Also the litharge, which is an impure oxide of lead, formed on the surface of the melted mass during the process of refining, is called *argenti spuma*, 'froth of silver,' not froth of lead. It would seem consistent with these ideas to regard the lead as extracted from silver, rather than the silver as extracted from lead, although the ore really contains a far greater proportion of lead than silver."

(*c*) TR · BR.—These abbreviations are found in n. 3, Mr. Pegge, reading POT · for LVT ·, regarded TR · as standing for *Tr*[ibunitia] i. e. *tribunitia pot*[estate]; Mr. Crane proposed *tr*[ibutum]; Dr. Gifford, *tr*[iumviri]; Mr. Yates apparently adopts Mr. Crane's suggestion. As to BR · Mr. Pegge regarded it as standing for *Br*-[itannicus], agreeing with *Cl*[audius]; Mr. Crane, *Br*[itanni co], agreeing with *argento;* Dr. Gifford, *Br*[itannorum] governed by **argentaria;* and Sir Henry Ellis, *Br*[igantum], governed by †*argentariis,* in which opinion Mr. Yates seems to concur.

As the principal opinions on the doubtful portions of the inscriptions have been stated, let us proceed to enquire to which the preference should be given, and whether any other more probable interpretation can be proposed. As to LVT·, MET · LVT·, and METAL · LVTVD·, there can, I think, be but little doubt that the explanation of Mr. Lysons is to be preferred to those offered by Mr. Crane and Mr. Smith. There is a *prima facie* probability that MET · and LVT · are shorter forms of METAL · and LVTVD · ; moreover, the blocks on which these abbreviations occur, scil. those bearing nn. (3), (10), (13) and(14), have all been found either in Derbyshire, where was the station '*Lutudarum,*' or in its neighbourhood. *Mansfield,* about 6 miles from which n. (14) was found, is only some 12 miles distant from *Chesterfield,* which is believed to be on or near the site of the ancient '*Lutudarum.*' The only exception is in the case of the four blocks bearing n. (3), which were found in Sussex, but it may reasonably be inferred relative to these, as to other pigs under similar circumstances, that they were on their way to the coast for shipment to the continent, and were probably the product of mines in Derbyshire, as one bearing the same inscription was found at Matlock in that county. I have said, that there is a *prima facie* probability that MET · and LVT · are shorter forms of METAL · and LVTVD · : this probability seems to me to reach almost certainty in the case of MET · LVT · in n. (10), but I rather question the inference as it relates to LVT · in nn. (3), and (14). I strongly suspect that LVT · —perhaps an abbreviation of LVTVM—represents the Celtic designation of lead or lead-ore, to which I would trace LVTVDARVM, as a derivative, signifying the place where the veins were found and worked, *i.e.* the lead mines.

* I am not sure that this was the construction intended by either: perhaps it was *Lutudari Britannorum* and *Lutudari Brigantum,* i.e., at Lutudarum of the Britons or of the Brigantes.

This suspicion is strengthened by the fact that we can trace this designation of the metal in *lood* in Dutch, *loth* in German, *lod* in Danish, *lód* in Icelandic, *lod* in Swedish, *lot* in Russian, **luaidh* in Gaelic, and *lœd* or *lead* in Anglo-Saxon, whence our term is derived. It also derives some support from the remarkable omission in the inscriptions of the ordinary Latin designation of the metal—*plumbum*.

But a question arises as to *Lutudarum*—in what case is it? Is it the nominative singular of the second declension? the genitive plural of the first declension? or the genitive plural of the third declension? Dr. Gifford and Sir Henry Ellis, when they read LVT · in n. (3) as Lut[udari] seem to have adopted the first opinion. Similarly Sir Henry Ellis, p. 290, reads LVTVD · Lutudar[ense], *i. e.*, I presume, deriving this adjective from *Lutudarum* as the nominative. Prof. Phillips, in the passage which I have cited, p. 32, has adopted the second opinion, but seems to have mistaken *Lutudæ* for the name of a people or tribe. Mr. Yates is inconsistent on this point, for in the same page, p. 11, he says, "at Lutudarum" and "to Lutudar," leaving it uncertain whether he adopted the first or third opinion. Similarly Mr. Bateman, p. 31, speaks in one sentence of 'the metallic district of Lutudarum,' and in another, the next but one, uses the terms—'the mines of the British Lutudæ or Lutudarum.' Of these I prefer *Lutudæ*, the nominative plural of the first declension, and hence form *Lutudensis* as its adjective.

There is also another question, which we have not yet considered, as to *metallum*, of which MET · and METAL · are abbreviations. Does it signify metal or mine? It is scarcely necessary to remark that there are examples of both significations in ancient authors. I am inclined to adopt the latter, and as to construction prefer the nominative.

Let us now take up the forms EX·ARG· and EX·ARGENT. There can, I think, be no doubt, that the *prima facie* interpretation of *ex argento* inscribed on an object would be that that object was *made of silver*, as we have *ex arg.* in Orelli, n. 1691; now this is certainly inapplicable to these pigs, for they are, I presume, unquestionably made of lead. Adopting the same signification of *ex*, we may suggest another expansion—*ex argent*[ario plumbo]; but the

* Can the combination of this and the Gaelic *uidha*, the end of a journey, be the origin of *Lutudæ*—*Luaidhudhe*, the lead station?

obvious objection to this reading, otherwise plausible, is that the *argentarium plumbum* of Pliny was not lead but tin.

The interpretation, which would probably next present itself, is *derived, extracted from silver;* and this is adopted as the true signification by Mr. Yates, who, however, seems to prefer *argent*[ifodinis]. It may be stated in favour of this view, and also of the opinions that we should read *argent*[ifodinis], *argent*[aria], or *argent*[ariis], that as silver was probably the principal object that the Romans sought for in these operations, they may have called their works, 'silver-mines,' instead of 'lead-mines.' Mr. Yates also suggests: "Even in the present day we find that where the galena contains a large proportion of silver, as is frequently the case in the British Isles, the mines are not called lead mines, but silver mines."

The interpretation of EX·ARG· and EX·ARGENT; as denoting that the silver had been extracted from the lead, seems more conformable to present usage. A passage in Strabo, p. 198, *ed. Falconer Oxon.* 1807, in which he notices a kind of lead found in Spain, which contained so little silver, that it was not remunerative to extract it, is sufficient to prove that the ancients were acquainted with some process for effecting this separation; and the same inference may be drawn from the obscure statement in Pliny, *Hist. Nat.* xxxiv, 47, referred to by Mr. Wright: *Plumbi nigri origo duplex est: aut enim sua provenit vena nec quidquam aliud parit;* aut cum argento nascitur mixtisque venis conflatur. *Ejus qui* primus *fluit in fornacibus* liquor stannum *appellatur; qui* secundus, argentum: quod remansit *in fornacibus* galena, *quæ est tertia portio additæ venæ. Hæc rursus conflata dat* nigrum plumbum *deductis partibus duabus.*

If these words be taken in their apparent sense, it is evident that Pliny has made statements on the subject, which are wholly at variance with modern Mineralogy and Metallurgy. No ore is known to exist in any part of the world, which at one smeltiug process would yield successively *stannum, argentum,* and *galena.* The only satisfactory explanation of the passage seems to be that suggested by Kopp, *Geschichte der Chemie,* iv. 127, that three different smeltings are referred to, scil. melting out the argentiferous lead, removal of lead by oxidation, and reduction of the so formed litharge or oxide of lead.

But if this reading and interpretation of EX·ARGENT· be adopted, what is the grammatical construction? It is impossible that the

words *ex argento*, if regarded as complete, can express 'the silver being extracted,' or that the lead was, as Prof. Phillips calls it, 'exargentate.' The only grammatical explanation which seems at all probable, is to regard EX as an abbreviation of the participle of some compound ---b, such as *excoquo*, and the construction as that of the ablative aosolute, scil. **ex*[cocto] argent[o].

After the best consideration that I have been able to give to this perplexing phrase, I am disposed to prefer *ex argent*[aria] (scil. *vena* or *fodina*), or the equivalent *argent*[ifodina], but in the sense that the marks EX · ARG · or ARGENT · indicated that those blocks, on which they were inscribed, were the product of a mine of argentiferous lead—that they were made from a vein which had been found to yield silver, and consequently that those marks were a sort of guarantee that the blocks which bore them contained that precious metal in combination with the lead of which they were composed. The grounds of this interpretation are, that as the Romans were acquainted with a process for extracting silver from lead, the blocks of lead would command a higher price, if they were known to contain silver—and that British lead varies so much in this respect, some veins, as in Derbyshire and elsewhere, containing but a trace, that it was necessary to use such distinctive marks, in order to enhance the market value. But we have yet to consider TR· and BR· As these abbreviations are found only in one instance—scil. n. (3)—we shall take up the inscription itself—

TI · CL · TR · LVT · BR · EX · ARG ·

The following readings have been proposed:—*Ti*[berii] *Cl*[audii] *Tr*[ibutum] *Lut*[um] *Bri*[tannico] *ex ar*[gento], by the Rev. T. Crane; *Ti*[berii] *Cl*[audiani] *Tr*[iumviri] *Lut*[udari] *Br*[itannorum] *ex arg*[entaria, by Dr. Gifford;* and *Ti*[berii] *Cl*[audiani] *Tr*[iumviri] *Lut*[udari] *Br*[igantum] *ex arg*[entariis], by Sir Henry Ellis.† The first question which presents itself here is, does this inscription refer to the Emperor Claudius? I must confess that I have strong doubts on this point. The absence of any title whatsoever in this case,

* And yet *excoctum argentum* is used in the sense—refined silver.

† The words of Sir Henry Ellis are:—"Dr. Gifford thought this inscription stood for *Tiberii Claudiani Triumviri Lutudari Britannorum ex argentaria*. We are inclined ourselves to read the last words *Lutudari Brigantum ex argentariis*." From this statement I infer that he adopted Dr. Gifford's readings in the first three words, but in what sense either understood them I am unable to conjecture.

whilst in every other instance in which an Emperor is named, we always have some one or other, warrants the suspicion, that the reference to the Emperor Claudius is erroneous. I am inclined to think that TI. CL. TR. are the initials of some private individual, such as those named in nn. (13) and (14).

We have an example of similar abbreviations on the medicine stamp found at Wroxeter in 1808. According to Mr. Wright's readings, *Journal of Archæol. Assoc.*, vol. 1859, p. 317, the name of the empiric who prepared it, was TIB·CL·M· *i.e. Tib*[erii] *Cl*[audii] *M*[edici], but both reading and expansion seem very doubtful. In the *Celt, Roman, and Saxon*, p. 244, he read IBCLM, and thus Mr. Way and Dr. Simpson, the latter of whom proposes the expansion *J*[ulii] *B*[assi] *CL*[e] *m*[entis]. Similarly also we find the abbreviations of names on potters' work, in Fabretti, p. 503, and Orelli, ii., p. 372. It is of course impossible for me to surmise for what *cognomen*, according to this supposition, TR· stands, but I suppose that it was such as *Tr*[ophimus] or *Tr*[ajanus] of which we have examples with *Ti*[berius] *Cl*[audius].

On comparing nn. (3) and (14) a difference of order—LVT·BR· and BRIT·LVT·—is observable, but this is, I think, nothing more than the variety of collocation of the adjective, which is often found.

I would read nn. (3) and (14) thus:—

Ti[berii] *Cl*[audii] *Tr*[****] *Lut*[**] *Br*[itannicum] *ex arg*[entaria];

C[aii] *Jul*[ii] *Proti Brit*[annicum] *Lut*[**] *ex arg*[entaria].

We may now proceed to nn. (10) and (14).

IMP. CAES. HADRIANI. AVG. MET. LVT.

Imp[eratoris] *Cæs*[aris] *Hadriani Aug*[usti] *Met*[alla] *Lut*[udensia.]

L. ARVCONI. VERECVNDI. METAL. LVTVD.

L[ucii] *Aruconi*[i] *Verecundi Metal*[la] *Lutud*[ensia].

Mr. Yates, p. 11, remarks: "Aruconius appears to be a name of British origin. Perhaps this Lucius had removed to Lutudar from Ariconium, the modern Weston in Herefordshire and an important mining station of the Romans." If there be any connexion between *Aruconius* and *Ariconium*, it seems more probable that the name of the place was derived from the name of the person than v. v.

Nn. (1) and (9) remain for consideration before we proceed to n. (4).

*N. (1) BRITANNIC** AVG II

Mr. Way, who was the first that noticed this pig, refers the inscription to Britannicus, the son of Claudius, and assigns the date "about AD. 44-48." In confirmation of this reference it is stated by Mr. Way that "Mr. Franks, [who had opportunities of examining the block in the British Museum] informed him that the inscription may be read BRITANNIC:: :: AVG F:: (Augusti filius)." Mr. Yates, p. 17, remarks: "On examining the object itself, I was satisfied that the last letters are FIL, which is the reading adopted by Mr. Roach Smith, and not II, or IMP', as other antiquaries have supposed. Hence, I conclude that the inscription, which is of unusual historical interest, may be thus restored:

BRITANNICI CLAVDII AVGVSTI FILII."

As the wood-cut, illustrating Mr. Way's remarks, presents II· after AVG·, I have so represented those letters in the copy which I have given, but I concur in Mr. Yates's reading and expansion.

N. (9) CAESAR***** VADON.

Mr. Smith, *Journal of Archæol. Assoc.* v. p. 556, observes:

"Unfortunately the inscription, which originally had been well cut, has so perished from oxidation, that its restoration cannot with safety be proposed, especially as it exhibits a reading different from those of a similar description, which are yet preserved or on record. Camden mentions, that several of these pigs of lead had been found in Cheshire, inscribed IMP·DOMIT·AVG·GER·DE·CEANG·, and IMP·CAES·DOMITIAN·AVG·COS·VII·BRIG· One similar to the latter of these was found, in the last century, at Hayshaw Moor, in Yorkshire, and one on Hints Moor, near Tamworth, reading IMP·VESP·VII·T·IMP·V·COS·DE·CEANG· The specimen [bearing CAESAR***** VADON] was most probably inscribed to Domitian."

Mr. Smith justly regarded the restoration of the fragment as hazardous. In addition to its imperfection, it has peculiarities which are not found in the other extant inscriptions on pigs of lead. But there are no grounds, so far as I can see, for his reference of it to Domitian. The absence of IMP· and AVG· would certainly suit his position at one period of his life, but it is impossible to make out his name from the extant letters. DO are the first two letters, but they

* On the side of this pig are the letters V·EIP·C or, as they are otherwise read, V·ETP·C or V·FTP·C, which, Mr. Way observes, probably denote its weight. The only ground for this opinion seems to be the occurrence of P, which may stand for *Pondo*. Can it be that the letters are V·EID·O, marking the time, scil. *quinto (ante) idus Octobres?*

are followed by a form which seems necessarily to be either N or VA.* I have myself nothing further to suggest than that it is possible that the last word may have been DOVA, another form of DEVA.

We now proceed to n. (4), the inscription on the block represented in the subjoined woodcut.

In *the Journal of the Archæological Association*, v. p. 227, Mr. C. Roach Smith offers the following remarks on it:—

It is inscribed on the top, in letters an inch in length, NERONIS · AVG · EX · KIAN · IIII · COS · BRIT · ; on one side HVLPMCOS · ; on the other EX · ARGENT · and CAPASCAS · ; with the numerals XXX. This inscription is peculiarly interesting as referring to the Cangi at an earlier date [than on the pigs of the time of Vespasian and Domitian, A. W.] the name being spelt as pronounced, *Kiangi*, and just previous to the reverses of the Romans in Britain, from the courage and skill of the heroic Boadicea. Nero was the fourth time consul the year before; and this pig of lead would seem to have been on its way from the country of the Cangi towards the south, for exportation, composing probably part of the tribute, the harsh exaction of which was one of the causes of the insurrection. The *Brit.* must be considered as referring to the metal or the province, and not intended for *Britannicus*, as before observed on the *Br.* in the inscription of Claudius. The lateral marks are not altogether [at all?] to be satisfactorily explained, except the *ex argent.*, which occurs in other instances and refers to the separation of the silver from the ore."

In Mr. Wright's *Celt, Roman, and Saxon*, p. 237, we have an additional observation by Mr. Smith on the inscription:

" As Nero never assumed the title of Britannicus, and as the numerals precede the *cos*, I suspect the inscription should be read—

(Plumbum or Metallum) Neronis Aug. cos. iiii. Ex. Kian. Brit.

The P · M · Cos · may belong to the above, and the rest be the name of some superintendent."

The obscurity of this singular inscription fully justified Mr. Smith's resort to conjecture, and the suggestions which he offers are, as usual

* In the original, the transverse line is not in the same position as in N, but connects the other extremities of the perpendiculars, *i.e.* as if it were VA ligulate, without the bar of the A.

with him, worthy of consideration. But the tone of his remarks is likely to mislead; and perhaps did mislead Mr. Yates, when he regarded this inscription as "evidently referring to the Ceangi." Mr. Smith says that "this inscription is peculiarly interesting as referring to the Cangi at an earlier date, the name being spelt as pronounced, *Kiangi*." Now this statement, as to pronunciation and orthography at an earlier date, is wholly conjectural, without any authority to support it.

Nor is the suggested transposition of *ex Kian.* and *iiii cos* warranted by precedent, or at all probable. Moreover a very strong objection to Mr. Smith's reading is derived from the difference of the prepositions. In other blocks where the *Ceangi* are named we have the preposition *de*, whilst here we have *ex*. Again, in those other blocks we have *Ceang.*, but here K is substituted for C, *i* for *e*, and *g* is omitted.

But if we give up the reading *ex Kiangis*, what solution is there of the difficulty? The only conjecture which I can offer on the subject is, that the words EX · KIAN express a date, *scil.* EX · K[ALENDIS] IAN[VARIIS].

It is scarcely necessary to say, that there are examples of K · IAN · being used for *Kalendis Januariis*: and the only inquiry which seems necessary, relative to this reading, is as to the reason of the date being stated in the inscription.

We know from Pliny xxxiv., ch. 17, that there was a law prohibiting more than a limited production of lead in Britain—*ne plus certo modo fiat*—and it seems probable to me that with a view to this law, the blocks, at least in some reigns, bore marks of the time at which they were made, so that it might be known what blocks were manufactured, and consequently what quantity of lead was produced during the year. The mention of the consuls, or not unfrequently of one, especially the Emperor, was, as is well known, the recognised mode among the Romans of distinguishing the year. But it may be asked —why mention *Kalendis Januariis* when that day was commonly known to be the first of the consular year? To this it may be answered that it was not uncommon for the Emperors to enter on the consulship at different periods of the year, and hence it may have been necessary to specify in this case the date of the commencement of the Emperor's fourth consulship. Another reason, peculiar to Nero, for this specification, may be, that it conveyed a flattering reference to his having rejected the proposition of the Senate, that

the year should begin with the month of December, in honor of his birthday—the 15th of December. Tacitus *Ann.* xiii. 10, notices this fact:—"*Quamquam censuissent patres ut principium anni inciperet mense Decembri, quo ortus erat, veterem religionem* Kalendarum Januariarum *inchoando anno retinuit.*"

Such forms as $\overline{IIII}$ · COS ·, instead of COS · $\overline{IIII}$ ·—a transposition which Mr. Smith notices—are rare: but both forms seem to have been used.

In Henzen, n. 6770, we have:—DOMITIANO · $\overline{II}$ · COS ·, VESPAS · $\overline{X}$ · COS ·, DOMIT · $\overline{VIIII}$ · COS ·, DOMIT · $\overline{XIIII}$ · COS ·, NERVA · $\overline{II}$ · COS. It may, however, be inferred, as I think, when the numeral is placed before instead of after COS ·, that the date of the inscription is not during but after the expiration of the consulship.

BRIT · I regard as standing for BRIT[ANNICVM], as is common, and agreeing with *lutum* or it may be *metallum* understood. The pig was, most probably, thus marked to distinguish it as the product of Britain, from others manufactured elsewhere, as in Spain.

We now proceed to consider the lateral inscriptions. Mr. Smith reads these marks as HULPMCOS · on one side, and EX ARGENT · and CAPASCAS · with the numerals XXX on the other; and thus they were also read by the writer in the *Gentleman's Magazine,* liii. p. 936. In the *Monum. Hist. Brit.* they are given:—

HUL P M CO, EX ARGE N
CAPA OC? IV
XXX

and from the wood-cut it seems probable that some letters are effaced before IVLPMCOS. In such uncertainty regarding the true readings, it might, perhaps, be more judicious for me to follow Mr. Smith's example in *the Journal,* and leave them as I found them. But as in such cases even an attempt may be useful, I venture to offer some suggestions. From IVL and COS ·, I draw the conjecture, that there may be a reference to the circumstance, that Nero held his fourth consulship only for six months. His colleague in that year (A.D. 60) was Cornelius Lentulus, and in their places Velleius Paterculus and Pedanius Salinator were *suffecti* on the Calends of July. See Borghesi, *Bull. Inst. Archæol.* 1846, p. 174, and Henzen, 5407. This conjecture leads to another, that the date mentioned here indicates the end, as *ex Kalendis Januariis* denoted the beginning of the

period during which the set of pigs, of which this was one, were manufactured. But what of PM? It is plain that the ordinary interpretation of these *notæ* as *pontifex maximus* is inapplicable here, and that we must look for some other more appropriate expansion. They may, possibly, stand for *posuit modum*, in the sense of "put an end to," "gave up," and COS for *consulatui*. But I do not recollect having met with a parallel, Or, perhaps, P·M· COS· may stand for *post mensem consulatum*, and the phrase may have been used in accordance with the ordinary *ante diem* (*tertium*, *&c.*,) *Kalendas*, *&c.*, where *ante* governs *Kalendas* and *diem* is placed in the accusative, although the context would sometimes require a different case. As to CAPASCAS—if that be the true reading—the only it conjecture, which I can offer, relates to the first two syllables, which, is possible, may be for CAPITARIVS AS, *scil. as* for *tributum*, *i.e.*, the capitation tax. It is scarcely necessary to say that the *tributum* was of three kinds: *secundum capita*, *secundum censum*, and *extra ordinem*.

On the whole, I am inclined to suggest as the most probable reading of the principal inscription:—

NERONIS AVG[VSTI] EX K[ALENDIS] IAN[VARIIS]
QVARTVM CO[N]S[VLIS].

It is not improbable that the lateral inscription IVLPMCOS may stand for IVL[IAS] P[OST][M]ENSEM CO[N]SVLATVM and it is possible that CAPAS—of which C·AS may be a repetition in a shorter form—may denote that the block was one of those prepared in payment of the capitation tax, whilst XXX may mark the number of the pig.

ON THE POSITION OF LIEVRITE IN THE MINERAL SERIES.

BY E. J. CHAPMAN,
PROFESSOR OF MINERALOGY AND GEOLOGY IN UNIVERSITY COLLEGE, TORONTO.

Much uncertainty still prevails regarding the true composition of *Lievrite* or *Ilvaite*. The earlier analyses of this mineral, those of Vauquelin and Collet-Descotils, made the substance, essentially, a silicate of sesquioxide of iron and lime. Stromeyer's analysis, which followed those of the above-named chemists, gave the iron, on the

other hand, as protoxide. A subsequent examination by Von Kobell disclosed the presence of both oxides, as fully established by the later analyses of Rammelsberg and others. These analyses, the correctness of which it is impossible to doubt, do not lead however to any general formula; nor can any formula of a satisfactory character, in a mineralogical point of view, be obtained from them. It will be as well to quote their results before proceeding with our inquiry. *A* is Stromeyer's analysis, as calculated by Von Kobell; *B*, that of Rammelsberg; *C*, Wackernagel's; and *D*, Francke's—all of Elba specimens. *E*, is an analysis by E. Tobler, of a specimen from Herbornseelbach in Nassau. (*Ann. Chem. und. Pharm.* xcix. p. 122. Also Rammelsberg's *Mineral-Chemie*, p. 740.)

	A.	B.	C.	D.	E.
Silica	29.28	29.83	29.45	29.61	33.30
Sesquioxide of Iron	23.00	22.55	25.78	21.09	22.57
Protoxide of Iron	31.90	32.40	28.60	32.71	24.02
Protoxide of Manganese	1.43	1.50	0.94	1.55	6.78
Lime	13.78	12.44	15.49	14.47	11.38
Alumina	0.61	....	....	....	....
Water	1.27	1.60	....	....	1.12
	101.27	100.32	100.25	99.43	99.47

Rammelsberg deduces from the above, the following oxygen ratios, and calculates, from these, the formulæ given below—truly stating, however, at the outset, "es geht hieraus das wahre Verhältniss nicht mit Sicherheit hervor."

	RO.	R^2O^3.	SiO^2.		
A	11.33	6.90	15.21	= 4.9 : 3 : 6.6 =	9.8 : 6 : 13.2
B	11.08	6.76	15.49	= 4.9 : 3 : 6.9 =	9.8 : 6 : 13.8
C	11.01	7.74	15.29	= 4.2 : 3 : 5.9 =	8.4 : 6 : 11.8
D	11.75	6.33	15.37	= 5.6 : 3 : 7.3 =	11.2 : 6 : 14.6
E	10.19	6.77	17.29	= 4.5 : 3 : 7.7 =	9.0 : 6 : 15.4

I. .... 5 (2 RO, SiO^2) + 2 (Fe^2O^3, SiO^2). This requires the oxygen ratio, 10 : 6 : 14.

II. .... 3 RO, 2 Fe^2O^3 + 6 (RO, SiO^2). This assumes the sesquioxide to play an electro-negative part, and requires the oxygen ratio 9 : 6 : 12.

III. .... 2 (2 RO, SiO^2) + Fe^2O^3, SiO^2. This requires the oxygen ratio, 4 : 3 : 6.

IV. .... 9 (2 RO, SiO^2) + 2 (2 Fe^2O^3, 3 SiO^2). This exacts the oxygen ratio, 18 : 12 : 30.

Apart from this want of concordance, these formulæ do not serve to connect our mineral with other species of kindred character. In

other words, they fail to present any satisfactory indication of the place which the *Lievrite* should occupy amongst the Silicates generally. Reflecting upon this, it occurred to me that the true composition of the mineral might be arrived at by tracing out its mineralogical affinities. If this seem paradoxical, it must be remembered that purely mineralogical considerations have taken the initiative on more than one occasion in the solution of obscure questions connected with mineral chemistry. Whilst, for example, the various garnets, the different varieties of pyroxene, &c., were still kept apart by the chemist who adhered to chemistry alone, Mineralogy insisted upon their union, and thus led the way to the recognition of Isomorphism. If the relationship of *Lievrite* to a mineral of known composition can be clearly shown, a great assistance will at least be afforded towards the deduction of its true atomic character.

On comparing this mineral with other silicates, one cannot help being struck by the remarkable correspondence existing between it and *Chrysolite*—at least, as regards the so-called *Fayalite* and other iron-holding varieties of the latter. It is curious that this coincidence should hitherto have escaped attention. The gelatinization of the silica in acids, a very peculiar character in the case of anhydrous silicates, is exhibited by the two species in common. Their conditions of occurrence are also more or less identical, the form in each is Trimetric with axial relations in part corresponding, and each contains an unusually low average of silica. This amounts, in *Hyalosiderite* and *Fayalite*, to about 30 per cent. The same also in *Lievrite*. Dana places the latter mineral (though doubtfully) in his ANDALUSITE GROUP, with *Andalusite*, *Topaz*, and *Staurolite*; but a collocation of this kind is an exceedingly forced one. Geological relations (an element in Mineralogical Classification of the highest importance, although hitherto strangely overlooked), composition, and general characters, are all opposed to it. The form, it is true, is Trimetric, with some remote analogy, as shewn by Dana, to that of *Andalusite*; but since we find such opposite minerals as *Augite* and *Borax*, for example, exhibiting an identity of crystallization, no great stress can be placed on this character. There is an equal amount of crystallographic correspondence, moreover, between *Lievrite* and *Chrysolite*, whilst in other respects the two present a close agreement. In Chrysolite, several vertical prisms are known (the ∞P series of Naumann and most German crystallographers; *I* series of Dana; *V* series

of the author. If we make the macrodiagonal unity, these prisms give for the brachydiagonal, the following values:—0·4660 (= *V*; prism angle, 130°2′);—0·9484 (= *V* 2; prism-angle, 93°3′);—1·397 (= *V* 3; prism-angle, 71°10′);—1·684 (= *V* 4; prism-angle, 61°47′). In Lievrite, the two commonly occurring prisms, give, respectively—0·6840 (= *V*; prism-angle, 111°12′);—and 1·370 (= *V* 2; prism-angle, 72°16′). To make these correspond with the chrysolite values, the first prism must be considered to equal $V\frac{3}{2}$, and the second *V* 3. The vertical axes of the two forms stand to each other very nearly in the ratio of 5 to 4. But we need not attempt to push these analogies beyond their legitimate limits. The affinity, in general characters and conditions of occurrence, of *Lievrite* to *Fayalite* (and through this latter to *Chrysolite*) cannot be overlooked if we take the entire relations of these substances into consideration. Single characters, in the determination of analogies, are necessarily useless.

Now, the atomic constitution of the *Chrysolites* is perfectly well established. The oxygen atoms in base and acid are equal, and the base consists of simple oxides only, the general formula being 2 (RO), SiO^2; or two atoms of monoxidized base + one atom of Silica. In the normal *Chrysolites* the base consists of magnesia; in the *Olivines*, of magnesia and protoxide of iron; and in *Fayalite* (at least, essentially) of the latter oxide alone. In *Lievrite*, on the other hand, as shewn above, both protoxide and sesquioxide of iron are present; and the oxygen atoms of the Silica do not correspond with those of the bases.

In attempting to reconcile these discrepancies, I called to recollection a fact that came under my notice some time ago. In examining a specimen of *Lievrite* that had been broken up into small pieces, I found that certain fragments exerted a much more powerful influence on the magnet, than others. Whilst some of the particles scarcely shewed a trace of magnetism, others were magnetic in a marked degree. These latter, tested by the blow-pipe, seemed almost free from silica; whilst the feebly-magnetic fragments gave very readily, with microcosmic salt, the well-known reaction of that substance. It occurred to me, therefore, that the analysed specimens of *Lievrite* might have contained a certain portion of magnetic iron ore: a circumstance easily conceivable, if we call to mind the geological associations of our mineral. The nearly uniform proportions of the FeO and Fe^2O^3 found in the various analyses, seemed, it is true, opposed

to this idea; but it appeared at least possible that the crystallized specimens might be able to take up a certain proportion, and no more, of the magnetic oxide. I calculated therefore from the four first analyses given above, the mean composition of *Lievrite*, and reduced this, with the following results, to 100 parts:—

Silica	29.54	=	29.66
Sesquioxide of Iron	23.08	=	23.25
Protoxide of Iron	31.25	=	31.49
Protoxide of Manganese	1.35	=	1.46
Lime	14.04	=	14.14
	99.26		100.00

Now, 23.25 parts of Fe^2O^3 require 10.46 parts of FeO to form magnetic iron ore (= FeO, Fe^2O^3). This deducted from 31.49, leaves 21.03 for the protoxide of iron present (on the above supposition) in the silicate. The analysis consequently stands as below:—

Silica	29.66	=	44.75
Protoxide of Iron	21.03	=	31.72
Protoxide of Manganese	1.46	=	2.20
Lime	14.14	=	21.33
	66.29		100.00

Calculating the oxygen ratios of the above, we obtain:—

SiO^2	23.24	=	$1\frac{3}{4}$	=	7 = 14
FeO, MnO, CaO	13.59	=	1	=	4 = 8

Here, then, we have 8 atoms of RO to 7 atoms of SiO^2, in place of 2 to 1 as required by the chrysolite formula. If the oxygen ratios in any of the above analyses had come out as 9 : 6 : 14, we might have written the formula 7 (RO, SiO^2) + 2 (FeO, Fe^2O^3); but the analyses do not yield these values. The view, therefore, as suggested above, that the peculiar composition of *Lievrite* may arise from the presence of magnetic iron ore, cannot be sustained.

But the formula of *Lievrite* may be brought to coincide with that of the Chrysolite series, by assuming the iron to have been originally present in the condition of FeO only. If this be assumed—and the assumption is in part warranted by the well-known fact that *Lievrite* is especially subject to alteration, the conversion of the FeO into Fe^2O^3 still going on in many specimens—the difficulty is at once removed.

Taking the mean composition as given above, and calculating the weight of FeO corresponding to the 23.25 *p. c.* of Fe^2O^3, we obtain 20.92. Adding this to the FeO, and correcting the whole to 100 parts, the analysis reads as follows :—

			Oxygen :	
SiO^2	..	30.47		15.81
FeO	..	53.66	11.91	16.33
MnO	..	1.40	.31	
CaO	..	14.47	4.11	

Although these values do not come out exactly equal, they lead evidently to the common chrysolite formula 2 (RO), SiO^2. If we adopt, consequently, the assumption on which the above calculation is based, the *Lievrite* falls naturally into the mineralogical group to which it undoubtedly belongs; whereas on the other view, founded on the bare results of analysis, not only does the atomic constitution of the mineral remain uncertain, but its composition fails to harmonize with its physical characters and conditions. The suggestion, therefore, embodied in this brief notice, may not be found altogether unworthy of consideration by those engaged in the study of mineral analogies.

REVIEWS.

Seven Years' Residence in the Great Deserts of North America. By the Abbé Em. Domenech, Apostolic Missionary; Canon of Montpellier, Member of the Pontifical Academy, Tibernia, and of the Geographical and Ethnographical Societies of France, &c. Illustrated with fifty-eight wood-cuts, by A. Joliet, three plates of Ancient Indian Music, and a map showing the actual situation of the Indian Tribes, and the country described by the author. 2 vols., 8vo. Longman & Co., London. 1860.

From the days of England's first prose writer and earliest of literary travellers, Sir John Mandeville, the wonders of unknown lands have been an unfailing source of the marvellous. In his time, though the New World was still among the marvels of the future, yet "Tartarie, Persie, Ermonie, Libiye, Chaldee, Etiope, and Ind the Less and More, where dwellen many divers folks, and of divers shapes of men," were all in that pleasant condition of misty obscurity which allowed ample

scope for embellishment by a traveller of adequate powers. Still more, the reading public, then, and for a couple of centuries after, was gifted with an amplitude of faith in the compass of the marvellous pertaining to strange lands, which only exposed a traveller to the censures of the incredulous, if he should venture to affirm that he had seen anything among the Antipodes resembling matters at home. In those days a Du Chaillu with his Gorillas and nest-building Troglodites, would have been considered rather tame and common place; and the bookmaker who has spiced up Anderssen's "Okavango River" to the requisite seasoning for Mudie's readers, might have drawn on his fancy as freely as the old romancers, who anticipated in their creations the recovered Saurians of the Geological age of monsters. It is curious, indeed, to note how, with each fresh accession to the area of exploration, the appetite for the marvellous grows with what it feeds on. The discovery of America gave wondrous scope to this; the explorations of the Southern Ocean in the eighteenth century again revived it; Layard in Asia, and Livingstone in Africa, have furnished fresh incentives; and guided by Franklin, Kane, and other recent Arctic voyagers, the northern "regions of thick-ribbed ice" have warmed imaginations into a glow fit to melt the dread barriers of their long-hidden mysteries; until, amid the rivalry of arctic and equatorial exploration, men's minds are divided on the question, whether to look for the new terrestial paradise in undiscovered islands of the "open Polar Sea," or in the unexplored platteau of the African tropics.

In the work named at the head of this article we have a recent production of the European press, which, though professing to be rich in marvellous disclosures about the unknown regions of our own Western hemisphere, has, we suspect, nearly escaped the attention of Canadian readers. We are somewhat doubtful, indeed, whether many of them have a very clear idea as to where our unexplored American Zaharas lie. Such a mystery hangs about them, that seven years' residence in the Great Deserts of this New World ought to be productive of some marvellous revelations; and here we have two portly and elaborately illustrated volumes professedly teeming with such.

When our great dramatist undertook to picture the courtship of the Moor, and the tender, yielding sympathies of Desdemona, it was with no thought of discrediting the veracity of his hero that the poet represented him as calling his wonderful relations a traveller's history :—

> "Wherein of antres vast and deserts idle,
> Rough quarries, rocks, and hills whose heads touch heaven,
> It was his hint to speak; such was his process;
> And of the Cannibals that each other eat,
> The Anthropophagi, and men whose heads
> Do grow beneath their shoulders!"

To hear such very credible things the daughter of the old Venetian senator did seriously incline; and even in the Poet's own day, the world of Columbus, Vespuccio, Cortes, and Pizarro, was so new, strange, and little known, that it only required equally respectable witnesses to prove that the Utopian Commonwealth of Hythloday still flourished there, and that the aborigines' heads did grow beneath their shoulders, instead of between them. For ourselves we live in a time when it behooves us to make the most of our "travellers' tales." Exploration progresses at such a rate that every year lessens that unknown area, within which the Darwinian philosopher may still speculate on the discovery of the transitional anthropoid animal in his last stage of passage from apehood to manhood. But with a Mudie's readers, multiplying by the thousands, the question of literary supply and demand becomes scarcely less pressing than that of the cotton supply to England's Manchester Associations; and if we could only furnish writers with the invention of a Defoe or tl e genius of a Swift, we should be well content to trace out on our maps the voyages of new Robinson Crusoes and Gullivers; and like our fathers, give the preference to the adventures of a Munchausen, rather than to the Abyssinian travels of a Bruce.

Amid such voluminous literature as the seven Essayists have recently given birth to, the charge has been revived against this age of ours that it is a sceptical one; but we demur to any such charge. Now and then a literary adventurer like Du Chaillu, in his haste to meet the sensational demands of the popular press, is hurried beyond reason, and only discovers when too late, that he has crammed in an extra year's travelling into the too precise interval between his A.D. 1856 and 1859. But within all reasonable compass the reading world is still most charitably credulous with its "travellers' histories;" and as to their pictorial adjuncts, so that they please the eye, the standing rule is, "no questions asked." When Messrs. Childs and Peterson, the enterprising New York publishers, issued their beautifully illustrated edition of Dr. Kane's "Arctic Expedition," no critic ventured to inquire if the lamented traveller's sketch-book did actually contain the germs of all its wonderful vignettes of Arctic scenery, sketched in the

dread polar midnight, when imagination has to picture the indefatigable draughtsman exposed to a temperature in which the mercury freezes in his thermometer, and manipulating in the dark, with his pencil in a hand gloved and furred, till it was less delicate than a polar bear's paw. The genuineness of the touching narrative no one questioned; and illustrations being in request, the artists of Philadelphia and New York proved equal to the demand, whatever may have been the rude suggestive scraps of pencilling from which they wrought. But even this failed to satisfy the omniverous appetite of a reading public. A second American Arctic narrative followed, and might have commanded as unquestioning a welcome as the first, had not the rogues fallen out over the spoils; and the Philadelphian correspondent of a New York journal given publicity to the quarrel, as the exposure of "a piece of literary swindling worthy of the notorious Barnum." "It is well known," writes this correspondent, "that Dr. Kane's work on the Arctic Expedition was all the rage a short time ago in American society. An engraver named Cyram has lately sued the publishers, Lloyd & Co., of Philadelphia, for the sum of $264, due for engraving plates for Dr. Kane's work. Some amusing facts came out on the trial. It appears that the picture representing the *Advance* stuck in the ice, was copied from an old picture in Captain Cook's Voyages in the Southern Seas, with ice thrown in *ad libitum*. The portrait purporting to be Sontag, one of Kane's officers, was altered from a portrait of a highwayman in the *National Police Gazette*. An engraving representing the occulation of Saturn, was produced by altering an eclipse of the sun from an old geography; and there was more of the same sort. If this is the way Philadelphia publishers bring out the crack books of the season, they deserve to be as world-famous as the Philadelphia lawyers."

These, however, are the doings on this progressive side of the Atlantic, where the ideas of publishing, copyright, and book-begetting all together, have revealed a stage of development unknown to Europe's fossil old stagers. Indeed England has hitherto flattered herself that "Barnum" is quite a distinct and purely American variety of the species; and rather taken comfort from the thought that his grand science of Humbug finds its fitting sphere only in the Great Republic; nor need she be startled out of her self-complacency by the whisper of a Du Chaillu and his Gorillas. The traveller is none of her begetting, but a sort of nondescript, Americanised, African Frenchman, recently

adopted and very partially naturalized in England. His publisher, though naturally a little sensitive on the subject, stands acquitted of all culpable share in the Gorilla-book manufactory; and we hope is resigned to the inevitable; finding it by no means a losing concern to have undertaken the publication of so notorious a traveller's tale. The *index expurgatorius* is generally the best of advertisements; though some men are squeamish enough to object to be pilloried, notwithstanding the notoriety it secures.

It is not, however, our purpose to follow in the wake of English and German critics, in reviewing the apochryphal adventures and superabundant chronology of Pierre Beloni Du Chaillu, or other such literary freebooters; but on the contrary, to invite our readers into an exploration of the Great Deserts of the New World, under the guidance of the well-accredited author whose name and credentials figure at the head of this article.

The Abbé Domenech, Titular Canon of Montpellier, and member of the Tibernian Pontifical Academy, as well as of sundry Parisian Scientific Societies, is already known as the author of "Missionary Adventures in Texas and Mexico," a work which all have agreed to praise. The *Eclectic Review* commended its author as one who has transferred to the territories on the banks of the San Antonio and Rio Grande, that interest which the Abbé Huc knew so well how to give to the scenery and life in China. The reviewer does, indeed, confess to earlier doubts that the author was impudently testing the powers of credence of his readers, and drawing on his imagination for the details by means of which a genuine sketch was stuffed out into bibliopolic amplitude. But with some slight reservation he withdraws his earlier incredulity, and accords his praise to the volumes, not as a romance, but as a traveller's narrative. The *Saturday Review* follows with the same readily suggested comparison between the famous Chinese explorer, and this "good and brave young Abbé Domenech," who now in his later volumes, addresses from Paris his dedication, "To his Lordship, Charles Thomas Thibault, Bishop of Montpellier, Roman Count, Assistant at the Pontifical Throne, Commander of the Imperial Order of the Legion of Honour, and of the Religious and Military Order of Saints Maurice and Lazarus, Knight of the Grand Cross of the Honourable Order of Christ of Rome, of the Order of the Holy Sepulchre," &c. &c. There is something refreshing in escaping beyond regions of misty dubiety, within

the pale of such well accredited veracity as is certified here. We seem to look in fancy on the good young Abbé, who, enchanted doubtless with the reception his first volumes met with, has been induced, as he tells us in his preface, "to continue the publication of his ethnographical studies, and the precious notes gleaned during his sojourn in the New World, on the nature, the aspect, and the singularity of the American Deserts, as likewise with regard to those savage tribes who are as varied in their physical appearance as they are similar in their civil and religious organization." Were not the many-titled Bishop of Montpellier's authentication of his titular canon's identity abundantly sufficient for the purpose, the Messrs. Longman would no doubt be prepared with their testimonials. So far, however, as the materials wrought up into two portly volumes, out of the Abbé's "precious notes," are concerned, we must confess we should not find it very difficult to believe that their author never travelled beyond the purlieus of Grub Street. The preface led us to expect a tale fit to captivate another Desdemona. "America," says the Abbé, "is comparatively speaking, a new country, a virgin land, which contains numerous secrets." Again he exclaims: "In those wildernesses there are actually to be found hieroglyphical monuments, immense ruins; white, red, and brown Indians; albinos, bearded men, and men without beards;" and then he adds: "This work is but a detailed programme of what I hope to publish gradually on this subject. I have spared neither fatigue nor labour to give my readers an exact idea of the great wildernesses of America, and of the Indian tribes they contain. If *I have not been able to derive much help from the books published by some writers who have treated on this subject*, it is because their accounts are, generally speaking, exclusively confined to the Indians of the United States." Nevertheless, he confesses to having read Schoolcraft and Catlin's works, the publications of the Smithsonian and Ethnographical Societies, and the reports of the United States Scientific Expeditions, "either," as he says, "to generalise my opinions or to complete my narrative."

After such a flourish of trumpets, from an author so rich in the abundance and novelty of his materials, that these two portly volumes constitute the mere programme of what he hopes to publish on the subject: we were surely justified in anticipating the opening up of virgin soil. Instead of this, however, the perusal of these "programme" volumes rewards us only with a stale rifacimento of crude,

or exploded ethnological platitudes, and a vague expatiation over all hitherto explored corners of the map of North America, but without a noticeable addition to our knowledge of "parts unknown." Far be it from us to doubt that there actually does exist—in London, Montpellier, Rome, or Texas,—this "good and brave Abbé Domenech;" but it certainly lay within the capacity of an ordinary Grub Street book-hack, to compile quite as good an *omnium gatherum* of extracts from American blue-books, and Scientific Society's publications, without ever travelling beyond his ink-bottle and library shelves. The much-abused Du Chaillu, not only was in Africa, but brings home and sells to Professor Owen, his gorillas, in proof that he did shoot them; in spite of sceptical naturalists who trace his illustrations to Parisian photographs and other handy material. But the explorer of our American Deserts does not, so far as we can discover, furnish a solitary picture of the novel ethnographic or other secrets revealed to his favoured eye in the "Virgin Land" of his exploration.

The volumes are set forth as "illustrated with fifty wood-cuts, by A. Joliet, three plates of ancient Indian music, and a large map shewing the actual situation of the Indian tribes and country described by the author." As for the last of these, it is comprehensive enough to satisfy any definition of the so-called "great deserts of North America," for it is a map of the whole continent from the Hudson's Bay to the Gulf of Mexico, and from the Atlantic to the Pacific Coasts; and well answering in its vagueness to the book itself, which proves to be a weary journey through "Great Deserts" of printed wastes, instead of through actual savage-haunted wildernesses. So far, however, is the map from representing "the actual situation of the Indian tribes," now, or during the supposed travels of the author, that we find the Hurons, for example, on the Georgian Bay, from whence they were driven or extirpated while Canada was still a French Colony; and the Shawnees and other tribes, on Lake Erie, where our Abbé, had he really gone to visit them, would have found only the busy population of their long-settled white supplanters. In truth, though our author does here and there seem for a moment to refer to things seen by himself, it is in so vague and dubious a fashion, and interspersed among so many more he certainly never did see, that but for his previous "missionary adventures in Mexico and Texas," we should have been strongly tempted to enquire after "the

good Abbé" among those unpretending men-of-all-work, who cater for the book-manufacturers of Paternoster Row, and pen their veracious chronicles

> "Of most disastrous chances,
> Of moving accidents by flood and field;
> Of hair-breadth 'scapes,"

and all without ever missing the familiar Cockney music of Bow-bells. We say, but for the author's previous adventures. But there are other credentials also, which surely lie beyond the inventive art of the Book-maker, in those fifty-eight showy Zylographs which give such an air of well-authenticated accuracy to the volumes. There are portraits of natives, pictures of strangest scenery, engravings of inscriptions, native implements, pottery, &c., bringing home to our firesides the wonders of the great deserts; or, failing in this, illustrating the latest economic development of free trade in the Grand Art of Book-making.

Our first glance at the Abbé's illustrations suggested a strange familiarity in their choice picturings, such as was scarcely to be expected in his revelations of the mysteries of a "virgin land;" and the result of a little research to which this tempted us, may perhaps help the reader to some idea of the requisite process in the newly developed manufacture, whereby two goodly volumes of fascinating travel may be got up, with the help of a good name, and a reputable dedication, by any one who has access to a moderately furnished library. And first for the ethnology of the volumes. Volume II. figures for its frontispiece, a genuine "Comanche" in highly characteristic attitude, on horseback, and with his long lance in rest upon his left arm. But the original may be seen by any one curious on the subject, in a quarto plate, not of Comanches, but Navajos, drawn by H. B. Mölhausen, the artist of the U. S. Exploring party for a Railway route to the Pacific; Washington, 1855, p. 31. Like most of the other borrowed illustrations, the figure, which is one of a group, is reversed, and the features are so poorly copied as to be worthless for all ethnological purposes. The same Washington Report in like manner supplies the Mojave Indian, introduced at p. 40, vol. II., but still worse drawn, and if possible, more worthless for anything but a child's picture book. At an earlier date there issued from the Washington Bureau certain "Reports of the Secretary of War, with reconnaisances of routes from San Antonio to El Paso," and these, being little likely to come under the eye of ordinary readers, have

proved a mine of wealth for our adventurer;—who might aptly exclaim with the stay-at-home author of "The Task,"

> "He travels, and expatiates; as the bee,
> And spreads the honey of his deep research
> At his return,—a rich repast for me;
> *He travels, and I too!*"

In volume II., an account of the "Indians of the Pueblos" occurs, vague and uncircumstantial, as ever second-hand materials were; and with its more defined pictorial illustration to eke out the text. But here again the so-called "Pueblo Indian" proves to be a coarse caricature, the reverse of plate IV, of the Washington War Reports of 1850, representing in the original,—not a mere ordinary Indian, but "Hos-ta, or the lightning, governor of the Pueblo of Jémez." On the contrary the so called "Navajo Chief," of the Abbé, appears in pl. LII. of the same War Report, merely as an illustration of Navajo costume; but to fit him for his sudden promotion, a dandified shield with scalp-locks, borrowed from the fashions of the totally diverse tribes of the north, is substituted for the plain oval shield of hide, as originally drawn by R. H. Kern, the draughtsman of the Navajo Expedition. Ridiculous as such incongruous additions appear to any one familiar with the Indians of the north and of the south, they are trifles compared with the *olla podrida* served up, at p. 207, of vol. I., in the plate designated "Inscription Rock." This accompanies a description of the El Moro Rock of the Sierra Madre, one of the most extensive and curious groups of native and early European graven records hitherto discovered on the whole continent. Like most other descriptions from his pen, the reader is left to guess as he best may, whether the author pretends to have seen the objects he thus vaguely describes: "Beyond the Agua Fria you descend the western slope of the Sierra Madre, and reach a very open valley wherein may be seen *the Rock of Inscriptions* called El Moro by the Mexicans;" and so the writer proceeds,—in a diluted version of Lieut. J. H. Simpson, of U. S. Topographical Corps' narrative of his visit to the El Moro in 1849,—to tell, with all the indefiniteness of a borrowed report, what you may, can, might, would, or could see, gentle reader, if you only were there. But as to the accompanying illustration, be certain, if it is ever your fortune to visit the Sierra Madre, you will search in vain for its prototype; though without travelling any such perilous journey, you may discover its materials in the unmentioned volume of Washington War Reports now referred to, from whence there can be

little doubt the Abbé has drawn all his knowledge of the Moro Inscriptions. To this conclusion we are led, not only by the fact that the illustrative plate is a patchwork of scraps gleaned from half-a-dozen lithographs appended to Lieut. Simpson's Report, with Spanish inscriptions and Indian hieroglyphics transposed, reversed, and jumbled up together into as pretty a specimen of rock-engraving as the most credulous could desire: but also from another little bit of circumstantial evidence. Chap. XXI. is devoted to the subject of Indian ideography, inscriptions, &c., and with a cool effrontery, which might put Barnum himself out of countenance, our traveller thus comments on the shortcomings of his predecessors: "Thus do those men, prudent travellers, learned from intuition, return home to regale their countrymen with the history of a people they have hardly perceived, and describe places into which they have never ventured to enter; the consequence is that their narratives abound in errors and exaggerations. One cannot be too guarded against writers who invent respecting matters they know nothing about, and who translate while misunderstanding the works already published on the same subject." Having delivered himself with this lofty air, of his opinion of European travellers and their books in general, our author proceeds to illustrate by example his ideas of a more virtuous course, and resumes the subject of the Moro inscriptions, because as he says, they "have never been mentioned in any scientific or geographical work published in Europe." It is, of course, much too trivial a matter for him to condescend to notice, that they have not only been mentioned, but transcribed and illustrated in fac-simile, in Lieut. Simpson's Report. But though, as the latter tells us, they were described to him in what, after personal inspection, he acknowledges to have been no very extravagant hyperbole, as "half an acre of inscriptions," it is a singular coincidence that the Abbé not only does not chance to have noted a single example which his predecessor had not already copied; but where the latter, in transcribing the longest of them, has inadvertently added on to its commencement, the name of "Bartolomé Narrso," which, as appears from the fac-simile, stands apart and entirely distinct from it, the Abbé, by the most unaccountable accident, has fallen into the very same error!

Other inscriptions are from more familiar sources, such as Schoolcraft's "Indian Tribes," the American Ethnological Society's Proceedings, &c., though it is not a little amusing to find the learned

Abbé gravely weighing the rival merits of Lybian, Touranik, or Celtiberian claims for the somewhat notorious hoax of the "Grave Greek inscription;" and with corresponding gravity discussing the claim to a Phœnician origin for the Indian scratchings on the Dighton Rock. But we look in vain for a single original contribution to the old familiar materials illustrative of American lithology or ideography; though the author might just as well, and with as little contempt for truth, have invented for us a good Punic, Iberian, cuneatic or runic inscription, as patched up the jumble he has figured under the name of El Moro rock. What a pity it is that he missed the famous "Holy Stone of Ohio," recently found near Newark, by Mr. D. Wyrick, C. E., under one of the ancient mounds of the Ohio Valley. It is graven in Hebrew, Syriac, Etruscan, and Runic characters, and is regarded by the savans of Newark and Cincinnatti, as affording indisputable proof that under that very mound Moses was buried, and 'no man knoweth his sepulchre *until* this day!"

The thin octavo volume of "Reports of reconnaisances of routes from San Antonio to El Paro," in which the El Moro inscription was first produced, is an official document not likely to come under the notice of ordinary readers, and from which, therefore, an unscrupulous author might be tempted to borrow with little fear of detection; but the "Deserts of North America," with their topography and ethnology, are not always illustrated from such unfamiliar sources. The pen and pencil of Catlin have both been called into requisition, though it is well known, that lively traveller had himself the reputation of sometimes making the most of meagre materials,—as is indeed the fashion with ingenious artists in all ages. A few examples of the author's manner of appropriating others' materials—"Convey the wise it call,"—will best illustrate our meaning. The "Dawta Chief" of the Abbé, for instance (vol. ii. p. 28,) is Catlin's Sioux, Ec-ah-sa-pa, or Black Rock, whom he met and painted at Fort Pierre, at the mouth of Teton River; The "Iroquois" (p. 33,) is a poor reversed copy of Catlin's Not-o-way, or the Thinker; the "Mandan Chief," (p. 36)—of whom more anon,—— is Mah-to-toh-pa, or the Four Bears, second Chief of the Mandans, though with scarcely a trace of the true Indian features characteristically rendered by Catlin; and the "Saliskas," at (p. 36,) is Stu-mich-o-sucks, or the Buffalo's back fat, head chief of the Blackfeet, painted by the

American artist during his residence at the United States Fort, near the junction of the Yellow Stone with the Missouri.

Unacknowledged appropriations are carried on throughout in the same free wholesale fashion. But the sense of deception practised on the reader, is fully developed when on comparing the Abbé's illustration of an Osage Indian, with Catlin's portrait of Tchong-tas-sab-bee, or the Black Dog of the Osages, from which it is unmistakeably borrowed, not only do we find the characteristic Indian features lost in the surreptitious copy; but a ridiculous tatooing of two crossed hatchets on the cheek, with sundry other figures on breast and arms, are introduced, not only without authority from Catlin's original, but with as much propriety as an Indian brave's war-paint and scalp-locks would present, if added to the portraiture of General Beauregard, or President Lincoln. The like theatrical additions are introduced on the "Chinook woman," (p. 16, vol. I.) a Flathead Indian, copied, or rather made up, from an inaccurate design, in which Catlin has blunderingly represented the head of the cradle-board, intended to protect the infant from injury, as the instrument employed in flattening its forehead. The truth is, that the original artist, Mr. George Catlin, was drawing on his imagination when he undertook to delineate a Flathead of the Pacific, as he honestly confesses. The latter's description of this flight of fancy begins as follows: "Whilst I am thus taking a hasty glance of the tribes on the Atlantic coast, on the borders of Mexico, and the confines of Canada, the reader will pardon me for taking him a few minutes to the mouth of the Columbia on the Pacific coast, *which place I have not yet quite reached myself.*" One of the best proofs of Catlin's general accuracy is the difference between this slovenly fancy sketch and his specimens of genuine Indian portraiture. No one who studies M. Domenech's meagre and inaccurate notice of the Flathead Indians of the Columbia River, will doubt that he would have done well if he had imitated the candour of Catlin. Instead of this, however, the learned Parisian ethnologist treats us and his brother savans to an illustration manufactured by M. Joliet,—or whoever is responsible for the Abbé's pictorial ethnology,—out of the imperfect fancy sketch invented by the American painter.

It is scarcely necessary to follow out our process of comparison further in this department. The whole is made up after the same fashion. The "Chippeway," (vol. ii. p. 18,) is Catlin's *Ka-be-mub-*

be, plate 242, with the absurd substitution of a feathered crozier—unknown among Indian implements, lay or sacerdotal,—in lieu of the simple spear in the hand of the original. So also the "Medicine Man," (vol. ii. p. 286,) produced by the Abbé to illustrate a few of his vague common-places, is a feeble copy of Catlin's spirited sketch accompanying an equally graphic picturing of wild Indian life, which he thus introduces: "Sit still then, until I relate a scene of a tragic, and yet of the most grotesque character, which took place in this Fort, (at the mouth of the Yellow Stone River) and *to all of which I was an eye-witness.*" He accordingly proceeds to narrate a scene of Indian treachery and revenge, in which one of the Chiefs of the Blackfeet was shot by a Knisteneau. We give his account of it in a condensed form:—

"The Blackfeet returned into the Fort, and then I saw, what I never before saw in my life,—a medicine man performing his mysteries over a dying man. He was lying on the ground in the agonies of death, and no one could indulge the slightest hope of his recovery; yet the medicine man must needs be called, and hocus pocus applied as the *dernier resort*, when all drugs and specifics were useless. Several hundred spectators, including Indians and traders, were assembled. We were required to form a ring, leaving a space of some thirty or forty feet in diameter around the dying man, in which the doctor could perform his wonderful operations. This being done, in a few moments his arrival was announced by the death-like 'hush—sh—' through the crowd; and nothing was to be heard save the light and casual tinkling of the rattles upon his dress, which was scarcely perceptible to the ear, as he cautiously and slowly moved through the avenue left for him, which at length brought him in view of the pitible object over whom his mysteries were to be performed. He approached in a crouching position with a slow and tilting step;—his body and head were entirely covered with the skin of a yellow bear, the head of which (his own being inside of it), served as a mask. The huge claws also dangled at his wrists and ankles. In one hand he shook a frightful rattle, and in the other brandishing his medicine-spear or magic wand; to the rattling din and discord of all which, he added the wild and startling jumps and yelps of the Indian, and the horrid and appalling grunts, and snarls, and growls of the grizzly bear, in ejaculatory and guttural incantations to the Good and Bad Spirits, in behalf of his patient, who was rolling and groaning in the agonies of death, whilst he was dancing around him, jumping over him, pawing him about, and rolling him in every direction. In this wise, this strange operation proceeded for half an hour, until the man died; and the medicine man danced off to his quarters, and packed up, tied, and secured from the sight of the world, his mystery dress and equipments." Catlin adds, "There are some instances, of course, where the exhausted patient unaccountably recovers; and in such cases this ingenious son of the Indian Esculapius will be seen for several days after, on the top of a wigwam,

with his right arm extended and waving over the gaping crowd, to whom he is vaunting forth, without modesty, the surprising skill he has acquired in his art, and the undoubted efficacy of his medicine or mystery."

Such, in a greatly condensed form, is the American artist's lively narrative of his first sight of a native medicine-man of the Blackfeet Indians on the Yellow Stone River.

By one of the curious coincidences so frequent in his work, the Abbé Domenech gives, as pictorial illustration, the very Blackfoot Medicine Man sketched by Catlin under the circumstances narrated above; but in lieu of his graphic and circumstantial details, we have only some vapid generalities about "The Doctor-magician-priests," after which our author thus proceeds: "The dress they wear seems the effort of an imagination in delirium. We shall describe the one which to us appeared the most extraordinary. The science of the doctor in question was in great renown among the Indians, (what Indians?) and his *costume de circonstance* equally well-known among the pale-faces;" and so he goes on, describing the very same Yellow Bear skin dress; which, as Catlin exhibited it both in Paris and London, it is very possible he did see, and think "the most extraordinary."

We have said enough to show the value of our author's contributions for behoof of his brother members of the Ethnographical Society of France. The Parisian savans must be equally delighted with his archæological and topographical novelties from the New World. The landscapes are copied, or rather "made up," from similar sources to those already noted as laid under contribution. The "Natural Hill," for example, as it is somewhat oddly designated, is a slovenly copy of "Pyramid Mountain in the Valley Laguna Colorado," figured from a careful drawing in the "Report of the Geology of the Route explored by Lieut. A. W. Whipple, of the U. S. Topographical Engineers," printed at Washington in 1856; and the others are cribbed in like fashion, without acknowledgment. The Indian relics have been dug up out of previous publications with the same honest and naive perseverance. The plate of "Ancient Pipes," (vol. i. p. 392) is culled from the well-known "Smithsonian" volume of Messrs. Squire and Davis's "Ancient Monuments of the Mississippi Valley," from whence also are borrowed the plates of Ancient Pottery, but all printed of a uniform brick-red, in happy indifference to the texture of the originals, of sand-stone, porphyry, yellow clay, &c. The calumet and pipes figured at p. 272, vol. ii.,

may also be recognised in plate 95 of Catlin's "North American Indians." Schoolcraft's well-known "History of the Indian Tribes," furnishes sundry plates of Indian weapons, implements, hieroglyphs, &c. The American Ethnological Society's transactions have been laid under contribution with equal freedom: and we shall only add that if a single one of all the numerous illustrations is original,—which we more than doubt,—unless it has been drawn in a very different fashion from the slovenly, untruthful copies we have compared with their unacknowledged originals, it must be equally worthless.

The literary part of the book is managed with a little more skill than the clumsy scissors-and-paste work of its pictorial decorations; and if the author really wrote his original in French, the double process of translation borrowed materials must have undergone, would confer on them a novel strangeness which the pencil of M. Joliet has failed to give to the ethnographical illustrations. The facts and arguments, in much the same sequence, may frequently be recognised in the volumes from whence artistic tribute has been so freely levied, but all specialities are for the most part so carefully avoided, that their writers might be puzzled to prove ownership of the borrowed plumes; or establish a parentage for the changeling. Our author, moreover, adroitly leaves the reader to assume that he is writing of what he actually saw in "The Great Desert;" and yet when we attempt strictly to analyse the words, it is apparent that he is not without a loophole by which to escape from the charge of misrepresentation, if it should leak out that all the journeyings of this highly accredited Abbé have been limited to the well-trodden trail between Grub Street and the Row; with perchance an occasional exploration in the fertile regions of Great Russell Street. Here, for example, is one of his stories,—more precise and definite than most,—illustrative of the cold-blooded atrocity of Indian revenge:—

"A Mandan chief, Mahtotopa, whose portrait may be seen at the Museum of Natural History in Paris, found one day near the village the body of his brother pierced by a lance, which the murderer had left in the wound. He swore to revenge his kinsman, took the lance covered with blood, and carried it to the village, where it was recognised as belonging to Ononyatop, one of the bravest of the Riccaree warriors. The Mandan chief took the Riccaree weapon in his hands, and brandished it over his head before each cabin of the village, declaring in a loud voice that he would kill Ononyatop with the very same weapon. He waited in vain during four years for the opportunity of accomplishing his

design. At last, no longer able to restrain his impatience, he took the lance, saying that the blood of his brother cried out for vengeance, and added: Let no Mandan speak any more the name of Mahtotopa; let no one ask where he is, nor whither he has gone, until you hear the war-cry before your village, and he shows you the scalp of Ononyatop. The iron of this lance shall drink the blood of Ononyatop, or the shade of Mahtotopa shall follow that of his brother. He departed and traversed a distance of more than two hundred miles, with no other provisions than a little maize in a bag, walking by night and hiding by day, for fear of surprise. When he reached the village of the Riccarees he prowled around the cabins for some time, and under cover of the darkness of night approached that of Ononyatop. He saw his enemy light his pipe and lie down. Mahtotopa then entered resolutely and sat down near the fire, over which a kettle full of meat was suspended. He began to eat with the voracity of a man dying of hunger; he then in his turn lighted the pipe which his enemy had laid down after having used it. The wife of Ononyatop, who had also gone to bed, asked her husband who that man was eating in their cabin. The Riccaree answered: 'What does it matter? he is hungry, let him eat.' Mahtotopa then, turning round gradually, in order the better to see the posture of his victim, rapidly seized the lance and plunged it in his heart, took off his scalp in an instant, and as swift as an arrow fled into the prairie, holding his trophy in his hand. The whole village was quickly on foot, but no one knew who had killed the chief Ononyatop; and Mahtotopa, after having run several days and nights, praying the Great Spirit to give courage to his heart and strength to his legs, arrived the sixth day at his native village broken down with fatigue, but happy and proud to have revenged his brother, and to have brought home the scalp of Ononyatop."

Such is the story of Mahtotopa's revenge. Far be it from us to dispute the authenticating proof, that the Mandan chief's portrait "may be seen at the museum of Natural History in Paris;" but, after the extensive use made of George Catlin's pictures, it cannot fail to strike the reader as a curious coincidence, that that artist narrates the very same story, in his twenty-first letter, in illustration of the painted Buffalo-robe of *Mah-to-toh-pa*; a poor travestie of whose portrait by Catlin figures at another page of the Abbé's volumes, with no reference to any Parisian portrait, or Indian story, but merely the indefinite title of a "Mandan Chief."

Schoolcraft has been laid under still larger contributions than Catlin, unless the theory of accidental coincidences suffice to account for unacknowledged resemblances, such as those already referred to. In some cases, however, the Abbé does admit, in general terms, a little borrowing, as where he says, (vol. ii. p. 432,) "Several authors relate a legend which is current among a number of the Northern populations

regarding the Island of the Blessed," and he accordingly reproduces an Indian Legend which Longfellow years ago interwove into his "Song of Hiawatha." The comments which this legend elicits are among the most genuine-looking passages of the volumes, though we have read the like before. Let us extract one passage however, as possibly a genuine specimen of the author's own.

"By such legends have the Indians sought to embellish the doctrine of rewards, and to give it all the power and all the attraction for imaginations as vivid as those of the Red Men, which would have been wanting in an arbitrary law. It is for the same reason that Catholicism makes so much progress among the populations of the Great Deserts, whilst Protestantism, which rests more on the spirit of analysis than on the feelings of the heart, makes but few proselytes among these impressionable people. On several occasions the Indian tribes have written to the President of the United States, begging him to send them ministers of the Great Spirit, of the same religion as those who christianised their ancestors, to teach them how best to serve the Supreme Being, and to instruct them in the manner of cultivating the earth. Many of the Missions founded by the Jesuit fathers in the seventeenth century in the north of America still exist, or have been established anew; that of the Ottawa, on Lake Michigan, is without question one of the most interesting, and the Indians have built a very pretty chapel there.

"Among the tribes formerly visited by the French missionaries, the recollection of the *black gowns* is very fresh in the minds of the savages. They believe that the true ministers of the Great Spirit have black gowns, and they have but little sympathy with the married priests of the American sects. The number of Catholics is, in fact, very considerable among the Indians of the United States and of the Great Deserts. Dacotas and Osages have been seen trying to make the sign of the cross with the left hand, because it was nearer the heart than the right. The catholicism of the Indians possesses all the absolute simplicity and the robust faith peculiar to unspoiled natures."

The subject thus referred to by the Abbé towards the close, with a tone of genuine sincerity little apparent elsewhere, is one well deserving of greater attention than it appears to receive. Without pretending to any such explorations as would enable us to talk with familiar nonchalance of the secrets of the Great Deserts of America from the Hudson's Bay to the Gulf of Mexico, we know somewhat of the Red Indian in his native haunts. We have seen the poor remnant of the Hurons, in their little chapel of our lady of Loretto on the banks of the St. Charles, and watched the half-breed trapper kneeling in the picturesque sanctuary of Tadoussac, where, under the favour of Henry IV., the merchants of Dieppe and Rochelle established their first trading-post near the mouth of the Saguenay, in 1599; and some two

thousand miles westward,—where the enterprise of the Recollet and Jesuit missionaries preceded the earliest traders in the exploration of the great Lakes,—we have watched a band of Chippewa squaws decorating with flowers and birch-bark beadwork, the altar of the little Indian Chapel at La Point, on Lake Superior; ever and anon kneeling reverently before the homely looking stucco figures of the Virgin and Child, as they there made ready for the celebration of one of the Church's high festivals. We have heard the psalm tune raised by an old Mohawk chief, in the Episcopalian chapel of Tuscarora, on the Grand River; seen the Missassaguas gathering for the service of their Baptist Missionary at Rice Lake; and followed the Saulteaux canoes as they dispersed from a Methodist Indian Camp Meeting, among the Islands of St. Marie's River. Christianity in some sort has been brought to bear on the Red Indian of these northern regions of the new world for some two-and-a-half centuries. In this work the French missionaries took the lead; and without forgetting the memorable achievements of John Elliot and the devoted labours of David Brainard, we are bound to express our conviction that the Roman Catholic missionary has been greatly more successful in making converts after his fashion, than the protestant teacher. In part, at least this is accounted for by the adaptability of the showy externals of his worship to the Indian mind. It is a species of object-teaching which appeals to the acutest senses of the Indian, instead of making demands on his inert reasoning powers. In part also it may be ascribed, without prejudice, to the less exacting requirements of the proselytising teacher. A compliance with periodical forms and ceremonies, and the rendering devout homage to visible objects of mysterious sanctity, is in full accordance with all the rude conceptions of religion in the savage mind. But certainly a "robust faith," such as the Abbè Domenech assigns to Indian Catholicism is about the last definition we should apply to the religion of the native convert. "It is true we have three very good Spanish Gods," was, as the Mexican traveller, Bullock, tells us, the remark of a native Mexican, on seeing some of the idols of his ancestors dug up on the site of the Teocalli overthrown by Cortes more than two centuries before; "but," he added, "they might still have allowed us to keep a few of those of our fathers;" and it is an undoubted fact that among many nominal converts both of Catholic and Protestant teaching, the gods of their ancestors are still the objects of their most genuine worship.

It is worthy of consideration whether the protestant missionary might not learn a useful lesson from the catholic, and apply the system of "object lessons" to the perceptive faculties of the rude Indian, without making such the mere source of an external conformity to superstitious observances. The Roman Catholic missionary identifies himself with his converts. The festivals of Easter and Christmas, the fasts of passion week, and other commemorative services come in the place of pagan spring and harvest festivals, and sacred commemorations of their dead. The priest among the half-breed Buffalo hunters of the Red River, accompanies the band to the open prairie, and celebrates mass, before they start in pursuit of the herd; as on the Ottawa the trappers long attended mass at St. Marie's altar, before setting out on their adventurous chase. We fear that too many of our protestant missionaries would think it savoured of paganism to ask a blessing on the forthcoming Buffalo hunt, or the fishing at the Salmon-leap, though the very existence of the tribe during the winter depends on their success. But when such feelings are carried to excess, we cannot wonder at the greater favour entertained for the priest, who identifies himself thus with the daily life of the people, and "becomes all things to all men," after the fashion of his church in every age. The paganism of ancient Rome has transmitted relics of its popular festivals in not a few picturesque rites surviving in modern Italy, as in the annual service of St. Anthony's day, when all the cattle present themselves to receive the papal blessing.

Yet, while thus indicating how the heart of the poor pagan is won, in a way that the less pliant exactions of protestantism are incapable of; let us not do injustice to the self-denying labours and fearless enterprise of the old Jesuit Missionary Fathers. In 1632, Paul le Jeune, "the father of Jesuit Missions," set out with another missionary, in a ship of their own, to the work of evangelizing Canada; but already the Récollet fathers had been before them to Lake Nipissing and Huron itself; and long before the adventurous hunter had penetrated the western wilds, Father Hennepin had listened to the roar of Niagara, and Marquette had sailed on the bosom of the Mississippi. Nor were those fearless pioneers unmindful of their sacred mission. Before the middle of the seventeenth century they had baptized thousands of the fierce Hurons, gathering their converts into villages, instructing them in agriculture and other civilizing arts, and weaning them from their savage atrocities. In 1648, the good father

Daniel perished amid a band of his Indian converts, massacred by the pagan Iroquois; and many successive martyr missionaries suffered at the stake, or were put to frightful tortures, while engaged in their self-denying labours. When at length a miserable remnant of the Huron nation alone survived the exterminating warfare of their ferocious enemies, they were gathered together by the missionary priests, and settled in the neighbourhood of Quebec, where their descendants of mixed blood still survive. But our modern "missionary," the Abbé Domenech, in his "Map showing *the actual situation* of the Indian tribes and the country described," represents the Hurons as still in occupation of the region, from whence the last of them disappeared while the Cardinal Richelieu still ruled the destinies of France and her colonies. Had our Abbé actually visited the country of the savage Hurons, he would have done so in a comfortable railway car, and handed his well-furnished valise to mine host's baggage-porter; in which case he might have questioned the propriety of including it within any one of his "great deserts."

"The Red Men are melting like snow before the sun," was the touching simile of a Miami orator. Whole nations have been utterly exterminated, and the last remnants of others are rapidly following in their wake. Yet still the aborigines assert their claim to a broad and ample domain. Amid all the fictitious romance associated with the name of the Red Indian, we fear that neither Canadian philanthropists nor British Christians are fully alive to their claims on us, or to the numbers still surviving to advance such claims. If we assert the indisputable rights of conquerors and colonists, to our American possessions, do these rights involve no corresponding duties? In the United States, including the Confederate Southerners, with Texas and New Mexico, the Indians number about 500,000; in and around the settled British Provinces they cannot be less than 10,000; and throughout British North America, exclusive of the Esquimaux, they have been estimated at 125,000. On these great numbers (apart from those of Mexico, Central and Southern America,) Christianity and civilization have been equally inoperative. The great mass is still pagan; and what is surely a grave reproach to the British nation and her colonies, this statement applies with full force to many tribes long settled and surrounded by a white population; who regard with a contemptuous indifference, the dissipated, idle, improvident descendant of the old savage hunter and warrior of the forest.

So recently as 1857, the Church of England Missionaries among the Six Nations (the loyalist Indians who accompanied the English refugees to Canada at the close of the American War), replied to the query of the Indian commissioners: "What number are still pagans?" *Ans.*—"A large majority of the Cayugas, and a part of the Onondagas and Senecas;" and similar answers indicate a like condition among other settled tribes. The missions in more than one locality, and especially among the populous islands of Lake Huron, have been discredited by unseemly controversies between Church of England and other Missionaries, while the Roman Catholic Church embraces the greater number of the Indian converts. Meanwhile, impartial observers are tempted to ask in what respects many of such "Christian Indians" present any favourable elements of comparison with the wild Pagan tribes? To this pertinent query, Sir Francis B. Head furnished a tolerably plain-spoken answer in one of the most singular documents addressed by him to the Home Government during his official residence in Canada. Writing to Lord n: lg in 1836, he says: "If we attempt to christianize the Indians, and for that sacred object congregate them in villages of substantial log-houses, lovely and beautiful as such a theory appears, it is an undeniable fact, to which unhesitatingly I add my humble testimony, that as soon as the hunting season commences, the men (from warm clothing and warm houses, having lost their hardihood) perish, or rather rot, in numbers, by consumption. While as regards their women, it is impossible for any accurate observer to refrain from remarking, that civilization, in spite of the pure, honest, and unremitting zeal of our missionaries, by some accursed process, has blanched their babies' faces. In short, our philanthropy, like our friendship, has failed in its professions. Producing deaths by consumption, it has more than decimated its followers; and under pretence of eradicating from the female heart the errors of a Pagan creed, it has implanted in their stead the germs of Christian guilt."

On all this, it must be confessed, the colonist looks with wondrous apathy. The miserable, dirty, semi-civilized Indian who haunts the outskirts of the clearings, has no more romance about him in the eyes of the settler, than the straggling remnants of the forest, which he clears away as an encumbrance to the land. Familiarity speedily breeds contempt, and it seems in vain to hope for any enthusiastic efforts on his part in the evangelization of the Indian. But the ele-

ment of romance is not without its influence on others besides the colonist. With how different an eye do the annual May gatherings at Exeter Hall and elsewhere, look on a Missionary from some far away South Sea Island or African Kraal, and on a "City Missionary" from the deserts of St. Giles' or Whitechapel! It is hard to believe that the word *Missionary* can be the same in both cases. This may perhaps help to open the eyes of some English philanthropists, to causes which render their self-denying exertions nearly fruitless. The Church of England annually spends, on the Missions in Rupert's Land alone, between £6,000 and £7,000; and in a recent report it is shewn, that besides what is contributed by the Society for the propagation of the Gospel, the Church Missionary Society has expended about £50,000 upon Missionary operations in the Hudson's Bay Territories, in addition to funds contributed by the great Fur Company for the ministrations of religion. The present Bishop of Rupert's Land is a devoted and indefatigable missionary; but the fruits of all this cost and labour, so far as the natives are concerned, seem to be wonderfully small. Perhaps some part of the cause of this is revealed in the pertinent question which occurs in the "Red River Explorations' Report," printed by order of the Canadian Parliament in 1858:—"Can the ministrations of the Church in the English tongue, to orderly resident congregations of European Canadians, or half-breed origin, be Missionary labour, in the sense in which that highest of all duties is understood by those who seek to spread the truths of Christianity among a most degraded and barbarous heathen race?" "On two Sundays during my stay," says Professor Hind, in the same report, "at the time when Divine Service was being celebrated in all the churches of the settlement the heathen Indians held their dog feasts and medicine dances on the open plain. In one instance, five dogs were slaughtered, cooked, and devoured; in another instance, three;—the evil spirit was invoked, the conjuror's arts used to inspire his savage spectators with awe, and all the revolting ceremonies belonging to the most degraded heathen superstition practised, within a mile and-a-half of the spot where the stones are now gathered for the Bishop of Rupert's Land's Cathedral."

We are reluctant to believe that the fate which has hitherto befallen the Red Indian is the inevitable doom of the thousands that still survive. Civilization has elevated tribes as savage, and seemingly even more degraded; and christianity has achieved triumphs not less

hopeless in anticipation. To visit a genuine congregation of civilized Indian converts is a very pleasant thing. The sacred music is specially acceptable to them, and they learn to sing in parts, with great sweetness and fervour; as well as to play on the organ, and other instruments. Without cheating them with a mere round of formal observances in the name of religion; much may be done to adapt the services of Christian worship to their simple and child-like minds, and wherever this has been effectually done, the change produced is well calculated to gratify the disinterested and self-denying labourer in so good a cause.

The venerable, though little-known Society, "The Company for the propagation of the Gospel in New England, and the parts adjacent in America," nurses anciently accumulated funds and endowments, in some quiet nook of the British metropolis, and supports missionary agents, seemingly, in a very Catholic fashion, among the Indians of Canada; as it selects them indiscriminately from various denominations. The Hudson's Bay Company, with what some will consider greater catholicity, contributes towards the support of an Episcopalian, Presbyterian, and Roman Catholic ministry alike; but as might be expected, the services of such are rather rendered to the wealthy residents, the retired Hudson's Bay factors, the merchants, traders, and farmers, white and half-breed, than among the wild Crees, Chippewas, and Blackfeet, by whom they are surrounded.

The interest which justly attaches to the present condition and future prospects of the aborigines of this continent, and the responsibilities which devolve on ourselves as Canadians, in our relations to the dismembered Indian nationalities already retreating before our encroaching clearings, have tempted us to follow the lead of the Abbé Domenech in reference to the traces of any ameliorating influences resulting to what he calls "the population of the Great Deserts." But we must not allow this to divert us from the curious illustration of the process of book manufactory which his volumes afford. The establishment of a new system of book-circulating libraries by Mudie and other enterprising London booksellers is, we fear, doing in some degree for English literature what the cheap pirating-press of the United States has done for the American author. Substantial works of genuine interest and worth are at a discount, while the sensation literature of a Du Chaillu doubles its circulation by the very notoriety which the author's knavery begets for it. No wonder that under

such a system new American and other travels should be made without the trouble of crossing the Atlantic.

Messrs. Murray, Longman, and other magnates of "the Row," would be justly indignant at any insinuation of complicity with those light-fingered gentry of the quill, who are ready to figure in Mudie's newest list, as travellers, voyagers, missionaries or scientific Abbés, according to the paramount taste of the day. But will the character of the most reputable of British publishers long shield them from suspicion of at least avoiding any troublesome inquisitiveness about the genuineness of a saleable book? If the gentlemen of Lombard Street innocently give currency to a forged bill, it is returned on their hands when detected, and they refund the misgotten gains; but when the gentlemen of the Row have a literary forgery traced back to them, the chances are that it is with a view to an extra edition and double profits! When virtue is so clearly left to be its own reward, it is not difficult to surmise its fate. Perhaps even in our own small way, we may contribute to the reputation of unappreciated genius, and the public may read in a second edition the same fine moral poem of the Parisian Abbé's "Seven Years' Residence in the Great Deserts of North America," which so modestly contrasts his own veracious labours and accurate science with "the stumbling-blocks of fiction" set forth by other authors. "It is with sentiments of the most lively satisfaction," says he, "that we perceive of late years that authors of talent, scorning low novel writing, the reading of which is so pernicious to sensitive minds, have resuscitated a style of literature full of charm, interest, and novelty, by going to glean their scenes and subjects in the solitudes of the New World. We join with all our heart in this literary movement, which is capable of drawing the attention of the civilized world on those poor savages, to whose well-being we had devoted our youth. This work contains the result of our personal observations, and of our ethnographical studies on the Indians of the Great Deserts of North America; and *we cherish the fond hope that it may be the means of guarding those who may consult it against the stumbling-blocks of fiction, that would make them fall into historical or topographical errors, so very excusable after all, when relating to such important questions, and to regions almost unexplored.*"

Well done, Monsieur l'Abbé! who can wonder that the wise men of the Row were captivated with a book which opens with such

apposite morality, and winds up with a touching peroration on the power of religion, and the labours of its missionaries, in contending with the elements of Indian dissolution. No wonder, moreover, that the shrewdest of London's bibliôpoles should have been deceived into sharing such profitable romancing, when it is considered how this same learned Abbé Domenech has since culminated in his literary triumphs. Bent on the fulfilment of his promises of further revelations, he has secured the Emperor Napoleon III. as his latest publisher, and has issued, at Imperial cost, a magnificent folio of hieroglyphic and demotic chroniclings of the New World; as gratifying, we doubt not, to the members of the *Académie des inscriptions et belles-lettres* as the ethnology we have described must have proved to be to his fellow-members of the Parisian Ethnographic Society: for on inspection, this gorgeous imperial folio of Indian hieroglyphics turns out to be a series of facsimiles of a German child's drawing-book, be-sketched and be-scribbled in the usual style of nursery art, which some rogue has palmed on the credulous Abbé as a genuine Red Indian M.S., more valuable than all the contents of Lord Kingsborough's costly folios of Mexican picture-writing.

D. W.

New Species of Lower Silurian Fossils. By E. Billings, F.G.S. (Montreal: November 21, 1861).

In this pamphlet, recently issued by the able palæontologist of the Geological Survey of Canada, the author describes and figures a very considerable number of new fossils from the Potsdam Group and some of the succeeding formations of the Lower Silurian strata. Until a comparatively recent period, the lowest subdivision of our fossiliferous rocks bore the name of the *Potsdam Sandstone*, and was looked upon as consisting wholly of arenaceous deposits, nearly destitute of organic remains—a few fucoids, including the doubtful *scolithus linearis*, some lingulæ, and the celebrated crustacean(?) tracks, making up the entire list of these. The subdivision in question is now known, however, to include also various beds of limestone with interstratified and underlying shales and dark slates, classed collectively under the name of the Potsdam Group, and referred to the horizon of Barrande's Primordial Zone. Whilst the sandstones, as in most strata, are but sparingly fossiliferous, the limestones, with their interstratified argillaceous beds, exhibit an unexpected abundance of organic forms. Amongst those now described

by Mr. Billings, several are referred to new genera. The limestone of Anse au Loup on the north shore of the Straits of Belle Isle, has furnished two peculiar corals (or sponges) somewhat resembling *petraia* or *zaphrentis*, but considered by Mr. Billings to belong to a distinct genus, which he names *Archeocyathus*. The form is turbinate, simple or aggregate; the cup deep, and composed apparently of two walls with connecting radiating lamellæ, between which, poriferous tissue is distributed. The inner wall, according to Mr. Billings, appears to have been traversed by pores, affording a communication between the inside of the cup and the spaces filled with the interseptal tissue. One of the species is named *A. Atlanticus*, the other *A. Minganensis*. The latter passes upwards into the calciferous group, and is the form previously described by the author (from internal casts) as a *petraia*. Amongst the Brachiopods, which include species of *Obolus*, *Orthis*, *Orthisina*, and *Camerella*, there is also a newly-determined genus. On this, Mr. Billing bestows the name of *Obolella*, from its relationship to *Obolus*. In the latter, the smaller ends of the central pair of muscular impressions belonging to the ventral valve are directed downwards and towards each other, whilst in Obolella, according to Mr. Billings, the reverse of this occurs. The shell is of the ordinary calcareous character, and does not exhibit the dark lustrous appearance common to most species of *Obolus*. Two species are enumerated; but one of these, *O. cingulata*, from Anse au Loup, and from Swanton, Vermont, Mr. Billings considers may be still generically distinct.

The trilobites of these Potsdam rocks are more especially interesting. In addition to the much discussed *Paradoxides*, first discovered in the Potsdam beds of Vermont, and of which examples have since been found at Anse au Loup, Mr. Billings describes no less than five species of the genus *Conocephalites*, and two belonging to *Bathyurus*. The first of these genera, it is now well-known, is eminently characteristic of the Primordial Zone of Europe. The occurrence of the *Paradoxides* or *Oleni* at the distant locality of Anse au Loup, is a fact of much importance in settling the true position of the Vermont strata. Their discovery is due to Mr. Richardson, of the Geological Survey, who has traced out on the north shore of the Straits of Belle Isle a complete sequence of the lower fossiliferous beds.

At the close of this publication, descriptions are given of some new fossils from the Calciferous, Chazy, Black River, and Trenton formations. The more important of these comprise several sponges,

referred respectively to the genus *Astylospongia* of Ferdinand Rœmer, and to a new genus named *Eospongia* by the author. These forms are the more interesting, since undoubted examples of fossil sponges do not appear to have been previously recognized in the Palæozoic deposits of Canada. Another interesting form, described in this memoir, is a species of *Ampyx*, of which some fragmentary examples have been discovered in the Chazy limestone of St. Dominique, in the County of Yamaska, and also in the same formation at Highgate Springs in Vermont. E. J. C.

First Biennial Report of the Progress of the Geological Survey of Michigan, embracing Observations on the Geology, Zoology, and Botany of the Lower Peninsula. Published by Authority: Lansing, 1861.

This very creditable Report forms an octavo volume of four hundred pages. Its contents emanate almost wholly from the State Geologist, Professor A. WINCHELL of Ann Arbor; but a subordinate Report on the Zoology of the district embraced within the exploration, is furnished by M. MILES; and an account of the Botany of the region is also contributed by N. H. Winchell. As the northern portion of Michigan has been explored and reported upon by several trustworthy geologists, amongst whom we may mention more especially Messrs. Whitney and Foster, and also the late Dr. Houghton (drowned during the prosecution of the survey off Eagle River, Lake Superior), the attention of Professor Winchell has been directed in this instance to the more southern districts of the peninsula. In his present Report, after a systematic and very able review of the general geology of Michigan, including the connection of its various formations with those of surrounding districts, a detailed analysis of the salt wells, iron ores, coal, and other economic products of the State, is entered into. Some useful tables of altitudes are also given.

The central portion of the peninsula of Michigan is occupied by Carboniferous rocks, around which the older strata successively crop out, presenting the basin-shaped form of arrangement so common in Carboniferous districts generally. In addition to several exposures of granitic rock (probably of Azoic age), together with the trappean formations of Lake Superior, the following series of strata occur within

the limits of the State. Commencing with the most ancient, we have first a collection of metamorphic beds, comprising talcose and chloritic schists, with quartzites, siliceous slates, and bands of crystalline limestone, the whole being undoubtedly referrible to the Laurentian series of our Azoic rocks. The great iron deposits of Marquette belong to this division. The existence of Huronian strata within the peninsula does not appear to have been made out. To these Azoic rocks succeed the so-called "Lake Superior sandstones" of the age of the Potsdam group, but they are only developed in the higher portions of the State. The Calciferous sandrock is said to be unknown to the south of the Falls of Ste. Marie, the silicious and other limestones of the Trenton group immediately succeeding the Potsdam beds. It may be found, however, eventually, that much of the Lake Superior sandstone really belongs to the Calciferous subdivision, although we have not sufficient data at present to establish this. Many of the common Chazy and Trenton limestone fossils are cited by Professor Winchell from this outcrop of the Trenton group; and the formation is stated to stretch in a belt about four miles wide across St. Joseph's Island, and to reappear in the high bluffs opposite Little Sailor Encampment. From thence it extends across the middle of Great Sailor Encampment Island, and passes west in a gradually widening belt to the shores of Bay de Noquet and Green Bay, and onwards across Wisconsin into northern Illinois. Thirty-two feet is cited as its observed thickness in Michigan. The Hudson River deposits lie along the southern outcrop of the Trenton beds. Their dip carries them under the lower portion of the peninsula, but they do not reappear on the southern side of the basin, being covered at the anticlinal by some of the overlying beds. They are seen, however, further south, as in the denuded axis of Cincinnati, and elsewhere.

The Upper Silurian formations recognized in Michigan, comprise the Clinton and Niagara group, and the Onondaga-salt division. Some gypsum and a few brine springs occur in the latter, but the great salt formation of the peninsula belongs to a much higher deposit, a member of the Carboniferous series. The Devonian rocks are largely developed. They include, in ascending order, the upper Helderberg group, 354 feet thick, comprising the peculiar brecciated limestone of Mackinac, and other arenaceous and bituminous limestone deposits; the Hamilton group of bituminous and other limestones, 55 feet in thickness; the Portage group, 224 feet thick; and the Chemung group of 159 feet.

The Portage group in this Report, is called provisionally the "Huron group," an objectionable term, as likely to be confounded with the very dissimilar Huronian series of Canada. The Chemung subdivision is also described as the Marshall group, after the town of that name in Calhoun county. In neither of these sets of strata have any explorations been made, as yet, in quest of petroleum; nor have any natural "oil springs" been discovered amongst them. The fossils collected from the higher group are stated by Professor Winchell to be specifically distinct from those obtained from the Chemung beds of more eastern localities.

Continuing to ascend in the geological scale, we now reach the great Carboniferous formation. This, as occurring in Michigan, is subdivided in the Report into six separate groups, according to the following order. First, a series of micaceous sandstones, the so-called "Napoleon group," separated from the underlying Marshall deposits by a bed of clay or argillaceous shale. Secondly, the "Michigan salt group," comprising various shales and limestones, with gypsum and marl beds. This is the great brine formation of Michigan, a kind of repetition, as it were, of the Onondaga salt or gypsiferous group of more eastern sites. Some of the sandstones of the lower or "Napoleon" group, however, are also highly saliferous. Next follows the Carboniferous Limestone, 66 feet thick, succeeded by the so-called Parma Sandstone, a subdivision considered to represent the Ohio conglomerate, though here separated from the Devonian rocks by three intervening groups of calcareous and arenaceous deposits. The Coal Measures come next in order, attaining in some places to a thickness of over 120 feet. The coal seams, which consist of bituminous varieties, are said to reach in the aggregate a thickness of eleven feet. A single seam, averaging from three to five feet, appears to extend continuously throughout the formation, and to furnish material of good quality. It is chiefly worked at Woodville. Fire clay and some thin bands and nodules of iron-stone occur in connexion with it. Above the Coal Measures, a thick arenaceous deposit is met with. This, which much resembles the rock beneath the coal strata, is called the Woodville Sandstone; but Professor Winchell remarks that these three latter formations, though separated for convenience, should strictly be united, and ranked collectively as the Coal Measures proper. With the Woodville Sandstone, the entire Palæozoic series of Michigan is brought to a close; and the next succeeding deposits

are those of the Drift or Quaternary Period. Before turning our attention to these, we extract from the Report a few observations of much interest in reference to the geological relations of the groups already alluded to:—

"Many interesting considerations present themselves on a general review of the geology of the peninsula. From the Lake Superior Sandstone to the close of the Helderberg period, our state seems to have had a common history with Canada West, and the States on both sides of us. The same groups of rocks are traced uninterruptedly from New York across the peninsula of Canada to Michigan and even to the Mississippi river, preserving throughout that whole extent as great a degree of palæontological identity as could be expected of faunas stretching over so many degrees of the earth's surface. It is true, as has been long since shewn by Prof. Hall, that nearly every member of the Silurian and lower Devonian system, thins gradually in its westward prolongation, loses somewhat of its arenaceous or argillaceous character, and becomes at the west much more calcareous—changes which have generally been regarded as proving the origin of the materials of those groups to have been at the east. It is interesting to observe, however, notwithstanding this westward attenuation, how completely we are able to recognize all the essential features of the New York System in our own State.

"From the close of the Helderberg period, on the contrary, Michigan has had a history to some extent peculiar. The rocks of the Hamilton group can indeed be traced almost continuously from New York into our own State, but the palæontological characters are found materially changed, and the strata are more argillaceous. The Portage Group, of New York, supposing it to be represented by our Huron group, has received great accessions of argillaceous matter, and seems to have been deposited under circumstances more unfavourable to the existence of animal life. The Chemung Group, supposed to be represented by our Marshall Group, has been traced uninterruptedly into Ohio, where it becomes almost non-fossiliferous. The Marshall Group is totally isolated from rocks of the same age anywhere beyond the limits of our peninsula; and though the sandstones bear some physical resemblance to those of the Chemung Group of Ohio and New York, our formation contains little or no argillaceous matter; its fauna is remarkably rich, and its species are nearly all peculiar. The Napoleon Group, if correctly separated from the Marshall Group, has no distinct equivalent in surrounding States; and its entire destitution of organic remains will cause its true geological relations to remain in doubt.

"If anything were wanting to show that the geological column in Michigan has been built up as a distinct and independent structure, the existence of the gypseous or Michigan Salt Group, supplies the deficiency. But even further than this, no obvious parallelism has yet been traced between the overlying carboniferous limestone, and the groups of this system further west. The indications already pointed out, however, lead to the conjecture that our limestone was accumulating during several of the epochs into which geologists have divided this

period, though the isolation of our sea has resulted in little correspondence of organic remains. The paucity of rock-producing materials seems to have continued through the epoch of the coal—our measures not attaining one-twentieth the thickness of the same rocks in Ohio. The evidences lead us to the conviction that the Onio and Michigan coal basins were never continuous, and that the waters did not flow over the separating ridge between the close of the Helderberg period and the Drift. It cannot be denied, however, that, supposing the carboniferous sea to have been a general one, the remoteness and comparative isolation of the Michigan bay, furnished occasion for great contrasts in stratigraphical, lithological and palæontological characters.

"One other class of facts must be referred to, which weigh in the same direction. They constitute evidence that the materials for our upper Devonian and carboniferous rocks have been derived from the north. The Helderberg limestones are 350 feet thick at Mackinac, and not more than 60 feet thick in Monroe county. The Hamilton Group, so well developed in Thunder and Little Traverse Bays, is not recognized in the southern part of the State. The Huron Group, with its gritstones and flagstones at Pt. aux Barques, contains only two strata of flagstone at Grand Rapids. The conglomerate at the base of the Marshall Group, at Pt. aux Barques, is recognized at none of the Southern outcrops. The pebbles scattered through the Marshall and Napoleon Groups in Huron county, are entirely wanting in Jackson and Calhoun counties; while, on the contrary, extensive patches of the Marshall sandstone are found finely cemented by calcareous matter at Battle Creek, Jonesville and other southern points.

"One other remark is suggested by this review of our rocks. The geology of Michigan discloses little connection between the Carboniferous Limestone and the Coal Measures; while the transition to Devonian rocks is imperceptible. I see no reason for drawing the broad lines which separate great systems, between the Marshall and Napoleon groups, or between the Napoleon group and the Carboniferous limestone. On the contrary, I see this limestone characterized by a peculiar, persistent, marine fauna, while the Parma Sandstone, the Coal Measures and the Woodville Sandstone, were accumulated in shallow waters near shores, or even in marshes; and are characterized, from bottom to top, by evidences of the proximity and abundance of terrestrial vegetation. These contrasts hold throughout the country, and in all countries. Whatever marine remains are found in the coal measures, belong to species distinct from those in the Carboniferous Limestone; and if the generic distinctions are not complete, the organic facies of one is vegetable and terrestrial; that of the other, animal and marine. Downward the types of the lower Carboniferous rocks descend into the upper Devonian—some carboniferous species, and numerous carboniferous types, even reaching the Hamilton group. Observations in Michigan suggest rather to draw the broad systematic lines below the Hamilton group, and between the Carboniferous Limestone and the Coal Measures."

As remarked above, the Drift deposits, in Michigan, immediately overlie the Carboniferous Formation. The rocks beneath the Drift shew the usual glacial striæ, and the lower Drift beds consist of

boulder-holding clays. To these succeed accumulations of sand, &c., of more or less local origin, containing in some places, as at Grand Traverse Bay, layers of lignite, with imbedded coniferous stems. That these higher Drift accumulations are of fresh-water formation, is shewn by the presence of shells belonging to *melania* and *physa*, which occur above the lignite deposits. These shells, at Traverse Bay, are found in a bed of coarse sand, mixed with small boulders, and overlaid by twelve feet of fine yellow sand. The formations of still more recent date, comprise peat, shell-marl, and iron ochres. Remains of the *Elephas primigenius*, and those of the Mastodon and Elk, with a caudal vertebra of a whale, have been obtained from these modern accumulations.

In closing our brief notice of this Report, we may add that its pages bear abundant evidence of the very able manner in which Professor Winchell has carried out the work committed to his charge. The publication of the author's final Report may be looked forward to with much interest. E. J. C.

Manual of the Sub-kingdom Coelenterata. By Joseph Reay Greene, B.A., Professor of Natural History, Queen's College, Cork. London: Longman, Green, Longman and Roberts. 1861.

We receive with pleasure a second part of Professor Greene's Manuals of the Animal Kingdom. The present volume, like the preceding, is full of valuable materials for study, and it gives the view of the subject which seems at present to find most favour with European naturalists. We cannot recognize Coelenterata as a Sub-kingdom, nor admit the classification of its supposed members which is here presented. We believe that when relieved from the Protozoa, and some groups properly belonging to the Articulata, the Sub-kingdom Radiata is truly natural, and distinguished by clear and important characters, and with some transferences of families, we regard the classes Echinodermata, Acalephæ and Polypifera as expressing their proper Sub-division. We must also press the claim of Acalephae to the Ctenophoræ, which are placed among Actinozoa, (our Polypifera,) by Professor Greene. These matters, however, are at present subjects of controversy, and in indicating the views which our inquiries thus far dispose us to consider as most satisfactory, we do not undervalue the work before us as a source of information, and an excellent

interpretation of a system with which we must desire to be acquainted. We only strongly recommend to the student a careful comparison of the opinions and statements of Professor Greene, with what he will find in the volume of Agassiz, on the Acalephae. In this short notice of a useful summary we cannot discuss the disputed questions, but they are of such leading importance, as to affect the use of the work as a text book, where its doctrines are not received.

W. H.

Outlines of Elementary Botany, as Introductory to Local Floras. By George Bentham, Esq., V.P.L.S. London: Lovell Reeve. 1861.

We have here a work of small size and modest pretensions, but of the highest merit. It proceeds from one of the first botanists of our age—one who most eminently unites with great opportunities and a careful observation of facts, sound judgment and logical habits of mind. We have here in the compass of five and forty pages, the substance of volumes, and the means, with careful study and reflection, of laying a good foundation for the highest botanical acquirements. So clear and accurate is our author's language, that he seems independent of pictorial illustrations, and much as these seem sometimes to assist beginners, they are so apt to be misused for saving labour which ought to be gone through, that if they were confined to the lecture-room of the teacher, the loss to science would not be great. So very much do we admire Mr. Bentham's work, that we reluctantly notice faults, though of secondary importance, and detracting little from the general merit. At p. 18, ¶ 100, he says: "The Corolla is said to be *Monopetalous* when the petals are united, either entirely or at the base only, into a cup, tube, or ring; *polypetalous* where they are all free from the base. These expressions, established by a long usage, are not strictly correct, for *monopetalous* (consisting of a single petal,) should apply rather to a corolla really reduced to a single petal, which would then be on one side of the axis; and *polypetalous* is sometimes used more appropriately for a corolla with an indefinite number of petals. Some modern botanists have, therefore, proposed the term *gamopetalous* for the corolla with united petals, and *dialypetalous* for that with free petals; but the old established expressions are still most generally used."

We apprehend it to be a proper aim of writers like Mr. Bentham,

to correct what is wrong in "old established" ideas and expressions, and in science we are sure that accuracy of expression is essential for the diffusion of clear and correct ideas, so that if even great authorities are found resisting needful improvements, the movement belongs to those who insist on their importance. *Gamopetalous* is, after all, an awkward figurative term; but to *Synpetalous* and *Synsepalous*, there can be no reasonable objection, and *apopetalous* or *dialypetalous* will serve for the contrasted term. If being established is a good excuse for retaining a term, invented when the true nature of the case was not understood, and expressing a false view, we see no chance for improvement.

Again, we cannot help objecting very strongly to the use of *Pistil*, as a collective name for the carpels which make up the inner circle of the flower: *Gynœcium* we think the most appropriate term. A pistil, according to Linnaean ideas, is an apparently distinct part of the gynœcium, being either one of the carpels of an apocarpous gynœcium; one style and stigma where the ovarian portions of the carpels cohere, or the seemingly single organ formed by the complete coherence of the carpels.* With our present views of structure, such a term is useless except in applying the Linnaean System, and ought no longer to be employed in descriptive botany. The inner circle of the parts of a flower is the gynœcium, its several parts or the several modified leaves of which it consists are carpels, and each carpel consists of ovary, style, and stigma. We cannot accept, judging from our own experience and reading, Mr. Bentham's statement that *pistil* is generally applied in a collective sense, and we believe it to be now generally used in a very vague manner, which needs correction; this is easily applied by using pistil only in its Linnaean sense, and having good names both for the whole circle, the several pieces of which it is composed, and the distinguishable parts of each.

We note minor objections because so few occur to us, and we so very much admire and value the work, which we in conclusion most warmly recommend to all who are engaged in botanical studies.

W. H.

* Observing that the Linnaean use of the term *pistil* has been a subject of controversy, we turned to the *Philosophia Botanica* and carefully re-examined every sentence in which the word occurs. The result is a confirmed conviction that Linnaeus could not possibly have intended *pistil* as a general name for the inner circle of a flower. He speaks of pistils as one or more. The theory of the carpels not having been yet thought of, an entire or almost entire union of styles and stigmas was to him one pistil, whilst any considerable separation of styles, with or without coherence below, was regarded by him as several pistils. His authority cannot be used in favour of Mr. Bentham's application of the term, which is otherwise very objectionable.

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

ON ELEVATIONS AND DEPRESSIONS OF THE EARTH IN NORTH AMERICA, BY ABRAHAM GESNER, M.D., F.G.S.

(*From the Journal of the Geological Society, November* 1861)

United States.—Commencing at New Jersey, in the United States the writer has examined nearly all the most interesting parts of the coasts, as far northward as the northern part of Labrador. The whole south-eastern side of New Jersey, where it borders upon the Atlantic, to the extent of 100 miles in length and about 20 miles in breadth, is composed of alternate strata of sand, greensand, marl, and clay, some of the beds very highly fossiliferous. The land is comparatively low, and slopes gradually from the high lands in the rear towards the sea. A similar tract of country occurs in the bordering State of Maryland, and, still further southward, in North Carolina.

The oldest inhabitants of New Jersey, whose lives have been extended to upwards of eighty years, maintain that within a period of sixty years the sea has risen upwards of four feet, or what is equivalent thereto, the coast has fallen to that depth. Marshes that were formerly mowed for their grass are now submerged; the sea has encroached upon the land, even over the sites of ancient habitations. There are tracts where trees are seen growing upon fallen forests, which have been buried in sand and peat. Timber of excellent description is dug out of the present marshes. The amount of depression along this coast is variously estimated as being from 5 to 12 feet.

From these and other facts which might be quoted, it appears that there are marine Cretaceous deposits, and over them Pleistocene deposits with freshwater shells and Mastodon bones, apparently an old forest buried in sand, with the remains of another growing over it—these two being under the sea in some places and therefore proving submergence of a land-surface,—and that this submergence is still going on, according to the testimony of the inhabitants and the submergence of habitations.

In the harbour of Nantucket, there is a submarine forest. In dredging the estuary, Lieutenant Prescott found trunks and roots of the cedar, oak, maple, and beech, some of them standing upright and still attached to the soil on which they flourished. Excepting the cedar, all the woods are still sound. The trees are partially buried in sand, and are eight feet below the level of the lowest tide.

A similar submarine forest exists at Holme's Hole, on Martha's Vineyard. On the west side of the harbour, stumps of trees are found standing upon a level surface beneath the water; another woody tract occurs near the south-west extremity of the Vineyard, and on the north side of Cape Cod, opposite Yarmouth: the latter extends more than three miles into Barnstable Bay. At Portland a similar sinking of the land has been clearly made out. In none of these

instances is there any accounting for the facts but by actual subsidence. No indications of elevation were observed in this quarter.

New Brunswick.—Proceeding in a northerly direction, we arrive at the River Schoodiac, or St. Croix, the dividing line between the United States and the British Province of New Brunswick. Instead of submergence, an elevation of the land is here clear and distinct. It extends in a northerly direction upwards of twenty miles, and probably to a still greater distance along the coast in the direction of the Bay of Fundy. The greatest elevation is near the centre of this area, which has been but little raised at its edges. The solid rocks beneath the modern marl-beds are chiefly red sandstone, syenite, and granite, with intrusions of trap-rocks.

At St. Andrew's, St. Stephen's, Lubec, Eastport, and numerous sites in the adjacent districts, there are extensive deposits of sand, marl, and marly clay, containing relics of shells and sea-weeds which still inhabit the present shores; and the former are so numerous, that they have contributed sufficient lime to some of the strata to render them valuable for fertilizing-purposes. At first these marl-beds were supposed to be Tertiary deposits; but late observations have determined their more recent origin. The greatest elevation observed was near the town of St. Andrew's, where the marl with recent shells is found 28 feet above the level of the highest tide.

Among the numerous islands of Passamaquoddy Bay the writer observed many of indications of elevation; nor is it difficult to discover along the borders of the creeks and rivers the sites from which the sea has been slowly and gradually withdrawn. Strata of marl and clay with shells like those before mentioned, appear at Beaver Harbour, where the elevation has been less considerable.

Grand Manan is a beautiful island, situated off the mouth of the St. Croix River, and 12 miles from the American line. It is 25 miles long and 5 miles in breadth. The north-west side is a somewhat lofty range of trap-rock, uninhabited and presenting to the sea perpendicular and overhanging cliffs. The opposite side of the island is inhabited; the industry is agriculture and fishing; and a number of small islands and harbours afford shelter for vessels.

The most remarkable circumstance connected with this isolated part of New Brunswick is the fact, that the entire south side of the main and its islets have within a recent period been submerged to the depth of 18 feet and upwards.—There still remains a tradition that there once existed between the main, the three Duck Islands, and Nantucket Island, a kind of marsh of several thousands of acres. This marsh has slowly disappeared beneath the sea; and its surface is only partially uncovered by the water at the lowest spring-tides. The roots stumps, and trunks of a great number of trees (the pine, hemlock and cedar) still remain firmly attached to the sunken earth, and at the very sites where they flourished. The once living forest with its branches and leaves is now deeply covered by each succeeding tide. The anchors of small craft are often held fast among the wood of the bottom of the harbour. It was by this subsidence that several islands became isolated; for the marshes that formerly attached them one to another have been denuded and washed away by the waves. The subsidence extended to the distance of several miles westward; but it is

best measured near the small islands before mentioned. Viewed altogether, it would seem that Grand Manan has slowly moved upon its axis, depressing one side and elevating the other.

At the mouth of the River St. John and at the city of the same name, in the Province of New Brunswick, the evidences of elevation are distinct over an area of twenty square miles. Between the city and Portland there is a narrow and deep valley now occupied by a church, manufactories and dwelling-houses. In this valley, and above strata of clay, there are marl-beds containing marine shells and decomposed sea-weeds identical with those still inhabiting the shores of the harbour. These beds are about 18 feet above the level of the sea, which at some former period surrounded the site of the city.

At Manawagonis, Mispec, Emerson's Creek, and many other places in this quarter, there are beds of sand, clay, marl, and marly clay exposed to the sea, forming low and almost level tracts along its borders. Similar deposits also occur in the banks of the St. John and Kenebecacis Rivers, above the reach of the highest tides. They not only appear where the currents have exposed the beds, but also remote from those streams. The shells are chiefly imbedded in the sand and marl, which also contain the relics of recent marine vegetation.—In these deposits upwards of twenty genera of recnt *Testacea* and six genera of *Crustacea* have been obtained. Some of the shells, such as the *Mya mercenaria*, *Pecten*, *Arca*, &c., are well preserved. The shells of the *Solen ensis* and *Mytili* are too brittle to be removed. The claws of crabs and the bones of fishes, although changed, are not destroyed. The shells of the uppermost beds are more decayed than those of the lower deposits, and appear as though the elevation had been slow and gradual, and not sudden like those frequently indicated in districts moved by earthquakes. The strata containing these remains are now from 10 to 40 feet above the level of the tides, which rise 30 feet along this part of the coast at spring-tides.

The rivers emptying into the Bay of Fundy along this line of coast are broken by falls at their mouths; but the streams which do not pass through this raised district empty themselves into the bay smoothly and without interruption. It is therefore not unreasonable to believe that the breaking up of the river-beds was coeval with the elevation of the shelly deposits now removed far above the reach of the waves.

The next site to be noticed is remarkable for its submergence: it is called the Great Tantamar Marsh, situated 120 miles eastward of the St. John, in the County of Westmorland, and at the head-water of Chignecto Bay. This marsh is 13 miles long, and about 4 miles broad. Large tracts have been rescued from the sea by embankments, or "dikes," thrown up on the borders of the river, and its creeks. At the eastern extremity of the Tantamar, there is a sunken tract, composed of peat-bog, floating bogs, with swamps and small lakes, not less than 8 miles long and 3 miles in width. It is the breeding-place of great numbers of wild ducks and snipes. Large trees of different kinds, collections of shells, bones of fishes, &c., appear at different depths in the alluvium. But besides these, on the northern border of the alluvial deposit, patches of forest-trees, some of which have been felled by the woodman's axe, are now overflowed by the tides. Relics of the early French settlers, Indian harpoons, and pieces of their bark canoes, and

other traces of the aborigines have been dug up at depths of 5 and 10 feet beneath the surface, on the opening of canals and ditches remote from the river.

The same depressing influence has been at work at Shediac and Bay Verte.—At the latter place the gravestones of persons killed by the Indians in 1755 are now reached by the tide at high water, which washes the base of old Fort Moncton, and rises above its causeway.

In the County of Northumberland, where it borders upon the Bay de Chaleurs there has been a depression, evidently slow in its progress and continued. In the vicinity of Bay des Vents and LowerBay des Vents, extensive peat-bogs are seen at low water reaching outwards beneath the sea: the peat is of super-marine growth, and its highest parts are scarcely above the tide-level. The shores are low and level; and evidences of land-slides are absent. At Bathurst, on the contrary, and on the opposite shore of Lower Canada, there has been an elevation of several feet, and which apparently is still progressing. A number of minor elevations and depressions were observed during the writer's geological survey of the Province, before leaving which the terraces along the Upper St. John River may be adverted to, as being connected with this subject.

On the banks of this river we frequently observe, in ascending from its borders, several paralled steps which rise abruptly from one level to another in succession. These steps are composed of diluvial matter, in which there are occasionally contained decayed timber and fragments of freshwater shells. These are well displayed near the ferry four miles below Woodstock.

These several terraces mark distinctly the former banks of the river, which has been withdrawn from its ancient limits to a narrow channel with an increased velocity of current. Near the mouth of Maduxnakeag, a tributary of the St. John, the ancient bed of the stream is now dry and under cultivation.—Whether these terraces have been produced by an uplifting or depressing force, it is difficult to ascertain. It is probable, however, that the site of the river was once a lake, which has been drained by the yielding of the earth further down the stream, where there are now violent rapids and marks of recent terrestrial disturbance. Terraced vallevs are common on many of the rivers of North America.

Nova Scotia.—At many places in Nova Scotia, changes of level on the surface of the earth appear very distinct, although they are less manifest than they are in the sister Province. It is generally maintained by aged persons, that the tides flowing into the Bay of Fundy and Minas Basin and its numerous rivers and creeks, are rising. The records of ancient landmarks, the encroachment of the water upon the dry earth, the discovery of ancient bridges and relcs of the native Indians beneath the present tide-level, corroborate that opinion. At numerous places in the marshes of the Shubenacadia, Avon, and King's County Rivers, the alluvia of the sea are perfectly stratified. Some of these strata and those called "blue marsh" are composed in part of plants still undergoing decomposition and expelling carburetted hydrogen. These strata are sometimes 12 feet beneath the surface, and interlaid with beds of alluvium, which, when their layers are exposed, display with beautiful distinctness the tracks of the numerous wading birds that frequent the shores. It is almost unnecessary to add that sea-alluvia never accumulate above the highest tide mark.

On the southern side of this Province, where it meets the Atlantic, the old fishermen universally report the effects of uplifting at certain places where they have been wont to anchor their nets and boats in pursuing their avocation. Off the harcor of Halifax, and Sambro Lighthouse, a submarine elevation appears to be advancing. A few years ago a steamer was wrecked in breakers six miles south of the lighthouse, after a gale of wind : breakers at that place were unknown before. Recent soundings also show a shallowing of the water.

Cape Breton.—In the Island of Cape Breton, situated at the entrance of the Gulf of St. Lawrence (and which the writer had an opportunity to explore under the patronage of the late noble Earl of Dundonald), several upheavings and depressions of the land were observed, not dissimilar to those already mentioned. Among the latter is that of the ancient city of Louisburg, which forms an interesting feature in Colonial history. This place was once the stronghold of France in America, and has one of the finest harbours in the world. It was well fortified: and a population of 20,000 souls was contained within its walls. It was taken from the French by 4000 provincial troops, under Colonel Pepperall, in 1745. Afterwards Great Britain restored it to France. In 1758 it was again captured by General Amherst. The place was defended by 3000 men six ships of the line, and five frigates: in this action the brave General Wolfe won an early distinction. The inhabitants of the city were dispersed; and the British Government expended £40,000 in blowing up the fortifications. The city is now occupied by six families of poor fishermen ; two stories of the hospital remain, as do the foundations of the Governor's house and other public buildings, with much of the massive masonry of the bomb-proofs and bastions. Among the ruins are seen fragments of exploded shells and other missiles, mingling with the crumbling bones of the killed. Had Louisburg continued to exist up to the present time, its abandonment would not have been the less certain, for the sea now flows within its walls and overflows sites that were formerly inhabited. Its submersion is plain and distinct. The rock upon which General Wolfe l. aded has nearly disappeared. The waves break against the south wall which they have undermined and thrown down. The higher parts of the fortress afford shelter for sheep ; but each succeding tide flows freely into the northern side of the deserted city. The lands westward also bear testimony to an extensive submergence.

Prince Edward's Island.—The fertile Prince Edward's Island is situated in the Gulf of St. Lawrence, fifty miles eastward of the Province of Nova Scotia. It is composed of red sandstone ; no workable strata of coal have been found within its limits. Of several sinkings of the earth noted by the writer during his geological survey of the island, one of them merits attention as being more recent than any other that met his observation. It is situated between Lennox Island and Cascumpec, a deep and well-sheltered harbour. The sea has here thrown up mounds of sand from the shallow water, which are separated from the mainland by lagoons. The lagoon between Richmond Bay und Cascumpec is upwards of thirty miles in length. Cascumpec lagoon is a beautiful sheet of water, eighteen miles long and a furlong in breadth, abounding in shellfish and

wild fowl; its mainland side is a dense wilderness, and this part of the coast was explored in canoes paddled by Indians.

The harbour of Cascumpec is formed by an extensive peat-bog on one side, and a long mound of sea sand on the other; it has sufficient water to float the largest ships. The peat forms a perpendicular wall which was measured at low water, and found to be 19 feet beneath the sea. It is also perpendicular above the water and forms the shore to the distance of two miles and a half. This peat-bog is composed of the common sphagneous plants interlaid with the pine, hemlock, and other forest-trees and low bushes, some of which are still in upright positions. There are no higher lands in the rear from which this bog could have made a slide, nor any remaining site from which it could have departed.

In the lagoon, the sea had flowed, at the time of the writer's visit, into groves of maple, beech, birch, &c., which are constantly falling down from the sea-water overflowing their roots. The marshes where they meet the water, are filled with fallen timber; and all taken together presents a desolate picture of the changes that are still in progress. This part of the island is very low and level; and, from the gradual submergence of the land, the drainage of the country is obstructed, and lands now capable of being cleared and cultivated, will in the course of years be overflowed by the sea, unless the submersion should be arrested.

At numerous places on the shores of the Gulf of St. Lawrence and on the coast of Labrador, deposits of sand and clay containing recent shells and relics of marine plants are found at heights varying from 5 to 80 feet above the level of the sea. These elevated tracts are seen, at considerable distances from the present shores with notches worn out of the rocks by waves and currents of water; there are also limestones perforated by the *Mytilus lithophagus*, from which the sea has long since been withdrawn. At some localities there are also evidences of depression, similar to those already described.

Labrador &c.—The Atlantic coast of Labrador and the Island of Newfoundland present the same phenomena, although they are less perfectly delineated by reason of the ice; for ice-floes break down the shore, and icebergs deposit mounds of sand, gravel and boulders along the sea-board, the winter and summer aspects of which are altogether dissimilar.

Conclusion.—From what has been stated, it must not be understood that these silent *undulatory* movements of the land are confined to the coasts and estuaries: they are manifest on the borders of the rivers and the great lakes of Canada and also on the tributaries of the Mississippi. Slight shocks of earthquakes are common in Canada and the United States; but it does not appear, in the history of those countries, that any material change in the relative levels of certain tracts has been effected thereby. Admitting, however, that earthquakes have been the cause of sudden sinkings and elevations of the land, and which would produce anomalous results, there is a slow and constant undulatory movement of the earth's surface, which no doubt acts as much on the ocean's bed as upon the dry land.

METEOROLOGY OF STRATFORD.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS AT STRATFORD, FOR THE YEAR 1861, BY C. J. MACGREGOR, M.A.

Approximate height of Stratford above the sea, 1182.

The instruments with which the observations, embodied in the annexed summary, have been taken, were made by Negretti & Zambra of London, England. They are fixed in position in a shed attached to the Grammar School, and are thus protected from being unduly influenced by radiation and the direct force of the wind. Their index and capillarity errors are known, and by the "tables of errors" the readings are corrected at the time of observation.

1. Barometer.

Mean height	28.6955	
Highest	29.317	on January 22, at 9 p.m
Lowest	27.943	on May 7, at 7 a.m.
Yearly range	1.374	
Greatest daily range	0.951	from 7 a.m. of Feb. 7th to Feb. 8th.

The "means" of all the months except June, August, September, and December, were below the mean for the year.

2. Temperature.

Mean of the year	43°53	
Highest	90°4	on August 2.
Lowest	-20°4	on January 13.
Yearly range	110°8	
Greatest monthly range	67°2	in February.
Least " "	31°6	in November.
Greatest daily range	36°5	on May 30.
Least " "	4°2	on April 2.
Warmest month, July, mean temperature.	65°9	
Coldest month, January, " "	18°6	

The "means" of six months, from May to October inclusive, were above the "mean" of the year.

3. Elasticity.

Mean of the year	.275

4. Humidity (Saturation being 100.)

Mean of the year	81

5. Amount of cloudiness (0-10.)

Mean of the year	6.5

6. Rain.

Number of days on which rain fell	119
Number of hours during which rain fell	759.45
Depth in inches	31.8135

The month in which the greatest amount of rain fell, was July, depth. 4.4772 inches. The month in which the least fell was January, depth, 0.4138 inches.

7. Snow.

Number of days on which snow fell.... 59
Number of hours during which snow fell 519.45
Depth in inches..... 80.4

The last day of the winter of 1860–1 on which snow fell was May 1st; first do. of 1861–2, Oct. 23rd. There was frost in every month except August.

8. Aurora.

Number of days on which Aurora was visible.....16
Number of days on which it was impossible to see Aurora.....199
Number of days on which it was possible to see Aurora.....150

CANADIAN INSTITUTE.

SESSION—1861–2.

FIRST ORDINARY MEETING—*7th December*, 1861.

Professor DANIEL WILSON, LL.D., President, in the Chair.

I. W. Manson, Esq., Spencer W. Wyndham, Esq., W. Nelson Burns, Esq., and James H. Kerr, (Junior Member) elected provisionally by the Council during the recess, were ballotted for and duly elected.

II. *Donations received since the last meeting of the Institute were announced* (see Annual Report.)

III. *The following Papers were read:*

By Professor Wilson, LL.D.:

"On indications of an Asiatic Origin for the American Race."

By P. Freeland, Esq.:

"Description of Wenham's new Binocular Microscope."

SECOND ORDINARY MEETING—*14th December*, 1861.

Professor DANIEL WILSON, LL.D., President, in the Chair.

I. *The following Gentlemen were elected members:*

DOCTOR SMITH, Bristol, C.E.
DOCTOR CRANSTON, Arnprior, C.W.
WALTER O'HARA, Esq., Toronto.

II. *The following Papers were read:*

By Professor Croft, D.C.L:

"Description of Griffin's Gas Furnace."

By the Rev. Professor Hincks:

"On a curious variety of Maize from Oregon, with remarks on some diseased specimens of Maize."

III. The requisite nominations for the election of office-bearers for the ensuing year, were made; and the President announced the Annual General Meeting to be held on the 21st instant, to receive the report of the Council, to elect office-bearers and Members of Council for the ensuing year, and for other business.

ANNUAL GENERAL MEETING—21*st December*, 1861.

Professor DANIEL WILSON, LL.D., President, in the Chair.

Major R. Dillon, of the 30th Regiment, was elected a member of the Institute.

II. The Report of the Council for the year 1860-61, was read and adopted on motion of S. B. Harman, Esq., seconded by Capt. Thomas Dick.

III. The following Gentlemen, nominated at the last meeting as the office-bearers and Council for the ensuing year, were declared duly elected, viz.:—

President,	Hon. J. H. HAGARTY, D.C.L.
1st Vice President,	Rev. Prof. G. C. IRVING, M.A.
2nd "	T. C. KEEFER, Esq., C.E.
3rd "	S. FLEMING, Esq., C.E.
Treasurer,	D. CRAWFORD, Esq.
Recording Secretary,	P. FREELAND, Esq.
Corresponding Secretary,	Rev. Prof. HATCH, B.A.
Librarian,	Prof. H. Y. HIND, M.A.
Curator,	J. F. SMITH, Jun., Esq.
Council,	DANIEL WILSON, LL.D.
"	Professor E. J. CHAPMAN.
"	Rev. Prof. W. HINCKS, F.L.S.
"	Hon. G. W. ALLAN, M.L.C.
"	Prof. H. CROFT, D.C.L.
"	Prof. J. B. CHERRIMAN, M.A.

IV. *The following Papers were read:*

By Professor Croft, D.C.L.:

"A Communication upon an old Chemical Joke."

By Professor Chapman:

"On the peculiar conditions of occurrence of certain Canadian Minerals, illustrated by a series of specimens."

THIRD ORDINARY MEETING—11*th January*, 1862.

Business postponed to January 18*th.*

FOURTH ORDINARY MEETING—18*th January*, 1862.

Hon. Mr. Justice HAGARTY, President, in the Chair.

I. Charles Robertson, Esq., proposed at the last meeting as a member of the Institute, was ballotted for, and duly elected.

II. *The following Papers were read:*

1. By the President:

"The Annual Address."

The Hon. G. W. Allan moved, seconded by Daniel Wilson, LL.D., that the cordial thanks of the Institute be given to the President for the very able and interesting Address now read.

2. By Prof. H. Y. Hind, M.A., F.R.G.S.:

"A communication embodying observations made during his expedition to the Labrador Coast in the summer of 1861."

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—OCTOBER, 1861.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Average	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.				Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M.	10 P.M	ME'N		6 A.M	2 P.M	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	10 P. M.	2 P.M.		6 A.M	2 P.M	10 P.M	Resul't.	ME'N	
					°	°	°	°	°												°						
1	30.054	29.906	29.744	29.8867	47.5	57.2	54.0	53.25	+ 2.83	.283	.325	.401	.341	.86	.69	.96	.84	N E b N	E	Calm.	N 80 E	2.5	6.2	0.0	2.53	2.65	...	...
2	29.641	.504	.487	.5393	50.0	64.5	59.1	59.12	+ 9.18	.356	.494	.438	.442	.99	.81	.87	88	Calm.	S S W	S W	S 42 W	0.0	13.0	8.0	8.73	9.61	...	...
3	.631	.689	.757	.7018	54.4	64.5	49.3	56.07	+ 6.53	.318	.284	.323	.303	.75	.47	.91	.70	W	W	Calm.	N 52 W	9.8	9.6	0.0	5.23	7.16	0.018	...
4	.685	.636	.592	.6255	52.2	52.9	50.9	51.52	+ 2.48	.369	.372	.354	.359	.95	.92	.95	.94	E b N	E N E	E b N	N 64 E	5.4	7.0	11.8	8.63	9.10	0.625	...
5	.497	.424	.383	.4337	49.7	59.4	55.4	55.25	+ 6.63	.338	.470	.428	.419	.95	.93	.98	.96	N b W	E b S	N N E	N 40 E	1.8	4.0	0.4	2.49	3.60	0.012	...
6	.438	.393	—	—	55.5	51.1	—	—	—	.369	.373	—	—	.84	.99	—	—	N	N	N W	N 23 W	9.0	5.0	8.0	5.91	7.32	0.415	...
7	.760	.748	.736	.7552	40.3	52.9	48.6	47.40	— 0.45	.236	.318	.302	.284	.95	.78	.88	.86	N W	S S E	N N E	N 21 E	3.8	4.0	4.2	1.66	3.48	...	...
8	.804	.853	.892	.8610	44.3	57.3	47.5	50.23	+ 2.83	.258	.357	.276	.301	.89	.76	.84	.82	N b E	S	S E b E	S 86 E	6.2	5.4	2.0	1.57	4.37	...	...
9	.952	.937	.893	.9273	44.6	58.7	53.3	52.22	+ 5.15	.235	.250	.366	.291	.80	.51	.89	.75	N N E	E	E N E	N 69 E	6.5	5.8	4.4	4.32	5.06	..	...
10	.877	.801	.677	.7778	45.0	59.1	51.1	52.33	+ 5.67	.288	.345	.320	.327	.96	.68	.85	.84	Calm..	E S E	N E	E	0.0	7.3	4.4	2.15	3.76	...	...
11	.529	.408	.425	.4530	51.5	56.2	50.0	52.75	+ 6.50	.367	.406	.335	.360	.96	.90	.93	.90	Calm.	W b S	W b S	S 72 W	0.0	4.5	4.0	2.02	2.99	0.058	...
12	.260	.102	168	1713	40.3	47.9	43.9	45.28	— 0.68	.209	.260	.218	.235	.84	.77	.75	.77	Calm.	W b S	W b S	S 59 W	0.0	11 5	9.2	8.31	9.50	0.005	...
13	.237	.410	—	—	37.0	52.9	—	—	—	.201	.246	—	—	.91	.61	—	—	—	W b S	N W	W	N 61 W	3.1	18.2	4.0	10.86	11.35	0.005	...
14	.572	.473	.604	.5547	36.3	63.2	48.6	50.12	+ 4.85	.193	.360	.269	.273	.90	.62	.79	.75	W b N	S W b S	W N W	S 71 W	1.8	9.2	8.2	5.74	6.73	.	...
15	.740	.749	.764	.7575	35.2	53.6	46.8	46.23	+ 1.33	.172	.213	.282	.229	.84	.52	.89	.74	W b N	S S E	N E	N 69 E	0.5	4.0	4.0	2.54	4.02	.	...
16	.696	.627	.599	.6383	49.3	57.2	51.1	52.73	+ 8.20	.323	.302	.352	.362	.91	.83	.94	.90	N E	E S E	Calm.	S 84 E	7.8	3.0	0.0	2.23	2 49	...	...
17	.600	.578	.546	.5708	53.3	61.2	56.2	56.83	+12.60	.377	.410	.371	.381	.92	.76	.82	.83	S E b E	E b S	N N E	N 50 E	2.4	3.5	5.5	2.97	4 07	0.080	...
18	.465	.437	.481	.4603	55.8	60.5	55.4	56.83	+12.80	.388	.419	.429	.407	.87	.80	.98	.88	N N E	N N E	N E	N 63 E	6.0	2.6	1.8	3.49	4.29	0.030	...
19	.412	.339	.494	.4202	53.3	55.8	46.4	51.63	+ 7.85	.399	.334	.249	.320	.98	.74	.79	.82	E b S	W	N W b N	N 79 W	6.5	15.0	11.0	6.04	8.02	0.072	...
20	.632	.770	—	—	41.0	50.0	—	—	—	.210	.232	—	—	.51	.63	—	—	W b S	N W b W	Calm.	N 55 W	4.0	15.0	0.0	6.39	7.07	...	...
21	.939	.870	.753	.8473	34.2	49.0	43.6	44.40	+ 1.15	.177	.245	.269	.222	.89	.69	.79	.75	N b E	E b N	E b S	E	1.6	13.8	11.6	8.97	9.43	...	...
22	.845	.808	.333	.4765	39.2	55.5	53.6	51.03	+ 8.07	.207	.337	.395	.330	.87	.76	.96	.87	N E	S E b E	S b W	S 8 W	1.4	6.5	1.6	2.80	6.47	0.455	...
23	.293	.365	.543	.4175	44.2	45.4	33.4	40.75	— 2.00	.248	.216	.163	.198	.86	.70	.85	.77	N W b W	W	Calm.	N 80 W	20.2	14.0	0.0	9.63	10.20	0.043	...
24	.723	.904	30.006	.8990	31.6	40.3	30.0	34.27	— 8.23	.147	.176	.134	.155	.83	.69	.77	.78	N W b W	W N W	N b W	N 55 W	8.0	16.0	1.6	5.90	6.58	...	...
25	.995	.896	29.884	.9262	34.5	51.8	45.4	45.77	+ 3.43	.181	.259	.253	.241	.90	.67	.83	.78	S	S	S W	S 17 W	3.8	9.0	2.8	6.04	6.32	...	Inp.
26	.808	.795	.896	.8363	47.9	47.2	38.9	44.22	+ 2.23	.278	.268	.194	.247	.84	.82	.81	.83	S W b W	N W b N	N W	N 72 W	6.0	5.5	6.0	4.76	6.50	Inp.	...
27	.960	.963	—	—	36.3	45.4	—	—	—	.168	.162	—	—	.78	.52	—	—	N N W	S	N N E	N 34 E	7.5	6.0	7.0	1.56	4.38	...	...
28	.908	.812	.672	.7898	31.6	46.8	35.6	38.52	— 2.97	.118	.225	.166	.176	.66	.70	.80	.74	N N E	S S E	E b S	S 75 E	4.0	5.8	3.8	2.20	3.71	...	...
29	.570	.309	.068	.2892	34.2	47.9	46.4	42.82	+ 1.55	.177	.221	.298	.227	.89	.66	.94	.81	N E b N	E b S	Calm.	S 83 E	4.8	7.2	0.0	3.64	5.17	0.105	...
30	28.998	.032	.195	.0910	41.7	42.3	38.8	40.83	— 0.12	.264	.227	.213	.229	1.00	.83	.90	.89	W	S b W	Calm.	S 44 W	5.0	6.4	0.0	4.30	4.67	0.070	...
31	29.374	.595	.787	.6033	40.7	47.9	43.5	43.48	+ 2.73	.231	.230	.250	.236	.91	.69	.89	.84	W S W	N W b W	Calm	N 55 W	7.0	10.5	0.0	3.52	4.08	...	...
M	29.6455	29.6036	29.6068	29.6191	43.81	53.94	47.51	48.74	+ 3.70	.264	.312	.298	.292	.89	.73	.87	.82					4.72	8.21	4.04		5.98	1.993	Inp.

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR OCTOBER, 1861.

Highest Barometer..... 30.054 at 6 a. m. on 1st } Monthly range =
Lowest Barometer ..... 28.998 at 6 a. m. on 30th } 1.056 inches.

Self-registering Thermom.

Maximum Temperature ..... 71°0 on p.m. of 2nd } Monthly range=
Minimum Temperature ..... 29°0 on a.m. of 25th } 42°0

Mean maximum Temperature ..... 55°34 } Mean daily range=
Mean minimum Temperature ..... 41°62 } 13°73

Greatest daily range ..... 31°0 from a. m. to p. m. of 14th.
Least daily range..... 3°6 from a. m. to p. m. of 23rd.

Warmest day..... 2nd... Mean temperature..... 59.12 } Difference = 24°85.
Coldest day..... 24th... Mean temperature..... 34°27 }

Maximum } Solar..... 81°6 on p. m. of 3rd } Monthly range =
Radiation. } Terrestrial..... 22°0 on a. m. of 25th } 59°6

Aurora observed on 6 nights, viz.: 10th, 13th, 14th, 24th, 25th, and 27th.
Possible to see Aurora on 17 nights; impossible on 14 nights.
Snowing on 1 day, inappreciable; duration of fall, 1.0 hours.
Raining on 15 days,—depth 1.993 inches; duration of fall 53.6 hours.
Mean of cloudiness = 0.61. Difference from average 0.00.
Most cloudy hour observed, 2 p. m., mean = 0.69; least cloudy hour observed 10 p.m.; mean, = 0.51.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1393.90	1014.93	1251.35	1940.96

Resultant direction N. 61° W.; Resultant velocity 1.06 miles per hour.
Mean velocity..... 5.96 miles per hour.
Maximum velocity ..... 30.9 miles, from 11 a. m. to noon on 13th.
Most windy day .....13th..... Mean velocity, 11.35 miles per hour. } Difference=
Least windy day.....16th..... Mean velocity, 2.49 ditto. } 8.86 miles.
Most windy hour.....noon to 1 p.m.....Mean velocity, 9.24 ditto. } Difference=
Least windy hour.....1 to 2 a.m.....Mean velocity 4.01 ditto. } 5.23 miles.

2nd. Ground Fog at 6 a.m.—5th. Sheet Lightning at 8 p.m., and Fog from 7 p.m to midnight.—7th. Solar Halo during the forenoon (very perfect).—8th. Low Ground Fog from 10 p.m. to midnight.—9th. Solar Halo during most of the day.—10th. Ground Fog at 6 a.m. Solar Halo at 9 a.m.—11th. Ground Fog at 6 a.m. Rainbow at 5 p.m.—13th. Rainbow in N.W. 8 to 9 a.m.—14th. Lunar Corona from 11 p.m. to midnight.—15th. Solar Halo at 2 and 4 p.m.—16th. Foggy from 5 p.m. to midnight. Lunar halo at midnight.—18th. Foggy at midnight and continuing so all night.—19th. Dense Fog at 8 a.m.—21st. Brilliant Meteor at 10 p.m., descending from Zenith towards W. by N.—24th. Snowing slightly from 6 to 8 a.m. (First of the season).—26th. Incessant sheet lightning in S. from 9 to 11.30 p.m. 29th. Dense Fog at midnight.

Heavy Dew recorded on 5 mornings during the month.
Frost recorded on 11 mornings during the month.

The Resultant Direction and Velocity of the Wind for the month of October, from 1848 to 1861 inclusive, were respectively N. 56 W. and 1.67 miles.

COMPARATIVE TABLE FOR OCTOBER.

Year.	Temperature. M'n.	Diff. from Aver.	Max. ob'd.	Min. ob'd.	Range.	Rain. No. of days.	Rain. Inch's.	Snow. No. of days.	Snow. Inch's.	Wind. Resultant Direction, V'y.	Mean Force or Velocity.
	°	°	°	°	°						
1840	44.4	−1.1	68 5	23.9	44.6	13	1.860	3	...	... ...	.....
1841	41.6	−3.9	58.3	20.3	38.0	6	1.360	2	...	... ...	0.41 lbs.
1842	45.1	−0.4	68.5	30.0	38.5	8	5.175	0	...	... ...	0.35
1843	41.8	−3.7	65.7	24.5	41.2	12	3.799	4	2.5	... ...	0.54
1844	43.3	−2.2	69.6	17.8	51.8	7	Imp.	4	12.0	... ...	0.43
1845	46.4	+0.9	62.7	20.0	42.7	11	1.760	1	Inap.	... ...	0.26
1846	44.6	−0.9	69.7	20.7	49.0	14	4.180	2	Inap.	... ...	0.44
1847	44.0	−1.5	65.0	20.3	44.7	13	4.390	2	Inap	... ...	0.19
1848	46.3	+0.8	62.2	26.4	35.8	11	1.550	0	0.0	N 54° W	1.24 4.60mls.
1849	45.3	−0.2	59.2	25.5	33.7	13	5.965	1	Inap	N 12° W	1.27 4.76
1850	45.4	−0.1	66.6	24.8	41.8	10	2 085	0	0.0	N 66° W	1.10 5.30
1851	47.4	+1.9	66.1	25.0	41.1	10	1.680	2	0.3	S 72° W	1.06 4.39
1852	48.0	+2.5	70.7	29.8	40.9	12	5 280	0	0.0	N 5° E	1.19 4.47
1853	44.4	−1.1	64.7	25.5	39.2	10	0.875	2	Inap.	S 88° W	1.74 4.77
1854	49.5	+4.0	74.2	29.8	44.4	15	1.495	3	Inap.	N 45° W	1.52 4.57
1855	45.4	−0.1	64.3	28.0	36.3	14	2.485	5	0.8	N 82° W	4.91 9.88
1856	45.3	−0.2	70.1	23.3	46.8	10	0.875	2	0.1	N 76° W	2.15 6.07
1857	45.4	−0.1	63.5	27.7	35.8	10	1.040	2	0.2	N 19° W	2.93 6.24
1858	48.8	+3.3	76.3	34.2	42.1	17	1.797	1	Inap.	N 34° W	0.36 5.96
1859	43.0	−2.5	68.4	22.3	46.1	11	0.940	4	Inap.	N 68° W	5.04 8.12
1860	47.3	+1.8	63.7	28.4	35.3	15	1.618	1	Inap.	N 9° W	2.00 6.93
1861	48.7	+3.2	64.5	30.2	34.3	15	1.993	1	Inap.	N 61° W	1.06 5.96
M	45.52	...	66.48	25.38	41.10	11.7	2.485	1.9	0.84	.....	... 5.86 Ml.
Diff. from av'g.	+ 3.22	...	— 1.98	+ 4.82	— 6.80	+ 3.3	— 0.492	— 0.9	— 0.84	.....	... + 0.10

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—NOVEMBER, 1861.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Average	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Result't, Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M.	2 P.M	10PM	ME'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P.M.		6 AM.	2 PM.	10 P.M.	Result.	ME'N		
					°	°	°	°	°												°							
1	29.894	29.919	29.822	29.8765	41.0	43.2	43.5	42.45	+ 1.98	.211	.209	.240	.222	.81	.74	.81	.81	N E b N	E N E	E b N	N 70 E	5 0	9.0	17.5	10.77	10.94	0.415	...
2	.595	.368	.121	.3245	41.7	39.9	40.3	40.33	+ 0 07	.255	.233	.228	.235	.93	.95	.91	.94	E N E	N E b E	N E b E	N 51 E	21.6	21.0	25.2	18.30	20.73	3.132	...
3	.043	.085	—	—	39.2	44.3	—	—	—	.216	.214	—	—	.90	.72	—	—	N W	W S W	W S W	S 79 W	13.3	9.5	6.0	7.83	8.25	.195	...
4	.237	.298	.351	.3022	36.3	44.3	39.9	40.05	+ 0.28	.193	.204	.224	.206	.90	.69	.91	.83	W b S	W b S	Calm.	S 75 W	8.6	16.0	0.0	6.50	6.85	.005	0.2
5	.241	.229	.219	.2282	44.6	51.5	42.8	46.07	+ 6.58	.264	.254	.250	.256	.90	.66	.90	.82	S W b W	S S W	Calm.	S 43 W	2.5	8.6	0.0	2.46	3.83	...	...
6	.179	.263	.426	.3053	44.3	50.8	37.8	43.80	+ 4.63	.268	.195	.190	.219	.92	.50	.84	.77	N N W	N	W b N	N 36 W	7.4	9.2	3.8	6.23	6.85	Inp.	...
7	.514	.546	.559	.5482	34.2	44.3	35.6	38.25	— 0.75	.168	.157	.167	.164	.85	.53	.80	.73	Calm.	N N W	Calm.	N 39 W	0.0	4.3	0.0	2.89	3.13	...	...
8	.480	.404	.411	.4310	34.9	44.6	41.7	40.65	+ 1.97	.176	.235	.210	.209	.86	.80	.79	.82	Calm.	Calm.	N W b W	N 57 W	0.0	0.0	1.0	0.66	1.42	Inp.	...
9	.515	.553	.622	.5702	32.4	43.2	32.7	35.92	— 2.48	.152	.122	.157	.152	.83	.42	.85	.78	Calm.	N W b N	Calm.	N 22 W	0.0	5.4	0.0	2.26	2.42	...	...
10	.671	.574	—	—	32 4	42.8	—	—	—	.169	.213	—	—	.91	.77	—	—	N E b N	S E b E	E S E	S 51 E	1.4	12.2	6.0	7.73	9.14	0.090	...
11	.220	.482	.812	.5403	46.8	47.2	37.1	42.82	+ 5.03	.295	.192	.174	.210	.92	.59	.78	.76	N W b W	W b N	W S W	N 80 W	9.5	30.5	5.3	15.20	15.40	0.020	...
12	.074	.024	.836	.9113	29.5	43.5	40 7	37.83	+ 0.33	.144	.186	.196	.179	.87	.66	.77	.79	S W b W	S b W	S E b E	S 45 E	1.0	4.5	0.8	1.37	3.59	0.025	...
13	.658	.578	.700	.6478	42.1	44.6	39.2	41.73	+ 4.55	.213	.235	.164	.201	.79	.80	.68	.75	E	E N E	W N W	N 37 W	7.0	0.6	15.5	1.11	3.44	...	...
14	.724	.631	.510	.6103	38.1	41.0	34.5	37.38	+ 0.48	.213	.167	.114	.158	.93	.63	.57	.69	N W	N W b N	N b W	N 24 W	11.5	7.8	1.0	5.34	6.43	...	...
15	.439	.434	.516	.4728	30.6	34.5	31.3	31.70	— 4.80	.131	.114	.114	.118	.76	.57	.65	.66	N	N	N W b N	N 36 W	2.2	10.8	11.6	11.14	11.82	...	0.1
16	.508	.550	.665	.5873	28.8	34.2	34.5	32.37	— 3.83	.144	.131	.157	.143	.90	.66	.78	.78	N W b W	N W b N	N W b N	N 37 W	16.8	36.8	10.4	18.92	19.10	...	0.1
17	.632	.620	—	—	28.7	39.2	—	—	—	.145	.173	—	—	.92	.72	—	—	W N W	N W	N N W	N 43 W	5.0	15.0	10.0	9.73	9.93	...	...
18	.666	.720	.858	.7610	27.0	40.7	33.4	33.25	— 2.23	.129	.188	.134	.144	.88	.73	.70	.75	N W b N	N W b N	N b W	N 17 W	4.4	10.2	12.6	9.11	9.38	..	...
19	.933	.902	.836	.8897	27.0	38.5	36.0	33.47	— 1.62	.106	.129	.172	.138	.73	.55	.81	.71	N b W	S b E	E b S	N 79 E	2 0	2.5	8 0	4.12	4.83	...	...
20	.727	.563	.591	.6190	37.1	40.1	39.2	38.70	+ 3.93	.158	.169	.207	.182	.71	.68	.87	.77	E b S	E b S	N E	S 82 E	10.0	8.0	2.0	5.18	5.30	0.127	...
21	.706	.826	.862	.8053	37.8	42.8	35.3	38.50	+ 4.12	.217	.250	.198	.219	.96	.90	.96	.93	Calm.	Calm.	Calm.	S 77 E	0.0	0.0	0.0	0.45	0.60	Inp	...
22	.811	.522	.138	.4535	37.8	39.6	42.1	39.87	+ 5.78	.217	.184	.204	.204	.96	.75	.76	.83	S E	E	E	S 72 E	5.0	16.5	17.5	9.85	14.42	0.230	...
23	.193	.153	.133	.1593	34.2	36 7	35.2	35.20	+ 1.53	.160	.168	.172	167	.81	.75	.84	.81	S W b W	S S W	S W b S	S 39 W	16.5	13.6	2.5	6.57	7.35	...	0.3
24	.091	.065	—	—	30.6	32.7	—	—	—	.144	.129	—	—	.85	.68	—	—	Calm.	S W b W	Calm.	S 58 W	0.0	3.2	0.0	1.47	1.54	...	Inp.
25	.207	.323	.448	.3440	25.1	35.6	31.6	30.67	— 2.30	.123	.167	.156	.148	.91	.80	.87	.86	Calm.	Calm.	N	N 16 W	0.0	0.0	1.0	0.47	0.48	...	...
26	.606	.676	.747	.6848	27.3	30.9	30.2	32.18	— 0.38	.133	.131	.142	.143	.89	.73	.84	.79	N N W	S S W	W b N	S 47 W	0.2	6.2	2.8	1.84	3.31	...	...
27	.621	.370	.433	.4752	36.0	36.0	33.4	35.02	+ 2.83	.180	.196	.140	.166	.85	.93	.74	.81	S b E	S b E	S W b W	S 32 W	12.5	9.0	16.5	7.32	11.53	0.055	0.2
28	.653	.630	.510	.6022	28.0	32.2	32.4	30.43	— 1.45	.117	.126	.176	.139	.76	.69	.96	.81	W S W	S W	S E b E	S 30 E	7.8	1.5	12.0	2.41	5.52	...	2.0
29	.190	.358	.436	.3343	36.0	38.9	33.4	35.73	+ 4.23	.206	.160	.163	.177	.97	.67	.85	.84	Calm.	W S W	W b S	S 78 W	0.0	11.0	4.0	6.84	7.10	Inp.	...
30	.410	.437	.590	.4862	32.7	33.8	27.7	31.33	+ 0.25	.172	.122	.106	.137	.92	.63	.70	.77	W b S	W b S	Calm.	S 81 W	10.5	20.4	0.0	8 34	8.42	...	0.5
M	29.5348	29.5253	29.5443	29.5371	35.05	40.83	36.21	37.14	+ 0.99	.182	.180	175	.178	.87	.69	.81	.79	.....	.....	.....	.....	6.06	10.11	6.35	.....	7.44	4.294	3.2

Highest Barometer . . . . . 30.000 at 8 a. m. on 12th. } Monthly range=
Lowest Barometer . . . . . 29.005 at midn't on 22nd. } 0.995 inches.

Self-registering Thermometer.
- Maximum temperature . . . . 52°4 on p.m. of 5th } Monthly range=
- Minimum temperature . . . . 23°0 on a.m. of 18th } 29°4
- Mean maximum temperature . . 42°39 } Mean daily range=10°40
- Mean minimum temperature . . 31°99 }
- Greatest daily range . . . . . 20°4 from a. m. to p.m. on 10th.
- Least daily range . . . . . 3.5 from a. m. to p. m. on 30th.

Warmest day . . 5th ... Mean Temperature . . .=48°07 } Difference=15°40.
Coldest day . . . 25th ... Mean Temperature . . .=32°67 }
Maximum { Solar . . . . . 70°0 on p. m of 7th } Monthly range=
Radiation { Terrestrial . . . . . 12°0 on a. m. of 18th } 58°0.

Aurora observed on 1 night, viz.: on 7th. Possible to see Aurora on 11 nights; impossible on 19 nights.
Snowing on 8 days: depth, 3.2 inches; duration of fall, 17.4 hours.
Raining on 14 days; depth, 4.294 inches; duration of fall, 48.1 hours.
Mean of cloudiness=0.74; Difference from average, 0.00 Most cloudy hour observed, 8 a.m.; mean =0.78; least cloudy hour observed, 4 p.m.; mean=0.71.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
1867.64	899.10	1519.52	2522.28

Resultant direction, N 46° W; Resultant Velocity, 1.94 miles per hour.
Mean velocity 7.44 miles per hour.
Maximum velocity 36.3 miles, from 2 to 3 p.m. on the 16th.
Most windy day 2nd—Mean velocity 20.73 miles per hour. } Difference 20.25 miles.
Least windy day 25th—Mean velocity 0.48 miles per hour. }
Most windy hour, 11 a.m. to noon—Mean velocity, 11.00 miles per hour. } Difference
Least windy hour, 6 a.m. to 7 p.m.—Mean velocity, 5.58 miles per hour. } 5.42 miles.

2nd. Stormy day. Very high wind and heavy rain.—9th. Solar halo during the forenoon.—10th. Lunar halo at 8 p.m.—11th. Lunar corona from 10 p.m.—14th. Indistinct lunar halo at 7.50 p.m.—16th. Indistinct solar rainbow at 9.20 a.m.—17th. Faint solar halo from noon to 2 p.m.—21st. Fog at 10 p.m. and midnight.—25th. Lunar halo at 5.30 a.m., and solar halo at 9 a.m.—27th. Indistinct lunar halo at 6 a.m.—29th. Fog at 6 a.m.

The averages derived from the observations of the last 22 years shew that November, 1861, was comparatively warm, very rainy, and rather calm; it had a little more than the mean depth of snow, and exactly the average amount of cloudiness.

The Resultant Direction and Velocity of the Wind for the month of November from 1848 to 1861 inclusive, were respectively N.76° W., and 2.29 miles.

COMPARATIVE TABLE FOR NOVEMBER.

YEAR.	TEMPERATURE. Mean.	Difference from Average.	Maximum observed.	Minimum observed.	Range.	RAIN. No. of days.	Inches.	SNOW. No. of days.	Inches.	WIND. Resultant. Direction.	Velocity.	Mean Velocity
	°		°	°	°							
1840	35.9	— 0.8	54.4	20.5	33.9	5	1.220	8	...	...	...	...
1841	35.0	— 1.7	63.2	7.6	55.6	8	2.450	5	...	...	...	0.91lbs
1842	33.3	— 3.4	50.6	7.6	43.0	9	5.310	10	...	...	...	1.22 "
1843	33.5	— 3.2	51.2	14.4	36.8	10	4.765	7	1 2	...	...	0.59 "
1844	34.9	— 1.8	49.8	12.0	37.8	8	Imp.	4	8.0	...	...	0.48 "
1845	36.8	+ 0.1	58.8	7.6	51.2	7	1.105	4	5.0	...	...	0.53 "
1846	41.3	+ 4.6	55.5	18.2	37.3	12	5.805	2	0.4	...	...	0.64 "
1847	38.6	+ 1.9	58.2	7.8	50.4	14	3.155	3	Inp.	...	...	0.36 "
1848	34.5	— 2.2	49.3	16.5	32.8	9	2.020	3	1.4	N 81 w	1.81	4.81ms.
1849	42.6	+ 5.9	66.7	28.4	38.3	10	2.815	2	1.0	N 39 W	1.55	4.78 "
1850	38.8	+ 2.1	62.3	18.1	44.2	7	2.955	1	Inp.	N 42 w	1.43	5.27 "
1851	32.9	— 3.8	50.1	16.5	33.6	5	3.885	6	6.7	N 50 W	1.25	4.7u "
1852	36.0	— 0.7	50.4	18.7	31.7	7	1.775	3	2.0	N 59 W	1.53	6.50 "
1853	38.7	+ 2.0	54.1	14.4	39.7	15	2.425	6	2.7	N 9 W	0.55	5.52 "
1854	36.8	+ 0.1	54.9	15.1	39.8	13	1.115	4	1.3	W	3.44	7.54 "
1855	38.6	+ 1.9	54.1	18.7	35.4	8	4.590	6	3.0	N 66 w	3.18	10.81 "
1856	37.4	+ 0.7	56.4	22.8	33.6	10	1.375	9	9.5	s 85 w	2.95	8.75 "
1857	33.5	— 3.2	57.8	—2.3	60.1	14	3.235	9	6.9	s 61 W	5.45	9.25 "
1858	34.2	— 2.5	52.0	20.5	31.5	12	3.879	13	4.0	N 25 W	3.14	8.87 "
1859	38.9	+ 2.2	61.0	24.1	36.9	12	5.193	9	0.6	N 81 w	3.39	9.65 "
1860	37.9	+ 1.2	62.7	14.0	48.7	12	2.569	8	1.9	s 89 w	4.95	11.02 "
1861	37.1	+ 0.4	51.5	25.1	26.4	14	4.294	8	3.2	N 46 W	1.94	7.44 "
Mean	36.69	...	55.23	15.74	39.49	10.0	3.140	5.9	3.10	...	...	7.49
Diff. from Av'ge.	+0.45	...	—3.73	+ 9.36	— 13.09	+ 4.0	+ 1.154	+ 2.1	+ 0.10	N 76 w	2.29	—0.05

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—OCTOBER, 1861.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., LL.D.

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

Day.	Barom. corrected and reduced to 32°			Temp. of the Air.—F.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Horizontal Movement in Miles in 24 hours.	Mean of Ozone. (tenths)	Rain in Inches.	Snow in Inches.	WEATHER, &c. A cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.					6 A. M.	2 P. M.	10 P. M.
1	30.315	30.250	30.160	40.0	60.9	50.6	.232	.310	.309	.96	.60	.85	s w	s s e	s b w	4.80	2 0	...	...	Fog.	Clear.	Cirr. Str. 8.
2	29.952	29.748	29.474	46.4	74.3	60.4	.286	.469	.456	.92	.57	.88	s s e	s b e	s b e	41.00	2.0	...	...	C. C. Str. 6.	Cu. Str. 6.	Do. 8.
3	678	721	903	61.0	64.0	50.2	.449	.314	.265	.85	.53	.75	w b s	w	N N W	220.80	2.5	...	...	Clear.	C. C. Str. 6.	Clear.
4	964	934	98:	43.0	60.0	46.1	.224	.456	.286	.79	.88	.92	s s e	s s e	s s e	22.90	3.5	In'p.	...	Cum.	Cu Str. 10.	Do.
5	796	719	758	40.0	41.6	43.0	.225	.251	.261	.91	.96	.95	N E b E	N E b E	N W	242.90	5.0	0.836	...	Rain.	Rain.	Rain.
6	629	647	700	51.0	57.9	55.5	.351	.429	.405	.96	.91	.94	s s e	s s e	N E b E	91.30	4.0	...	...	Cu. Str. 10.	Cu. Str. 8.	Do.
7	924	932	30.020	50.0	53.1	48.2	.297	.295	.310	.85	.73	.91	N E b E	N E b E	s	147.10	4.5	0.523	...	Cu. Str. 4.	Do. 6.	Cu. Str. 10.
8	30.021	30.010	074	46.4	53.0	45.1	.269	.248	.275	.88	.86	.91	W S W	S E	s s w	12.80	3.5	0.420	...	Rain.	Do. 6.	Clear.
9	150	127	206	41.0	68.2	48.7	.235	.476	.329	91	.69	.94	s s w	S	S E	0.30	3.0	...	...	Fog.	Clear.	Clear.
10	120	100	020	36.7	68.4	49.6	.236	.536	.315	.95	.77	.89	s s e	s s e	E	1.20	3.0	...	...	Fog.	Do.	Clear. A. B. S.
11	29.851	29.814	29.701	43.0	49.2	47.3	.254	.322	.316	.92	92	.97	E	N E b E	N E b E	73.49	4.0	1.236	...	Cu. Str. 8.	Rain.	Cu. Str. 10.
12	601	406	412	50.0	68.4	50.4	.341	.606	.353	.96	.86	.93	w	W S W	S S E	88.80	5.0	1.694	...	Rain.	C. C. Str. 6.	Do. 10.
13	401	394	521	43.6	52.0	46.3	.254	.208	.280	.92	.53	.89	W S W	W N W	W	229.80	5.5	0.044	...	Cu. Str. 8.	Clear.	Clear.
14	632	624	701	41.9	59.0	49.0	.228	.380	.290	.86	.76	.82	W S W	W S W	S W	276.50	4.5	...	...	Do. 8.	Cu. Str. 4.	Cum. 3.
15	790	814	972	40.1	58.4	45.0	.225	.394	.245	.91	.82	.86	S W	S W	S W	155.90	4.0	...	...	Clear.	Clear.	Clear.
16	30.070	954	884	35.1	50.9	46.1	.183	.277	.286	.90	.75	.92	E S E	E N E	N E b E	54.40	3.5	...	...	Cu. Str. 10.	Cu. Str. 9.	Cu. Str. 10.
17	29.801	851	850	45.1	68.6	56.1	.275	.606	.391	.92	.88	.87	E S E	S S E	s b e	20.40	2.5	...	...	Do. 10.	C. C. Str. 4.	Cir. Cum. 6.
18	710	670	762	54.1	49.9	45.6	.390	.315	.293	.93	.89	.90	S S E	N E b E	N E b E	150.90	3.5	0.396	...	Do. 6.	Do. 8.	Cu. Str. 10.
19	697	511	497	44.1	48.1	45.2	.265	.310	.275	.92	.92	.92	N E b E	N E b E	W	158.60	5.5	0.014	...	Rain.	Cu. Str. 4.	Do. 4.
20	567	814	997	44.2	48.2	35.0	.265	.285	.175	.92	.85	.89	W	W N W	W b N	430.98	5.5	In'p.	...	Cu. Str. 8.	Do. 6.	Clear.
21	30.151	30.160	30.172	26.0	47.0	55.6	.111	.290	.177	.81	.90	.85	W S W	S S W	E S E	32.80	2.5	...	...	Clear. Frost.	Clear.	Do.
22	040	29.840	29.830	28.4	56.9	51.0	.129	.275	.309	82	.60	.85	N E b E	E S E	S S E	88.80	2.5	In'p.	...	Do. do.	Cu. Str. 8.	Cirr. Str. 8.
23	29.461	347	449	50.1	54.2	41.0	.341	.341	.235	.96	.83	91	S S E	W S W	S b E	230.20	5.0	In'p.	In'p	Cu. Str. 10.	Rain.	Do. 10.
24	750	891	30.200	31.3	39.0	29.0	.149	.158	.129	.85	.68	.82	W b	W b S	S W	364.90	5.0	In'p.	...	Do. 4.	C. C. Str. 4.	Clear. Au. B.
25	30.300	30.257	170	21.4	45.0	57.0	.090	.275	.177	.79	.92	.85	S S E	S E	S S E	48.70	3.0	...	...	Clear.	Do. 6.	Cir.Str.Ft.do.
26	080	001	29.912	36.0	51.6	46.7	.162	.348	.305	.84	.93	.96	S S E	S S E	S W	65.70	3.5	0.166	...	Cu. Str. 10.	Cirr. Str. 10.	Rain.
27	100	094	30.101	35.0	47.1	32.1	.183	.273	.142	.90	.85	.84	W	N b E	N W	128.10	3.5	...	...	Do. 4.	Cirr. 4.	Clear. Au. B.
28	066	009	29.950	30.0	41.0	33.0	.142	.111	.156	.88	.44	.85	N N W	S W	S W	49.60	3.0	...	...	Clear.	Clear.	Do.
29	29.750	29.453	541	28.0	56.0	40.5	.155	.315	.197	.88	.71	.78	S W	S W b S	S S E	75.00	2.5	...	...	Do.	Do.	Do.
30	301	357	400	30.1	44.0	41.0	.156	.248	.241	.85	.88	.95	N E b E	N N E	N E b E	11.70	5.5	In'p.	...	Do.	C. C. Str. 6.	Cu. Str. 10.
31	534	660	876	39.0	46 1	39.4	.216	.262	.210	.91	.86	.86	N E b E	S W	W S W	159.90	5.0	0.041	...	Cu. Str. 10.	Cu. Str. 10.	Do. 4. Au. B

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—NOVEMBER, 1861.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M.D., LL.D.

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

Day.	Barom. corrected and reduced to 32°			Temp. of the Air.—F.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Horizontal Movement in Miles in 24 hours.	Mean of Ozone.	Rain in inches	Snow in inches.	Weather, &c. ; Cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6A.M.	2P.M.	10PM	6 A.M.	2 P.M.	10 P.M					6 A M.	2 P.M.	10 P.M.
1	30.100	30.142	30.167	30.1	47.6	36.6	.148	.208	.149	89	66	71	W S W	S W by S	N E by E	61.50	2.0	...	...	Clear.	C. C. Str. 8.	Cu. Str. 4.
2	201	29.940	29.854	30.1	34.2	36.1	148	155	191	89	79	90	N E by E	N E by E	N E by E	258.70	2.5	...	Inap.	Cu. Str. 10.	Cu. Str. 8.	Rain.
3	29.497	421	387	35.1	42.1	41.0	183	244	241	90	91	95	N E by E	N E by E	N E by E	487.00	4.0	0.214	...	C. C. Str. 10.	Rain.	Do.
4	371	412	558	40.0	48.3	39.0	248	242	216	100	74	91	S S E	S by E	S S E	98.40	4.5	0.112	...	Light Rain.	C. C. Str. 8.	Cu. Str. 4.
5	567	521	567	34.2	47.0	43.0	155	258	281	79	81	88	S S E	E S E	N E	46.40	2.0	...	...	Cu. St. 10.	Cu. Str. 10.	Do. 10.
6	500	465	442	37.0	44.0	44.0	206	265	266	95	92	93	N E by E	N E by E	N W	87 20	1.5	...	...	Fog.	Do. 10.	Rain.
7	574	567	641	39.2	45.7	36.0	216	198	156	91	65	75	W S W	W	W S W	209.50	1.5	...	...	C. C. Str. 8.	Do. 4.	Clear.
8	660	567	755	31.9	41.5	33.2	144	126	156	80	49	84	W by S	S W by S	S E by E	217.30	1.0	...	...	Clear. Au. Bo.	Clear.	Cu. Str. 10.
9	661	642	701	32.1	41.4	35.0	130	190	149	74	73	74	S E	S S E	W	41.50	1.0	Inap.	...	Do.	Cu. Str. 10.	Do. 10.
10	894	30.001	981	23.0	43.0	33.0	106	127	154	86	47	86	S by W	E	S E	21.70	1.0	...	...	Do. Au. Bo.	C. C. Str. 4.	C. C. Str. 10.
11	477	29.459	632	38.9	42.0	40.0	216	293	210	91	96	86	S S E	E S E	W S W	220.30	3.0	0.673	...	Cu. Str. 10.	Rain.	Cu. Str. 8.
12	30.042	30.047	30.120	32.5	57.5	32.0	162	110	149	89	49	89	W S W	W by N	N W	397.40	2.5	0.014	...	Do. 10.	C. C. Str. 8.	Do. 9.
13	29.931	29.930	29.801	27.5	34.2	33.0	111	138	150	75	71	89	E	E S E	S by W	15.80	2.0	...	...	C. C. Str. 8.	Cu. Str. 10.	Do. 9.
14	754	746	780	31.0	38.1	30.0	136	144	136	78	63	83	S W	S W	S W	333.40	1.5	...	...	Str. 4.	Cirr. 2.	Cirr. Str. 2.
15	530	450	494	28.5	33.0	30.0	111	131	148	71	70	89	W N W	W N W	W by N	241.90	2.0	...	...	Cu. Str. 10.	Cu. Str. 2.	Snow.
16	357	519	617	27.3	38.4	37.3	129	186	157	88	81	71	S S W	S W	S	229.20	4.5	...	1.10	Do. 10.	Snow.	Cu. Str. 8.
17	650	657	670	31.1	39.4	30.0	142	178	117	84	78	72	S by W	S by E	W by N	236.60	2.0	...	0.46	Do. 10.	Cl'r. Sol. Halo.	Do. 4.
18	824	797	900	25.9	40.1	31.0	111	160	150	81	64	80	S W by W	W S W	W S W	48.10	2.0	...	...	C. C. Str. 6.	Cirr. 4.	Clear.
19	30.026	30.147	30.190	22.3	35.2	26.2	084	127	088	71	62	62	W	E S E	S S E	37.50	1.5	...	...	Clear.	Clear.	Do.
20	166	009	020	22.0	36.6	27.6	084	129	105	71	61	70	N E by E	N by E	N E by E	134.50	1.0	...	...	Do.	Do.	Do.
21	29.987	29.996	101	25.0	34.0	27.2	100	155	117	75	79	83	N E by E	N E by E	S W by S	172.50	2.0	...	...	Cu. Str. 6.	C. C. Str. 6.	Cirr. 4.
22	30.097	937	29.800	24.3	40.4	27.4	101	160	111	79	64	75	N E by E	N E by E	N W	61.60	2.5	...	...	Clear.	Clear.	Clear.
23	29.650	631	540	27.6	33.4	32.0	123	102	168	82	84	89	N E by E	N E by E	N E by E	161.10	4.0	...	1.92	C. C. Str 8.	Snow.	Snow.
24	261	344	441	32.0	33.4	34.2	168	162	177	89	84	88	N E by E	S E	S S E	247.90	5.0	...	4.42	Cu. Str. 10.	Do.	Cu. Str. 10.
25	504	542	640	27.6	36.2	26.1	123	170	105	82	80	75	E	E	S W	18.90	2.5	...	...	Do. 10.	C. C. Str. 10.	Clear.
26	700	779	900	25.1	35.2	24.3	165	162	111	80	79	86	S E	S W	S S W	48.80	2.0	...	...	Do. 10.	Cu. Str. 10.	Cu. Str. 10.
27	918	900	803	22.4	28.9	27.1	095	093	111	79	59	75	E by N	N E by E	N E by E	104.20	2.5	...	...	Clear.	Do. 10.	Do.
28	774	834	876	30.4	35.0	28.2	142	142	117	84	70	76	S E by E	S by E	S W	136.80	3.5	...	1.30	Snow.	Do.	Do. 4.
29	594	480	560	27.0	32.0	31.1	117	162	135	82	89	89	E	E S E	S S W	129.00	4.8	Inap.	1.64	Do.	Snow.	Do. 10.
30	299	548	662	29.6	37.3	29.7	136	164	136	83	76	83	W	S W	S S W	38.40	4.8	...	0.67	Cirr. Str. 10.	Do.	Do. 10.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER FOR OCTOBER, 1861.

Barometer	Highest, the 1st day	30.315
	Lowest, the 30th day	29.301
	Monthly Mean	29.876
	Monthly Range	1.014
Thermometer	Highest, the 17th day	68°.6
	Lowest, the 22nd day	26°.2
	Monthly Mean	46°.64
	Monthly Range	42°.4
Greatest intensity of the Sun's Rays		98°.0
Lowest Point of Terrestrial Radiation		24°.0
Amount of evaporation		1.17
Mean of Humidity		.843

Rain fell on 16 days, amounting to 5.370 inches; it was raining 69 hours and 30 minutes.
Snow fell on 1 day, inappreciable.
Most prevalent wind, the S. S. E.
Least prevalent wind, the S.
Most windy day, the 20th; mean miles per hour, 17.54.
Least windy day, the 9th; mean miles per hour, 0.01.
Aurora Borealis visible on 5 nights.
First Snow of the Season fell on the 24th day.
The Electrical state of the Atmosphere has indicated moderate intensity.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER FOR NOVEMBER, 1861.

Barometer	Highest, the 2nd day	30.201
	Lowest, the 29th day	29.299
	Monthly Mean	29.714
	Monthly Range	0.902
Thermometer	Highest, the 4th day	48°3
	Lowest, the 22nd day	19°7
	Monthly Mean	33°60
	Monthly Range	28°9
Greatest intensity of the Sun's rays		77°7
Lowest point of Terrestrial Radiation		17°4
Mean of Humidity		.787

Rain fell on 6 days, amounting to 1.023 inches; it was raining 32 hours and 52 minutes.
Snow fell on 8 days, amounting to 11·51 inches; it was snowing 54 hours and 29 minutes.
Most prevalent wind, N. E. by E.
Least prevalent wind, S.
Most windy day, the 3rd day; mean miles per hour, 22.5.
Least windy day, the 12th day; mean miles per hour 0.05.
Aurora Borealis visible on 3 nights.
The Electrical state of the Atmosphere has indicated feeble intensity.
Snow Birds (*Plectrophanes Nivalis*) first seen 17th day.
Imperfect Solar Halo on the 18th day.
Imperfect Lunar Halo on the 10th day.
Crows left here about the 7th day.