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# THE CANADIAN JOURNAL.

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## HISTORICAL FOOTPRINTS IN AMERICA.

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With the facilities of intercourse which steam navigation has created between Europe and America, and the habitual resort of the settlers on the Western Continent, to the marts and centres of gaiety of the Old World, it is becoming more and more difficult for us to realise all that is implied in the date A.D., 1492, as that in which American history begins. Few facts in the history of our globe are more singular, than that one hemisphere should have remained utterly unknown to the other till the close of the fifteenth century; and the wondering admiration with which the discovery of the New World was then greeted by the Old, was not diminished by the disclosures that followed. New, indeed, the western hemisphere was, as is the planet Neptune, or the latest discovered asteroid; or as the Flint-Folk of the drift are new to us. But with the discoveries of Cortes and Pizaro, the men of Europe became gradually familiarised with the conviction that it was no new world they had found; but one with native relics of an ancient past: pyramids, temples, and hieroglyphics tempting to a comparison with those of Egypt; and sculptures, rites, and institutions of various kinds, all pregnant with suggestive resemblances to those of the oldest Asiatic nations.

In that fifteenth century it had not occurred to the boldest scientific adventurer to conceive of the possibility of men who were not of the race of Adam. Speculative philosophy and science were, indeed, venturing boldly on many novel courses; yet St. Augustine's demonstration, which had satisfied the men of the fourth century of the impossibility of antipodes, was reproduced with undiminished force to those of the fifteenth century: since to assert the existence of inhabited lands on the opposite side of the earth, and beyond impassable oceans, would be to contradict the Bible, by maintaining that the world was occupied in part by nations not descended from Adam. From this it naturally resulted that when, in spite of such demonstration, antipodes were discovered; and an inhabited continent had been explored beyond the Atlantic, presenting to the gaze of the Old World social and political institutions, arts, and sciences, the growth of unknown centuries of progress: the only question discussed was, from what centre of the Eastern hemisphere were those derived? Egypt, Phœnicia, Carthage, India, China, Spain, Denmark, Ireland, and Wales, each found its advocates: The lost Atlantis of Plato and Seneca; the Ophir of Solomon; the nameless Atlantic islands of Hanno, Pharaoh-Necho, and other early explorers; 'the sanctuary of the lost Ten Tribes; the Vinland of Leif Ericson; the Huitramannaland of the Norse rovers from Iceland; and the western retreat of Madoc, son of Owen Gwyneth, King of North Wales: have all been sought in turn, and have stimulated the ingenious fancy of sanguine explorers among the traces of America's unwritten history.

That nations, possessed of language, arts, and government, were in occupation of America, was proof enough that the human race—the unity of which was then unquestioned,—had diffused itself into the western hemisphere; and this idea presented itself at first in a less startling form, from the belief, in which Columbus died, that only a new route had been opened up to eastern Asia. The conviction of ancient intercourse between the eastern and western hemispheres, fostered by such means, has accordingly furnished fruitful themes for speculation, almost from the first landing of Europeans on the American continent. Exaggerated resemblances have been traced out in the arts and architecture of Mexico and Peru to those of Egypt and India. Their hieroglyphics and picture writing have been hastily pronounced to be the undoubted offspring of those of the Nile. Philological resemblances, astronomical chronology, and religious rites, have all been

forced into the service of favourite theories ; and many ingenious and extravagant antiquarian romances, adapted to the popular taste by this means, have been welcomed as invaluable contributions to history : though in reality as insubstantial as the dreams of Merlin or the legends of Geoffrey of Monmouth. Nevertheless one class of monumental indices of intercourse between the eastern and western hemispheres, long prior to the fifteenth century, is of an indisputable kind. The Royal society of Northern Antiquaries of Copenhagen has placed the evidence of this before the world, in the most accessible form in the *Grönlands Historiske Mindesmærker*, and the *Antiquitates Americanae, sive Scriptores Septentrionales rerum ante-Columbiarum in America*. The latter was issued from the Copenhagen press in 1837 ; and to this a supplement subsequently appeared, to the contents of which special reference will be made in discussing some of the supposed traces of the ante-Columbian colonisation of America. To those works, along with the correspondence and researches to which their preparation gave rise, is chiefly due the revived interest in the recovery of ancient traces of intercourse between the eastern and western hemisphere, which continued for some years to engross a large amount of interest among all classes in the United States.

From the literary memorials of the old Northmen thus restored to light, sufficient evidence has been disclosed to render highly credible, not only the discovery and colonisation of Greenland, by Eric the Red; a Norwegian colonist of Iceland,—apparently in the year 985,—but also the exploration of more southern lands, some of which must have formed part of the American continent. Of the authenticity of the manuscripts from whence those narratives are derived there is not the slightest room for question ; and the accounts which some of them furnish are so simple, natural and devoid of anything extravagant or improbable, that the internal evidence of genuineness is worthy of great consideration. The exuberant fancy which revels in the mythology and songs of the Northmen, would have constructed a very different tale had it been employed in the invention of a southern continent for the dreams of Icelandic and Greenland rovers. Some of the latter Sagas do, indeed, present so much resemblance in their tales of discovery, to those of older date, as to look like mere varied repetitions of the original narrative with a change of actors, such as might result from different versions of one account, transmitted for a time by oral tradition before being committed to writing. But, notwithstanding

all reasonable doubts as to the accuracy of details, there is strong probability in favour of the authenticity of the American Vinland of the Northmen.

The Colonisation of Greenland, however, rests on no probabilities of oral or written tradition, but is an indisputable historical fact. In A.D., 999, Leif Ericson, the son of its discoverer, made a voyage to Norway, at the time when Olaf Trygvesson, the Saint Olave of Norse hagiology, was introducing Christianity into Scandinavia. Under the influence of the royal missionary, Leif Ericson abandoned paganism; and carrying back with him to Greenland teachers of the new faith, it found a ready acceptance among the Arctic Colonists. Greenland remained in connection with the mother country till the middle of the twelfth century, when it attempted to throw off its allegiance to Magnus, King of Norway, but was reduced to submission by an expedition despatched for that purpose by Eric, King of Denmark, whose niece was wedded to the Norwegian King.

There were two Norse colonies, those of east and west Greenland. The colonists of the western coast appear to have been exterminated by the Esquimaux; but the fate of those of the eastern settlement was long a mystery on which the modern Dane and Norwegian speculated as one of the obscure marvels of their race's history. It is obvious from the early details of the colony that the shores of Greenland must have been accessible in the twelfth and thirteenth centuries, to an extent wholly unknown in the experience of modern Arctic voyagers. In all probability the decay of the colonies is due to a considerable extent to climatic changes which had already, in the fourteenth century, begun to hem in the Greenland coasts with the icy barriers which for four centuries precluded all access to their inhospitable shores. But a great mortality among the voyagers trading between Norway and Greenland was occasioned in A.D., 1348, by a frightful plague known by the name of the *Black Death*; and it was long maintained that the whole Greenland colony had been exterminated by the same deadly scourge. Later accounts, however, still refer to the colonists; and the records of the reign of Queen Margaret—under whom the crowns of Denmark, Sweden, and Norway were united in 1397,—include references to the efforts then made to keep up the communication with Greenland. But political troubles at home speedily rendered the Queen indifferent to such remote dependencies. To all appearance, also, the Greenland coasts were being gradually hemmed in by

impassable barriers of ice, which cut off all intercourse with them subsequent to the close of the fourteenth century, and the very existence of the long lost region became a matter of doubt.

From time to time, however the subject was revived. Many a Norse legend and poem celebrated the charms of the Hesperian region which was fabled to lie embattled within the impassable Arctic barriers, clothed in the luxuriant verdure of a perpetual spring. In Iceland, where the old Norse colonists had maintained their ground, the faith in the ancient Greenland colonies remained unshaken; and received confirmation from various indications of the lost settlement, as well as from the definite traditions current among the Islanders, and narrated in their Sagas.

Among older memorials of Greenland and the mythic Vinland, it is recorded that towards the middle of the seventeenth century, an oar was drifted on the coast of Iceland bearing this inscription in runic characters: OFT VAR EK DASA DUR EK DRO THICK. *Oft was I weary when I drew thee.* To this the poet, James Montgomery, refers in the fourth canto of his *Greenland*, when following the later route of the Moravian Brethren in their generous exile:—

“Here, while in peace the weary pilgrims rest,  
 Turn we our voyage from the new-found west,  
 Sail up the current of departed time,  
 And seek along its banks that vanished clime,  
 By ancient Scalds in Runic verse renowned,  
 Now like old Babylon no longer found.  
 “*Oft was I weary when I toiled at thee;*”  
 This on an oar abandoned to the sea  
 Some hand had graven. From what foundered boat  
 It fell; how long on ocean’s waves afloat;  
 Who marked it with that melancholy line:  
 No record tells. Greenland, such fate was thine:  
 Whate’er thou wast, of thee remains no more  
 Than a brief legend on a foundling oar;  
 And he whose song would now revive thy fame,  
 Grasps but the shadow of a mighty name.”

Repeated unsuccessful attempts had been made by Norwegian, Danish, and English voyagers, at the time this poem was published, to effect a passage through the icy barriers around the east coast of Greenland; and it was not till 1822 that the enterprise of the distinguished Arctic voyager, Captain Scoresby, was rewarded with success.

Later explorations, however, shew that the sites of early colonisation had been more to the west, within Davis Strait; and there at length, in 1824, and subsequent years, well defined runic inscriptions and sepulchral records in the old Norse, or Icelandic language, have been brought to light; and are now for the most part deposited in the Christiansborg Palace at Copenhagen.

The result of such discoveries not unnaturally led to an eager desire to recover, if possible, similar traces of the early Norse Voyagers' visits to Vinland and other real or imaginary sites on the mainland of the American continent. In this there was nothing improbable; and should a runic inscription, analogous to those already brought to light at Kingiktorsoak, Igalikko, and other Greenland sites, reward the zealous researches of New England antiquaries, it would only confirm allusions to ante-Columbian voyages to the continent, already generally accepted as resting on good historical evidence. The search, however, has hitherto been attended with very ambiguous success, as shown in the well-known history of the Assonet or Dighton Rock inscription. Assuming that the voyages of Leif Ericson, Thorfinn Karlsefne, and other old Norse explorers, are authentic and indisputable, their visits to the American mainland were of no permanent character; and it may serve to illustrate the probabilities in favour of the recovery of any memorials of ante-Columbian voyagers, if we review such traces as are still discoverable, apart from direct written and historical evidence, of the actual presence of European settlers on the Continent of America, in the sixteenth, and even in the seventeenth century.

Among the remains of the ancient Norse colonists of Greenland, architectural memorials of a substantial character attest their perpetuation of European arts in their arctic settlements. The ruins of more than one ancient Christian edifice still mark the sites consecrated to religious services by the Norsemen who, while still pagans, sought a home in that strange region of the icy north. One of these primitive ecclesiastical ruins is a plain but tastefully constructed church of squared hewn stone, at Kakortok, in the district of Brattahlid. Though unroofed, the walls are nearly entire; and numerous objects of early European art, including fragments of church bells found in the same vicinity, confirm the evidence of the civilisation established and cultivated there by early colonists. Only a few miles distant from this ruined church the Igalikko runic inscription wa

found with its simple memorial of parental affection: VIGDIS M[AGNVS] D[OTTIR] HVILIR HER GLELE GVTH SAL HENAR, i.e., *Vigdis, Magnus' daughter, rests here; n. y God glad-den her soul.*

With such literate and architectural remains of the Greenland colonists of the tenth century still extant, it was not unnatural for New England antiquaries to turn with renewed vigour to the search for corresponding remains in the supposed Vinland of the same early voyagers, when the ancient manuscripts edited for the *Antiquitates Americanae* had established the discovery of the continent of America by Norsemen of the tenth century. Among those, the members of the Rhode Island Society took a foremost part. They had already furnished materials for illustrating the venerable manuscripts edited in that imposing quarto, which seemed to its sanguine editors to place their dreams of a Norse Columbus of the Tenth Century beyond all dispute. The Assonet, or Dighton Rock, on the east bank of the Taunton river, which yielded to its antiquarian transcribers the long desiderated traces of runic epigraphy, has attracted the attention of New England scholars for nearly two centuries. Its history is alike curious and amusing, but need not be detailed here.\* It is a detached rock, partly covered at high water, the exposed surface of which is covered with Indian devices rudely graven, and greatly defaced by time. So early as 1680 Dr. Danforth executed a careful copy of it; and since then it has been again and again retraced, engraved, and made the theme of learned commentaries by New England, British, French, and Danish scholars; each striving in turn to enlist it in proof of the favoured theory of the hour; and to make out from its rude scratchings: Phœnician, Punic, Siberian, or Old Norse characters, graven by ante-Columbian voyagers in the infancy of the world. The triumphs of the antiquarian seers culminated in the year 1837, when the *Antiquitates Americanae* issued from the Danish press, with elaborate engravings of this Dighton rock, from one of which—contributed by a Commission appointed by the Rhode Island Historical Society—its ingenious editor was able to furnish the interpretation of a “runic inscription” suddenly brought to light among the rude devices of the Wabenakies’ picture-writing. The inscription was only too apt a re-echo of the Saga manuscripts; and indeed is now affirmed to have been the deliberate imposition of a foreigner resident at the time in New-

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\* Vide *Prehistoric Man*, Vol. II. p. 172.



port.\* However it originated, certain it is that the so-called runic characters on the Dighton rock have vanished as completely as the faith in their marvellous historical revelations.

The literate evidence which the *Antiquitates Americanæ* furnishes in proof of the discovery of America by Northmen of the Tenth Century, rests on authority wholly independent of any real or fancied confirmation, derived from Greenland or New England inscriptions. The stimulus thereby furnished to antiquarian research was therefore no less strong than thoroughly legitimate. The members of the Rhode Island Historical Society accordingly renewed their search for traces of ante-Columbian art; and their attention was at once directed to a substantial piece of masonry which had occupied a prominent site at Newport, Rhode Island, beyond the memory of the oldest inhabitant. As a genuine American ruin of former generations the old Round Tower on Newport common forms an exceedingly striking feature; and the historical and literary associations ascribed to it, as well as the critical warfare which has raged around its site, and ransacked the mysteries of its very foundations, have added not a little to its genuine interest. When the antiquaries of Copenhagen were in search of relics of the long-lost Vinland, careful drawings of the old Tower were despatched to them, and welcomed as supplying all that they desired. Engravings reproduced from them illustrate the Supplement to the *Antiquitates Americanæ*, and the authentication of the old ruin as an architectural monument of the arts of Vinland and its Norse colonists of the eleventh and twelfth centuries is thus unhesitatingly set forth by Professor Rafn and his brother antiquaries of Copenhagen:—"There is no mistaking in this

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\* *The Controversy touching the Old Stone Mill in the Town of Newport, Rhode Island.* Newport. Charles E. Hammet, jr. 1851. p. 52. "The version of the inscription published in that work [the *Antiquitates Americanæ*], and distributed throughout Europe and America, was altered so as to make it appear to have been the work of the Scandinavians, by altering the characters, and adding in the body of the inscription, the characters ORINX which is said to be the name of one of their early navigators."

The tracings on the rock read as OR, appear in an engraving so early as 1790; the remainder, which serve to complete the name—not of *Orinx* as stated above, but of *Thorfin*, with a concise record of his fifty-one followers,—appear for the first time in the copy made, and sent to Copenhagen in 1830. No one will believe, for a moment, that the memoirs of the R. I. Historical Society had any hand in a fraudulent transcript, beyond their transmission of the drawing, executed either by some very credulous or designing copyist, of the rude and ill-defined Indian devices.

instance, the style in which the more ancient stone edifices of the North were constructed, the style which belongs to the Roman or ante-gothic architecture, and which, especially after the time of Charlemagne, diffused itself from Italy over the whole of the west and north of Europe, where it continued to predominate, until the close of the twelfth century. . . . From such characteristics as remain we can scarcely form any other inference than one, in which I am persuaded that all who are familiar with old Northern architecture will concur: that this building was erected at a period decidedly not later than the twelfth century."\* Having thus settled the age of the venerable structure, and scornfully dismissed the idea of its erection for a windmill, as one the futility of which any architect could discern; that of its supposed primary destination as a watch tower is also rejected: and the final conclusion indicated is that it is an ecclesiastical structure which originally "belonged to some monastery or Christian place of worship in one of the chief parishes in Vinland. In Greenland there are still to be found ruins of several round buildings in the vicinity of the churches. These round buildings have been most likely Baptisteries;" and in proof of this, reference is made to an octagonal building forming part of the ruins of Mellifont Abbey, in the County of Louth, in Ireland.

To venture on questioning the genuineness of this Norse relic after these attestations of its credentials to such venerable antiquity, involved some degree of boldness. Its associations moreover, connect it unmistakeably with the olden time. It forms a central point in some of the romantic scenes of Cooper's "Red Rover;" and Longfellow, assuming its antiquity as amply attested for all a poet's purposes, has associated it with another discovery of so-called Norse relics, which was welcomed at the time as fresh confirmation of the Scandinavian colonisation of the ancient Vinland. An Indian skeleton was dug up at Fall River, Massachusetts, in 1831, buried in a sitting posture, wrapped in cedar bark, with some tubes, two arrow-heads, and other fragments of brass lying beside it. At any other time, the native origin of the whole would have been acknowledged beyond all dispute. But the discovery coincided with the researches of Professor Rafn and his colleagues at Copenhagen.† Thither accordingly specimens of the relics were sent. A portion of what was somewhat

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\**Antiquitates Americanae*, Supp. p. 18.

† *Memoire sur la decouverte de l'Amerique au dixième siecle*. Copenhagen. 1848.

grandly designated the "pectoral," or "breastplate," on being submitted to the chemist, Berzelius, was found to bear a marvellous resemblance to modern brass; and an elaborate account of the "Discovery of Antiquities made at Fall River, Massachusetts," with the subsequent investigations, was published in the *Mémoires de la société Royale des Antiquaires du Nord*, along with a letter from a learned Boston Antiquary on "the famous Dighton Rock, the marvel of this region," with its ancient characters, affording indubitable proof "that the Northmen have been on that spot."\*

Here, at any rate, were ample materials for the poet. No better credentials could be desired for the hero of a genuine Norse Ballad, whatever the severer incredulity of the historical student might demand; and the Norse Viking, resuscitated from the skeleton in armour, speaks accordingly, narrating in his epical lyric, the ballad-legend of the Newport Round Tower. In response to the invocation of the modern Skald, the Viking recounts his passion, when,—like Othello, telling his adventurous tales,—the tender eyes of King Hildebrand's daughter kindled his heart with their soft splendour. But though they shone responsive, the royal father laughed his suit to scorn.

"Why did they leave, that night,  
Her nest unguarded?"

Bearing from the Norwegian shore in flight with the blue-eyed maiden, the fierce Viking tells how he dashed mid-ships on his pursuers; and leaving Hildebrand and his crew to perish in the "black-water," he sweeps fearless before the gale into the unknown West:—

As with his wings aslant,  
Sails the fierce cormorant,  
Seeking some rocky haunt,  
    With his prey laden:  
So towards the open main,  
Beating to sea again,  
Through the wild hurricane,  
    Bore I the maiden.

Three weeks we westward bore,  
And when the storm was o'er,  
Cloud-like we saw the shore,  
    Stretching to leeward;

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\* *Mem. de la Soc. Royale des Antiquaires du Nord.* 1840-44. P. 117.

There for my lady's bower,  
 Built I the lofty tower,  
 Which, to this very hour,  
 Stands looking seaward.

But the modern Skald who rehearses the old Viking's tale, claims at the same time a poet's license. "That this building could not have been erected for a windmill," says Professor Rafn, "is what an architect can easily discern." "I will not enter into a discussion of the point," responds the poet. "It is sufficiently well established for the purpose of a ballad; though doubtless many an honest citizen of Newport, who has passed his days within sight of the Round Tower, will be ready to exclaim with Sancho, 'God bless me! did I not warn you to have a care of what you were doing, for that is nothing but a windmill; and nobody could mistake it but one who had the like in his head.'"

The controversy was still maintained among the New England Oldbucks and Wardours, when in 1847, a learned mediator dating from "Brown University, Providence," proceeded to publish, under the *nom de plume* of "Antiquarian," a series of abstracts from a joint Report of Professor Rafn of Copenhagen, and "Graetz of Gottenburg," and from an elaborate narrative prepared by "Professor Scrobein," a distinguished geologist, despatched to Rhode Island by the unanimous vote of the Royal College at Copenhagen. From the researches of this well accredited commissioner, the ruined tower is ascertained to have been "an appendage to a temple, and used for religious offices, as a baptistery or baptismal font. It appears to have been erected by the Northmen, in the eleventh century, during a sojourn of Bishop Eric in Vinland, as the island was called, from the excellency of its wine and abundance of its grapes." Excavations within the ruin brought to light "the foundations of the *receptimium*, or place where the candidates stood while receiving the baptismal shower . . . In close proximity to this was a second foundation, that of the *palestrium*;" and the discovery was completed, and placed beyond all dispute by the finding of various ancient coins, including "some of Henry II. 1160, which would lead us to believe that some kind of commercial intercourse existed in those days."

To the manifest delight of the rogue—an undergraduate we may surmise,—who palmed off this grave hoax on the Rhode Islanders, it was taken up seriously. "Graetz of Gottenburg" passed muster under

the wing of the veritable Rafrn of Copenhagen. " Bishop Oelrisher ' who bequeathed the 1400 reichsthalers needed for prosecuting the interesting inquiry escaped challenge. But an elderly disputant, "one of the oldest inhabitants," indignantly affirmed the falsity of Professor Scrobein's report; that he had been grossly deceived; that he had no hand in the report attributed to him; and only neglected to inquire if anybody at Copenhagen or elsewhere had ever before heard of this mythic Professor, whose report, as the venerable controversialist maintains, "was a gross and palpable imposition on the [Copenhagen] committee, the Royal Society and the world." The "Antiquarian" of Brown University gravely responded with still more startling extracts from the Professor's report; which document, says he, "I would willingly submit, but its extreme length forbids!"\* And so the old mill grew ever more famous. More than one poet added his contribution to its renown; and in the "Poem of Aquidneck," the muse thus questions and solves its controverted points of history:—

How long hath Time held on his mighty march  
 Since first arose thy time-defying arch?  
 Did thus th' astonished Indian gaze on thee,  
 A mystery staring at a mystery?  
 A son of Canaan shall we rather say,  
 Viewing the work of brethren pass'd away?  
 Was it Phœnician, Norman, Saxon toil  
 That sunk thy rock-based pillars in the soil?  
 How looked the bay, the forest, and the hill,  
 When first the sun beheld thy walls, old mill?  
 Alas! the Antiquarian's dream is o'er,  
 Thou art an old stone windmill,—nothing more!

The Norse builders and ante-Columbian date of the Newport Tower, which found in earlier days as zealous champions as the Phœnician origin long ascribed to the Round Towers of Ireland,—after being thus subjected to the sly assaults of the satirist, as well as the severe questioning of grave critical censors,—have been so universally abandoned, that some may perhaps deem it scant courtesy to recall the forsworn creed. In reality, however, this chapter in the history of American archæological research is replete with interest and value. But for the investigations into the significance of the

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\* *Controversy touching the Old Stone Mill in the Town of Newport, Rhode Island.* Newport, 1851, p. 16.

Dighton Rock inscription, extending over nearly two centuries; and the more recent researches into the origin and history of the Newport Tower: we might have good reason to assume that all inquiry after historic footprints had been delayed until their last traces had been obliterated by successive generations of colonists in the long-settled New England States. Happily, the history of the Dighton Rock refutes this assumption, and furnishes good reason for believing that no important ante-Columbian monument has disappeared within the period of Anglo-American occupation. The long unheeded Round Tower adds its confirmation to the same belief. Probably no member of the Rhode Island Historical Society now doubts that in the picturesque ruin which has acquired an additional interest by the learned strife to which it has given rise, we have the identical structure referred to in the will of Benedict Arnold, first governor under the Charter granted by Charles II. to the Colony of Rhode Island, and Providence plantations, in 1663. He had removed from Providence to Newport ten years previously; and in his will, dated there, the 20th of December, 1677, he thus directs: "My body I desire and appoint to be buried at ye North East corner of a parcel of ground containing three rod square being of and lying in my land in or near ye line or path from my dwelling-house leading to my stone built wind-mill in ye town of Newport." In another clause he bequeathes the same "stone built wind mill" to his wife Damaris Arnold, and after her decease to his youngest daughter, Freelove Arnold, having provided for his elder daughter, Godsgift, in other clauses. The names are characteristic of the old Puritan, whose father was one of those who came from Salem to Providence, and shared the latter with Roger Williams in 1636. An entry in the Journal of Peter Easton, one of the first settlers, records, under the date of Aug. 28th, 1675, a great storm, which "blew down our wind mill and did much harm."\* The brief interval between this date and that of Governor Arnold's will, leaves little room for doubt as to that of the stone-built one which he there devises to his heirs. The date and its associations, though unacceptable to those who would fain decypher runic inscriptions of the tenth or eleventh century on the Dighton Rock, identify the first Norse discoverers, and trace out their settlements in the Vinland of the Sagas: is nevertheless one sufficiently near that initial date of A.D.

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\* *The controversy touching the Old Stone Mill in the Town of Newport, Rhode Island.* Newport, 1851, p. 64.

1620, when the Pilgrim Fathers landed on Plymouth Rock, to give the old ruin on Newport common as great a value in the eye of every true hearted American, as the CATT STANE can claim from the British antiquary who believes that its rude letters record the burial-place of Vetta son of Victus, son of Woden, the lineal ancestor of Hengist, the Teutonic colonist of England.

A picturesque old relic, known *par excellence* as The Old House of Boston, stood till 1860 at the corner of North and Market Streets of the New England Capital, with its quaint gables, and overhanging oaken-timbered walls, such as abound in the old capitals of Europe, and look as if they had been built before the laws of gravitation had a being. The date latterly assigned to it was 1680; but the march of improvement knows no antiquarian sympathies; and a range of modern warehouses has usurped the site of the venerable civic relic. Here and there among the burial grounds of New England and other older States, weathered and half-defaced stones commemorate the worth of early colonists; and doubtless some lie buried, where they may be found in other ages, when the Roman characters and English language of the sixteenth and seventeenth centuries will seem as strange to the eyes of a new generation as the runes of the Greenland Norsemen do to our own. But a recent discovery towards the northern limits of the New England States suffices to encourage the hope that still earlier traces of the first European colonists may yet gratify intelligent curiosity with glimpses of the beginnings of America's history. This new found historical footprint of the seventeenth century, only brought to light in the autumn of 1863, is a plate of copper measuring ten inches by eight, found at Castine, in the State of Maine,—the old Indian Pentagoet,—near the mouth of the Penobscot river, famous with the Kennebunk, or Kennebec, as it is now called, as marches of the French and English debateable land, subsequent to the treaty of Aix-la-Chapelle. It was discovered in the course of excavations made in constructing a battery at the mouth of Castine harbour.\* The corroded sheet of copper attracted no attention when first restored to light; nor was it till its discoverer had cut a piece off it to repair a boat, that his attention was drawn to the characters engraved on its surface. Fortunately the detached piece was easily recovered; and on being restored to its place, the inscription was decyphered as follows:

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\* *Proceedings of the American Antiquarian Society*, April, 1864. p. 60.

1648 . 8 . IVN . F.  
 LEO PARIS . IN .  
 CAPVC . MISS.  
 POSVI HOC FV-  
 NĀTĪM IN HNĀR-  
 EM NĀÆ DĀÆ  
 SANCTÆ SPEI

The inscription, it will be seen, commemorates the erection in what was then a part of *La Nouvelle France*, of, as may be presumed, a Mission Chapel of the Capuchins, dedicated to our Lady of Holy Hope. Charlevoix, in his *Histoire Général de la Nouvelle France*, refers to a visit of the Jesuit Father, Dreuilletes, to a Hospice of the Capuchin Fathers on the Kennebec river, in 1646; and states that at that date,—only two years before the event commemorated in the inscription,—they had another mission house at Pentagoet. The Capuchin Fathers were a fraternity belonging to the Franciscan Order of Mendicant Friars, whose mission here, and in the Kennebec region, appears to have been, not to the Indians, but to the French colonists of Acadia and the neighbouring mainland. The inscribed plate records the laying of the foundation stone in which it was deposited, by brother Leo of Paris, at the date named; and may be read in extenso thus:—1648, 8 junii, *frater Leo Parisiensis, in Capucinorum missione posui hoc fundamentum in honorem Nostræ Dominæ Sanctæ Spei.*

The date, though so modern, according to the estimate of European antiquaries, carries the mind back to a very primitive period in the history of Maine; and the interest of the inscription is enhanced by the associations connected with the site of the building it commemorates. “Few spots on the coast of New England can boast so much natural beauty, and none has had the vicissitudes of its history so interwoven with the history of different nations, as the peninsula of Pentagoet, Penobscot, Castine.” The date also has its own peculiar significance in the past history of the New England States. This might be illustrated by various contemporary events. Perhaps the most memorable, as it is the most characteristic, is that in that very year—when Europe was arranging the peace of Westphalia,—witchcraft came to a head in the New World, and the first of the New England witches was hanged in Massachusetts Bay.



Corresponding memorials of an earlier date doubtless lie undisturbed beneath the older foundations of churches and hospices of Lower Canada. The little church of Tadoussac, at the mouth of the Saguenay, still occupies the site consecrated to the service of God, on what was one of the earliest settlements in the New World. A trading post was established there by French fur-traders, under the special favor of Henry IV. ; and contracts were entered into by two merchant traders of Rouen and St. Malo for its colonisation as early as 1599. Within very recent years the remains were still visible of a stone mansion built by Captain Chauvin who died there in 1603, after having made two voyages with settlers to Tadoussac. A slighter, yet more enduring memorial of the old colonists attracted my attention when visiting the spot, in the scattered tufts of Sweet William, Mignonette, and other garden flowers, repeating the tale of Goldsmith's Deserted Village :

"Where once the garden smiled,  
And still where many a garden flower grows wild."

Jamestown, Virginia, which claims to be the earliest settlement on the American continent, was founded by the English Captain, Newport, in 1607, and on the 3rd of July, in the following year, Champlain laid the foundation of Quebec. The site of the first fort is now occupied by the venerable church of *Nôtre Dame des Victoires*, one of the oldest edifices in the City of Quebec, which received its present name on the defeat of the English forces under Sir William Phipps, in 1690. But the most curious inscription now visible on the old-fashioned buildings of the picturesque capital of Lower Canada, is one accompanying a quaint piece of sculpture known as the *Chien d' Or*, a work of the following century. But modern though it is, tradition has already confused its associations and forgotten its significance. Over one of the windows of an old house near the Prescott Gate, now used as the Post Office, is an ornamental pediment, the centre of which is occupied by a slab of dark limestone, on which a dog is sculptured in high relief and gilded, represented gnawing at a bone ; and beneath it this inscription :—

"Je suis un Chien qui ronge mon os,  
En le rongéant, je prends mon repos,  
Un jour viendra qui n'est pas venu,  
Ou je mordrai, qui m'avra mordu,"

The house is said to have been the mansion of a wealthy Bordeaux

merchant, who put up this piece of sculpture, with the accompanying quatrain, as a lampoon on M. Bigot, French Intendant and President of the Council ; and paid for his caustic wit with his life. But the date of the assassination of M. Philibert, the supposed lampoonist, is proved to have been long subsequent to that of 1732, inscribed on the stone ; and the origin and special significance of the inscription remain an enigma.

In the able and well digested resumé of American Archæology prepared by the learned librarian of the American Antiquarian Society, he remarks : “ We should be glad to see gathered into one chapter, under an appropriate head, all the evidences of Art beyond the ability of the natives, that must be assigned to an ante-Columbian period, and all other indications of a foreign people, before that era, in the United States. They cannot be numerous ; and the point is of sufficient importance to be distinctly presented with all the force it possesses. They have hitherto proved unsubstantial whenever we have attempted to grasp them.”\* The Dighton Rock, the inscribed rock on Cunningham’s Island, Lake Erie ; the much controverted “ Grave Creek Stone ;” and a contemptibly gross forgery with the date 1587, “ discovered, according to most respectable authority, on a plate of mica upon the breast of a skeleton, buried after the ancient manner, in a mound near that at Grave Creek, from whence the more celebrated inscribed stone was derived :” are all noticed, and some of them dismissed too gently by their courteous reviewer.

The invention of spurious inscriptions : from the notorious gold plates of the Mormon Gospel, to the “ Ohio Holy Stone,” and the new version of the Ten Commandments, partly in Hebrew and partly in unknown characters, engraved on a stone tablet, discovered under an ancient mound at Newark, Ohio, in 1860 ; have for the most part been the work of such illiterate and shallow knaves, that they scarcely merit serious notice, were it not for the amount of discussion they excited, before the all engrossing civil war preoccupied the public mind with its stern realities. The former relic, clumsily made out of common hone-stone, has been repeatedly engraved. A State Geologist of high repute pronounced its material to be “ *novaculite*, a stone entirely unknown among the rocks or minerals of the Ohio region ;” and a distinguished free-mason, “ well informed upon the history of his order, and upon antiquities in general,” certified that “ the stone was one

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\* *Archæology of the United States* : by W. F. Haven. p. 134.

used by masons of a certain grade in the East, soon after the building of the first temple by Solomon, and before the erection of the second,'—with much else equally wonderful; so that the HOLY KEY-STONE, as it was now designated, became an object of immense interest to American free-masons. The discussions on the authenticity and significance of the mound-version of the Decalogue fell with equal propriety into the hands of divines, though not without other learned aid. The Rev. J. W. McCarty, Rector of Trinity Church, Newark, was the first to interpret the mysterious characters. The Rev. Theodore Dwight confirmed his interpretation, and proved the antiquity of the inscription by references to Gesenius, comparisons with rare coins of the Maccabees, and remarkable coincidences with the Samaritan version. J. J. Benjamin, “perhaps the best Hebrew scholar now in this country, whose home is in the Turkish Province of Moldavia, and who is now in this country for the purpose of prosecuting researches among the Indians for evidences of the Lost Tribes,” with the aid of an interpreter, gave new readings; until not a few rejoiced in the belief that the veritable sepulchre of Moses had at length been discovered.—not in a valley in the land of Moab, over against Beth Peor; but in the Newark valley, in the State of Ohio.\*

The favourite idea of finding the Lost Ten Tribes among the Red Indians of the New World, which pervades Lord Kingsborough's elaborate work, and played a prominent part in the speculations of the earlier American ethnologists and antiquaries, lies at the root of this class of marvels. It retained its hold on the popular mind as long as such subjects possessed any attractions; and notices of the discovery of shekels and other Hebrew relics could be easily multiplied by a little research in the files of Western American newspapers. The Rev. George Duffield, of Detroit, furnishes one account of a Hebrew Shekel, found in Indiana among the bones supposed to have been thrown out of an ancient mound; and conjectured to be of the time of the Maccabees.† The discovery of a large hoard at Jerusalem, in recent years, has rendered the silver shekel a coin by no means rare; though its appearance might well excite wonder, among the genuine contents

\* *Cincinnati Commercial*, July 12th, 1860; Nov 5th, 7th, &c. *Newark North American*, July 5th, 1860, &c. *Harper's Weekly Journal*, Sept. 5th 1860. *New York Independent*, March 14th, 1861. *A representation of the two stones, with the characters inscribed on them, that were found by D. Wyrick, during the summer of 1860, near Newark, Ohio; &c., &c.*

† Schoolcraft's *History of the Indians*. Vol. iv. p. 149.

of a Western Indian mound. "We have at hand," says Mr. Haven, "Jewish phylacteries that were taken from beneath the soil, in a country village, where it was declared Jews were never known to have been; but a follower of Moses was ultimately traced to the very spot where these were found."\* The *Eagle* newspaper of Jackson, Missouri, describes "a veritable Egyptian coin," found there in December, 1858, about thirty feet below the surface, in digging a well; and comments on the evidence thus furnished from time to time, "that the country was known centuries before the time of Columbus, not only to the Northmen and other Europeans, but to the Egyptians, the Phœnicians, and even to the Chinese." Similar notices of the recovery of ancient coins have been repeatedly published; and, considering the zeal devoted to numismatic collections in America, it is far from improbable that an occasional stray waif from these cabinets may have furnished genuine materials for such a discovery. But it is to be feared that the majority of them are no better authenticated than the reputed find of the apochryphal Professor Scrobein, among the foundations of the Newport Round Tower.

Of another class of Antiquities is "the Alabama Stone," an innocent piece of blundering, not without its significance. It was discovered near the Black Warrior River, about forty years ago, when no rumours of the old Northmen's visits to Vinland stimulated the dishonest zeal of relic hunters, or tempted the credulity of over-zealous antiquaries; and so its mysterious Roman capitals and remote ante-Columbian date were only wondered at as an inexplicable riddle. As originally transcribed this record of the thirteenth century ran thus:

HISRNEHDREV.

1232

Had this Alabama stone turned up opportunely in 1830, when the Antiquaries of New England were in possession of a roving commission on behalf of Finn Magnussen and other Danish heirs and assignees of old Ari Marson, who knows what might have been made of so tempting a morceau? From the *Annales Flateyenses*, we learn of "Eric Grœnlandinga biskup" who, in A.D., 1121, went to seek out Vinland; and in the following century the *Annales Holenses*, recovered by Torfæus from the episcopal seat of Holum in Iceland, supply this tempting glimpse: "*faunst nyja land*," i.e., new land is found. With

\* *Archæology of the United States*, p. 135.

such a hint what might not learned ingenuity have done to unriddle the mysteries of the New World in the year of grace, 1232? Unhappily its fate has been to fall into the hands of Mr. Samuel F. Haven for literary editing, which he does in this unromantic fashion :

“ We have before us the ‘ Alabama Stone ’ found, some thirty years ago, near the Black Warrior river. To our eyes it reads HISPAN. ET IND.REX. as plainly as the same inscription on a Spanish quarter of a dollar somewhat worn. The figures may be as above represented, but of course they cannot be intended for a date,” unless indeed it be 1632. The “ Rutland stone,” duly honoured in the *Antiquitates Americanae*, next comes under review, with its supposed characters graven and then filled in with a black composition. But this is a counterpart to the famous “ Runamo Inscription ” cut on the surface of a flat rock at Hoby, between Carlshamn and Runamo in Bleking, a Province of Sweden. Saxo Grammaticus tells us in the preface to his *Historia Danica* that King Waldemar the Great, in the twelfth century, sent emissaries skilled in Runic lore to read and copy the inscription. Olaus Wormius tried it again nearly five hundred years after. But what both had failed to decypher, Professor Magnusen of Copenhagen mastered in 1834, and made it out to be an inscription in old-northern runes, and regular alliterative verse, referring to the heroes in the battle of Braavalle, fought, A.D., 680. To no fitter seer could the “ Rutland Stone,” with its regular series of literal characters, be despatched. But, alas for the credit of the Antiquarian craft, the Runamo inscription had by this time been discerned to be nothing more than the natural markings on a block of graphic granite: and to the same class of relics the Rutland Stone must be referred. Old enough it is for the most ambitious stickler for the antiquity of the New World; ancient indeed as the oldest of those records interpreted by the author of “ the Testimony of the Rocks; ” and inscribed by the same hand that formed its rocky matrix.

But from such learned and unlearned blunderings,—not without their value from the curious illustrations they afford of the change from the exclusive pedantry and diletantism of the eighteenth century of Europe, to the widely diffused, but superficial knowledge of the American nineteenth century;—it is pleasant to turn to an inscription of early date which invites consideration as a genuine, though rudely executed record of the sixteenth century. The “ Manlius Stone,” now referred to, was discovered about the year 1820, in the

Township of Manlius, Onondaga County, New York, by a farmer, when gathering the stones out of a field brought for the first time into cultivation. It is an irregular spherical boulder, about fourteen inches in diameter, now deposited in the Museum of the Albany Institute. On one side, which is smooth and nearly flat, the following inscription is rudely, but regularly cut, with the device, at the dividing line, of a serpent twining round a tree :

Leo. De	L : : 11
VI, 1520	×

The letters on the right side are somewhat defaced ; but the stone looks like a rude memorial hastily executed by some explorer, on the most convenient tablet at hand, either as a memento and evidence of his having reached the spot,—in itself a fact of no slight interest, when the date and locality are considered ;—or as the record made by some friendly hand to mark the last resting place of a companion who had persevered thus far among the first explorers of the New World's mysteries. But like most American inscriptions, that of the Manlius Stone has been tortured into meanings not very easily discernible by any ordinary process of interpreting such simple records. “By the figure of a serpent climbing a tree,” says one ingenious decypherer\* “a well-known passage in the Pentateuch is clearly referred to. By the date the sixth year of the reign of the Pontiff. Leo X. has been thought to be denoted. This appears to be probable, less clearly from the inscriptive phrase : *Leo de Lon VI.* than from the plain date, 1520, being six years after the Pontiff took the chair :” which, however, it is not, as Giovanni de Medici succeeded Julius II. in March, 1513. Mr. Buckingham Smith recently submitted to the American Antiquarian Society a paper devoted to the elucidation of inscribed stones found on ancient Indian sites,† among which he includes both the Grave Creek Stone and the Dighton Rock. Applying the same rule to those as to the Manlius Stone, he discovers in their characters, initials or ciphers used in the Catholic church, and renders them as abridged invocations to Christ and the Virgin Mary. Of the Manlius Stone he says, with more hesitation, “as, in the year of Christ, 1520, Giovanni de Medici (Leo X.) sat upon the Papal throne, the words might possibly have been LEO DECimus PONTifex MAXimus.” Again the same inscription is assumed by another interpreter to be

\* Schoolcraft's *Notes on the Iroquois*, p. 326.

† *Proceedings of the American Antiquarian Society*, April, 1863, p. 33.

a memorial of Juan Ponce de Leon, the discoverer of Florida, and to "tally exactly with the sixth year after his landing;" which, however, it does not, as that took place on *Pasqua Florid*, or Palm Sunday, A.D., 1512. The attempt, indeed, to identify the name thus rudely graven on a stray boulder, either with that of the sovereign pontiff, Leo X. or with Don Juan Ponce de Leon, is only less extravagant than the persistent decyphering of that of the Icelandic Thorfinn on the Dighton rock.

Apart, however, from any such special identification of the object of the memorial on the Manlius Stone, it is a relic of considerable interest. No reasonable grounds exist for questioning its genuineness; and we are thus supplied with an inscription of a date within eighteen years of the first landing of Columbus on the mainland; and only six years subsequent to Sir Walter Raleigh's first expedition to the country which, on the return of his exploring party, received the name of Virginia. A discovery of this nature, associated with the earliest known period of European exploration of the American continent, in a locality so far to the northward, and so remote from the sea coast, when taken into consideration along with the authentic traces of older Scandinavian settlement still discoverable in Greenland, is calculated to confirm the doubts of any Scandinavian colonisation of Vinland in ante-Columbian centuries. That the old Northmen visited some portions of the American coasts appears to be confirmed by credible testimony; but that their presence was transient, and that they left no enduring evidence of their visits, seem no less certain. To the Spanish pioneers of American discovery and civilisation in the centuries subsequent to the era of Columbus, we must therefore look for the earliest memorials of European adventure in the New World.

The lettered traces of the early Spanish explorers of America are definite, and generally easily deciphered inscriptions, like those of the older colonists of Greenland; and possess an inferior historical value, chiefly because of the ample materials provided by Spanish chroniclers for the history of the discovery and conquest of Spanish America. In 1850 a series of reports made to the Topographical Bureau of the United States, was issued from the War Department at Washington; and among these is the journal of a military reconnoissance from Santa Fe, New Mexico, to the Navajo Country, in 1849, by Lieutenant James K. Simpson of the Corps of Topographical Engineers. His narrative is accompanied with illustrations of a remarkable series of

inscriptions engraved on the smooth face of a rock of gigantic proportions called the Moro. The route of Lieutenant Simpson lay up the valley of the Rio de Zuñi, and there, as he informs us, he met Mr. Lewis who had been a trader among the Navajos, and was waiting to offer his services as guide to a rock, upon the face of which were, according to his repeated assertions, "half an acre of inscriptions." After passing over a route of about eight miles, extending through a country diversified by cliffs of basalt, and red and white sand-stone, in every variety of bold and fantastic form, they came at length in sight of a quadrangular mass of white sand-stone rock, from two hundred to two hundred and fifty feet in height. This was the Moro, or Inscription Rock, on ascending a low mound at the base of which, the Journalist states, "sure enough here were inscriptions, and some of them very beautiful; and although, with those we afterwards examined on the south face of the rock, there could not be said to be half an acre of them, yet the hyperbole was not near as extravagant as I was prepared to find it." On the summit of the cliff the ruins of a pueblo of bold native masonry formed a rectangle two hundred and six by three hundred and seven feet; around which lay an immense accumulation of broken pottery, of novel and curious patterns.

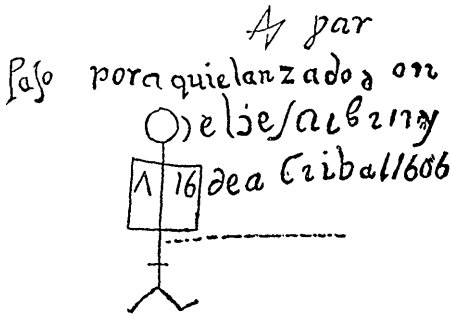
The inscriptions are of two classes: the native hieroglyphics, which furnish no means of judging of the dates of the oldest of such symbolic writings; and the Spanish inscriptions and devices. The longer examples of the latter class appear to be mostly imperfect, through the action, of time and the delacement of later visitors. But they have not been subjected to such careful study, by competent transcribers, as to ensure their complete reproduction, or conjectural restoration; and it is probable that future explorers may be rewarded by the discovery of many additional records of interest and historical value. One apparently reads thus:—

+ *Pasamos por aqui  
el sarjente mayor  
y el capitan Jū de Arechu-  
seta y el viadante Diego Martin  
Barba y el Alferes Guillen de Ynes  
Josana A. 1636.*

Another, and apparently the oldest with a date affixed, A.D. 1606, is given here in facsimile. But others are in an earlier character,



and, it can scarcely be doubted, include inscriptions of the previous century.



MORO INSCRIPTION: A.D. 1606.

The name of the old Spanish explorer who found time to engrave this unfaithful memorial of his visit is no longer decipherable, in consequence perhaps of the haste of its recorder, who thus tells us that on the 16th April, (?) 1606, he passed the Moro Rock with despatch. Older records than this, dated as well as undated, may yet reward the research of future explorers; for Lieutenant Simpson could only devote a portion of one day to their transcription; and the Abbé Dornech, who refers to them in his "*Seven Years' Residence in the Great Deserts of North America*," as inscriptions that "have never been mentioned in any scientific or geographical work published in Europe," merely reproduces a partial and inaccurate version of Lieutenant Simpson's report.

Some few of the Moro Inscriptions are in Latin; but the greater number are in Spanish, and are occasionally accompanied with pictorial devices, or rebuses, somewhat after the Indian fashion of picture writing. One, for example, reads *Pito Vaca ye Jarde*, with the accompanying symbol of the *Vaca*, or cow. Another group, consisting of certain initials interwoven into a monogram, accompanied by an open hand with a double thumb, all enclosed in cartouch-fashion, is supposed by the transcriber to be, even more literally than the previous bit of pictorial symbolism, a pictured pun. "The characters," he remarks, "in the double rectangle seem to be literally a sign-manual, and may possibly be symbolical of Francisco Manuel, though the double thumb would seem to indicate something more." The

device thus ingeniously interpreted includes an interwoven monogram of European characters, and the open hand, a symbol of frequent occurrence among the Indian hieroglyphics of this and other regions; though not as here, with the novel adjunct of the double thumb. It is perhaps, in the simple form in which it is introduced in groups of Indian symbolism, the same "Red Hand" which Stephens observed with such interest wherever he wandered among the ruins of Central America. Here, however, it is the work of the designer; and the monograph, which its transcriber reads as Francisco, appears more like the sacred monogram I. H. S. Perhaps it is thus placed, with an obvious significance, along side a native symbol of the Deity, or of one of his impersonated attributes. On the same face of the rock where this device occurs, is the following elaborate, though partially mutilated piece of local history, somewhat in the florid style of Oriental epigraphy:—

*G. y Capan Genl de las Proas del Nuevo Mexco por el Rey ñro Sr pasó por aqui de vuelta de los pueblos de Zuñi á los 29 de Julio del año de 1620, los puso en paz á su pedimto pidiendole su favor como vasallos de su Majad y de nuevo dieron la obedienci.; to do lo qual hizo con el agasajo solo, y prudencia como tan christianisimo . . . tan particular y gallardo soldado indomitable y loado amemos . . .*

*Joseph Erramos + Diego Nuñez Bellido +  
Gral y el Sapata Bartolomé Narrso.*

Lieutenant Simpson learned from the Provincial Secretary, Don Aciano Vigil, that though the conquest of the Province was originally effected by Juan de Oñate, in the year 1595, all records preceding the year 1680 have perished, as the Indians burnt the archives in an insurrection against the Conquerors at that date. On this account therefore, the Moro Inscriptions have even some historical value; and among these the one quoted above may be classed. The proper names occur so far apart from the main inscription that their connection in the form assumed by the original transcriber, is doubtful. Translated, it reads: The Governor and Captain General of the Provinces of New Mexico, for our Lord the King, passed this place, on his return from the Pueblo of Zuñi, on the 29th of July, of the year 1620, and put them in peace, at their petition, asking the favour to become subjects of his Majesty, and anew they gave obedience; all which they did with free consent, knowing it prudent,

as well as very christian . . . to so distinguished and gallant a soldier, indomitable and famed, we love . . . Joseph Erramos † Diego Nuñez Bellido † General and Counsellor, Bartolomeo Narrso.

Great credit is due to the intelligent zeal of the officers by whom the series of Moro inscriptions were copied, under such disadvantageous circumstances, with so much care; but a more prolonged visit to the same interesting locality will probably hereafter amply repay the labours of some enterprising explorer, and add perhaps to our present materials, by the discovery of ancient native, as well as early European inscriptions of great value. The Dighton Rock sinks into insignificance amid the numerous devices and hieroglyphics graven by native artists on the Moro Cliffs, from among the lines and markings of which an ingenious fancy need find no difficulty in selecting equivalents for more than all the ancient languages affirmed to be represented in the polyglot alphabet of the Grave Creek Stone.

One other authentic memorial of the early presence of the Spaniards in the New World is derived from a different locality. In the year 1817 a stone tablet, engraven here with its curious heraldic blazonry, was found on one of the North Chincha islands off the coast of Peru, buried in the accumulated guano of centuries to a depth of eighteen feet. The shield is quartered heraldically, and pierced at the intersection with a square socket, possibly for the insertion of the beam to which a beacon-light or lantern was attached. In the first quarter is a house, or church, with a belfry-tower and bell; and over this the abbreviated word DOM. The second compartment is charged with a pelican, of which there are myriads about the guano islands; and the inscription, running on into the fourth quarter, reads: PEDRO GVR CHN ISA. The device on the third quarter, is an arm holding a blazing torch, with an inscription of which the only word now decypherable is QVEMA, *burns*. The fourth quarter bears three Islands, no doubt intended for those of the Chincha group. So far as the whole is decypherable it may read simply: *The house of Pedro, Governor of the Chincha Islands*; which the device in the first quarter of the shield probably represents correctly as no palatial edifice. But the use suggested for the socket in the centre of the shield accords with the destination which its blazonry suggests for the tablet, as the decoration of a beacon-tower attached to the residence of the insular Spanish Viceroy.

The sculptured tablet exhumed from the guano bed of the Chincha Islands, and now deposited in the British Museum, is thus a memorial of the early appropriation by the Spanish conquerors of Peru, of what we know were among the most prized possessions of the Incas long before the advent of Pizaro and his unscrupulous conquistadors. The chronological significance of the depth at which it was found receives some illustration from other discoveries subsequently made.



CHINCHA TABLET.

In May, 1860, Messrs. Trevor and Colgate, bullion dealers, New York, exhibited to the American Ethnological Society four gold relics, which formed part of a discovery made on the same Chincha Islands, by some Coolies engaged in digging graves. They included the rudely executed figure of a man, wrought with the hammer and punches, from a piece of gold weighing about twelve gold dollars; and three cups of the same metal, wrought in like manner with the hammer, and weighing about five gold dollars each. But the most interesting fact in relation to those curious native relics is that they were recovered at a depth of upwards of thirty feet below the original surface of the guano; and they carry us back centuries before the period when the sculptured memorial of the Spanish intruders, described above, was abandoned to the same slowly accumulating sepulture.

Such then are a few highly characteristic illustrations of the footprints of early American explorers and settlers, which, without attempting any exhaustive treatment of the subject, may suffice for the purpose now in view. The sculptured tablet, the engraved plate, the medal, and the coin, are nearly indestructible. Wherever they have been left they are sure, sooner or later, to turn up; and already, as we see, chance discoveries on widely scattered localities, carry us back wonderfully near the first well established dates of permanent settlement on the chief centres of early occupation. The Northmen colonised Greenland nearly eleven hundred years ago, and their memorials remain to this day, as indubitable as those of the Romans in transalpine Europe. The Spaniards took possession of the American mainland six centuries later, followed by the Portuguese, the French, and the English; and the traces of all of them carry us back wonderfully near the earliest dates of their presence there. We know, moreover, from the amusing history of the Dighton Rock inscription, that the subject has attracted a lively and even eager attention for nearly two centuries; and since the revival of the traditions of the long lost Vinland, ante-Columbian inscriptions and memorials have been sought for even with an undue excess of zeal. The antiquaries of New England have done good service to the historian by their thorough exploration of all real or imaginary traces of ante-Columbian colonisation; and have no special reason to blush for the ardour with which they have been stimulated in the pursuit of so tempting a prize. If, however, some of them are inclined to reflect on the labours of their more enthusiastic confrères as a little Quixotic, they may derive consolation from the abundant counterparts that serve to keep them in countenance, in the past history of archæological research in older corners of the world. Nor has their labour been in vain. Their diligence has gone far to prove that no such relics as they sought for are to be found; and that if Icelandic and Norse rovers, or far older Egyptian, Phœnician, Greek, or Punic adventurers, ever landed, by choice or chance, on the American shores, they have left no memorials of their premature glimpses of the Western Hemisphere; and appear to have made no permanent settlements on its soil.

## ON ERRATA RECEPTA, WRITTEN AND SPOKEN.

BY THE REV. DR. SCADDING,  
LIBRARIAN OF THE CANADIAN INSTITUTE.

(Continued from page 153.)

## III. FOREIGN WORDS ANGLICISED.

1. *Anglicised French Words.*

French Canadians, on straying westward into the Upper Canadian settlements, used in former days sometimes to anglicise their names. There are persons in Toronto, I think, now bearing the names of Bishop and Walker whose fathers were respectively called L'Evêque and Marchant. In imagining, in the latter case,—doubtless from the sound,—that *Marchant* was the participle of *marcher*, there was an inadvertent return to the root-notion of *marcher*—which is *mercari*—to go about on commercial errands—like the venturesome trader of Horace,—

“Impiger extremos currit mercator ad Indos.”

Were the forefathers of any of our Cowpers, Coupers or Coopers, *col-porteurs*—*impigri mercatores* with a tray of wares suspended from their necks (*cols*)? (Comp. *coup* from *colpo*)—There was once also settled here a clever French machinist who, probably by some happy mistake, bore the fine Latinized cognomen *Columbus*.

In the familiar word *shanty*, from *chantier*, we have confounded the timber-yard with its “office”—the log-covered area of the first clearing in the forest, with the temporary hut for the shelter of the chopper;—for *chantier* is properly not a house at all, but an enclosure where logs are piled.—Again, we call the little wicket for air in our outer winter-windows, a *tiret*, even when it opens upon hinges, the term implying a *slide*.—“Concession,” as applied by us to the subdivisions of a township, implies no longer what it did in the old Lower Canadian feudal phraseology in which it originated. There, it was the grant by the King of a seignorial domain for the tenure of which certain acts of fealty and homage were to be performed, “pursuant to the custom of Paris.”—In referring to the Speaker of the House of Assembly, as *M. l'Orateur*, we have to meditate a good deal our English notion of *orator*, freedom from rhetorical flourish and

silence itself being official characteristics in that functionary. We have this use of *orator* in connexion with one of the English Universities—where “Public Orator” denotes simply the organ or mouth-piece of the corporation; but in this case, eloquence, or at all events, rhetoric art, the one allowably, the other generally of necessity, is associated with the title.

Our Canadian term *portage* requires a little interpretation. In an Article on Prof. Hind’s work on Labrador it is evident that the English reviewer stumbled at first at this expression. He doubted as to whether it was not Labrador for a certain measure of length, somewhat as *parasang* is Persian for three or four miles.—The word *traverse*, in the language of our Canadian boatmen, has likewise a meaning which is to a certain extent special, and in this application has given names to some localitiés, as, for example, Great Traverse Bay in Lake Michigan.—It is to be feared that our *Sable Islands* and *Points Sable*—which of course simply bespeak their own arenaceous character—sometimes convey to the English mind the notion that a certain valuable fur, met with only in Siberia, is among our peltries. Just as in the well-known Cornish “Perranzabulo” some have fancied they have discovered a Hebrew element, instead of reading in it, as they ought to have done, *Peranus in sabulo*—“St. Peran’s in the Sand.”

“Bureau” is, in one respect, a kind of border word, being familiar throughout Canada as a term for a Public Office—a sense in which it is not popularly known in England. It usually denotes there, as it does also here, a convenient article of household furniture. Its strict signification, however, is the Table covered with a tapis of rough drugget (*bure*) at which officials are supposed to transact business. It thus corresponds to our “Board” as applied to a body of Directors. In a somewhat similar manner, *toilette*—which describes now with us, alike the act of dressing and the dress, is in reality only the *toile*—the cover thrown over the dressing table. “Bonnet,” again, is the name of a material used in the decoration or needful protection of the head—applied at length to denote the head-covering itself; just as *castor* and *beaver* have come to signify “hat.” “Frock” also (Gallicè *froc*), is the name of a coarse fabric in wool (*flocus*), of which especially, the characteristic “frock” of the monk was made.

Our word “Map” presents another allied instance of metonymy. This is properly the French *mappe*, an old word for *napkin*. A chart of the world exhibited, when outspread, the regular folds of a newly-

spread napkin; hence the term *mappa mundi* was applied to it, and hence has come the term applied by us to that and all lesser geographical delineations.—*Mappe*, by a not uncommon change of *m* into *n*, has become in later French *nappe*, whence again has not only sprung our diminutive *napkin*, but,—by a singular aphæresis, arising from the influence of our indefinite article “an” before a vowel—the English word *apron* also, which is, in strict propriety, a *napperon*—that is, a small napkin doing pinafore duty.\* Apropos also of vestments and their material, we may here notice *surplice*. This is *sur-pelisse*, something thrown over the *vestis pellicea*, the fur-lined and more closely-fitting undergarment. With *-plice* for *pelisse* we may compare *plush* for *peluche*—a derivative not of *pellis*, but of *pilus*—whence also an English word *pile* in the sense of *nap*, &c.

The uncouth Americanism “Fillibuster” may have occasioned us some perplexity. It has arisen from the equally uncouth French *fibustier*; and this is said to have sprung from *fibot*, the French rendering of the Low Dutch *vlieboot*, which in plain English is *fly-boat*—a small vessel built for speed.

In writing down, as we do, a certain vessel of war, a “frigate,” employing in the first syllable an *i*, we have perhaps unconsciously recovered the stem-vowel of the original word, this being *fabricata*, a structure—a *bâtiment*, as the French still call a large ship; but in so doing we depart from the orthography of the nations from whom we borrowed the term. The Italians and Spaniards say *fregata*, the French *frégate*.

Our *canoe* is the French *canot*, and is imagined, I believe, by some to be an Indian word for boat. (This in Ojibway at least is *tchiman*.) Its source is, however, European. *Canna* for *boat* is a very ancient term. Juvenal speaks of the African *canna* as having a peculiarly sharp prow. He is referring to a certain Numidian oil used in the Baths, “quod,” he says—

“Canna Micipsarum prorâ subvexit acutâ.”

An old French word for *boat* is *cane*, whence *canard*. The root is

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\* Mistakes in regard to articles have occasioned many changes in words. From *lynx* came the Italian *lonza*. The initial *l* sounding like the elided article, it dropped off from the French *once*, whence we get our *ounce*, as the name of an animal. By a like process *azure* has arisen out of the Persian *lazurd*. In *lapis lazuli* the *l* has survived. Out of *lingot*, a derivative of *lingua*, we have made *ingot*. On the other hand, the bird which we correctly call the *oriole* (aureolus) the French by some caprice call *le loriole*.—*Liorre* is *l'hiorre* (*hodera*, ivy.)



*canna*, the cane or bamboo, one species of which (*bambus arundinacea*) grows to the height of sixty feet. So long ago as the time of Herodotus it was reported that on the Indus, the nations caught fish in boats made of reeds, each formed out of a single joint. (Herod. iii. 98.)

In saying *Engineer*, how unwittingly we drop out of the word almost all its nobleness! By it we transfer to the English mind but poorly the grand hint given in *Ingénieur*, that here is a man whose speciality is *ingenium*—brain!

This suggests to us that *Artillery* is to be interpreted in a similar manner, as denoting all *Engines* of war—the mechanical results of the application of the highest *art* and skill. It may here be not inappropriately added that *atelier*, the workshop, is thought, on good authority, to be also connected with *ars*, *astillaria*, i.e., *artillaria*, denoting, in late Latin, implements for every purpose, of peace as well as war.

Our word *redoubt*, to denote a certain part of a fortification, exhibits a *b*. We either seem to have supposed that the French *redout* was from *redouter* (*redubitare*), and not from *ridotto* (Lat. *reductus*) a retired place; or some of our gallant soldiers, on being received rather too sharply before such an outwork, and deciding to take second thoughts about the mode of attack, have good humouredly taken the name of the impediment to express their own hesitancy on the occasion; just as their impetuous Australian brethren have named for an obvious reason, a troublesome thorn in their woods a *wait-a-bit*.

This *ridotto* or *reductus* lies concealed also in *rout*, when it signifies a grand “party:” this is properly *réduite*, a hall for public amusements; whilst *rout*, a flight, and *rout*, in such an expression as *rabble-rout*, is *rupta*—whence also *route*, a road. In this last acceptance, *rupta* is a graphic term to us, who are familiar with the processes by which roads are first made, and at length perfected, in a new country.

The French form of the name of our James the First—only à l’*Anglaise* corrupted—is concealed in the title of one of our national flags—the “Union Jack.” It is as difficult to say why we have made *Jack* the familiar sobriquet of John, as to explain how we have formed *James* out of *Jacobus*. From its pronunciation, *I-a-cob*, we see how the Spanish *Iago* and *Diego* have arisen.—We are not responsible for the conversion of *St. Macarius’s* name into *Macaber*, in the popular mediæval pageant of the *Danse-Macabre*. Some etymologist in the court of James might have been suspected of the act.

A difficult word is supplanting *légerité de main*, viz., *prestidigitation*. If it survives, it is likely, like its synonym, to undergo mutilation. Already *prestigiateur* is common in the Papers. But this is not bad, provided it be understandingly used. It is, in its etymology, an entirely different word from *prestidigitateur*.\*

Curfew (*couvre-feu*), kerchief (*couvre-chef*) and vinegar (*vin-aigre*), are examples of our *errata*, in French, so trite that we make no remarks upon them. But one word in connection with *purée*, which emerges now and then in the Papers. A reporter, for example, was lately prosecuted, and successfully, by the restaurateur of a railway-station, for stating in print that his (the said restaurateur's) soup was a wretched *purée* of horse-beans. This word we have already in the language, only we have anglicised it into *porridge*. In this familiar form it comes nearer than even *purée* to the root—qu. bulb?—of the word, viz., *porrum*, leek.

A consideration of *pourchasser*, the French form of our "purchase," throws light on the curious use of this expression, not only for the act of buying, but to designate an acquisition of mechanical power or advantage. Our pursuit of an object—our aiming even at a mechanical effect—is a "chase" in which we are engaged. The gain of strength which we desire to describe by the term is a help—a lift onwards—towards our quarry.

Who would believe that *hatchment* was *achievement*? Our *achievements* are the great and good deeds which we have accomplished—brought *à bout*—conducted *à chef*, to a head—to a good issue, and which are supposed to be worthy of emblazonment on our shield of arms, whilst our actions of a contrary tendency are described as *meschefs* (*méchefs*)—non-fulfilments of our proper destiny—*mischievous* failures in duty.

It does not sound very Parisian to say of any body that he is all agog, or of any thing that it is all the go; yet we have here, disguised, the not dissimilar expressions—both perhaps having *gaudium* at bottom—*être à gogo*, *tout de go*. Anglo-gallicisms such as these are by no means uncommon. We have turned *sieur* (senior) into *sir*; *panse* (pantex) into *paunch*; *tortue* (tortuca) into *turtle*; *accise* (late Latin *accisiae*) into *excise*; *créanter* (*créance*, *fides*) into *grant*; *autruche*

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\* The one is from the Late Latin *praestus* (Ital. *presto*), and *digitus*; the other from *praestigiator* (a juggler), occurring in Plautus; and this from *praestigiae* (sleights, signs, &c.), whence *prestige*.

(*avis struthio*) into *ostrich*, &c. &c. From *patron* (*patronus*) we have formed *pattern*. Out of *s'essorer* (*exaurare*) we have developed *soar*. The *bassinetts* which we see advertised are *Barcelonettes*. *Jais* we have converted into *jet*, intending, it is probable, at first, that the *t* should be silent. In this case we have certainly obtained a very simple vocable out of a rather unpromising-looking original, viz., *gagates*, *gag'tes*.

*Tante* we have transformed to *aunt*, thereby accidentally approaching the original *amte*, i.e., *amita*, *am'ta*. We have rejected the initial *t*, which—as in *a-t-il*—was an intercalation to prevent hiatus, the full form having once been *ma-t-ante*. Of *frère* we have made *friar*, from which has evaporated the notion of *brother*.\* *Pape*, which has a fragment of sense in it, we write *pope*, which has not. *Messe* we call *mass*, departing still farther than our authorities from *missa*. (*Ite catechumeni! concio missa est.*) *Mets* we write *mess*, a departure again from *missa*—but now *missa* is neut. plur., denoting the things *sent* to the table. To *prowess* we attach the idea, I think, merely of might combined with courage; in *prouesse* is implied the *prudence*, or the *proved* experience of the *preux chevalier*.—Dropping out of *tailor* one of the *t*'s of *tailleur*, we somewhat obscure the notion of *cutting* which would otherwise be suggested from our familiarity with the cognizance of the well-known publisher, Talboys—a hatchet struck into a tree-trunk, accompanied by the legend *Taille-bois*.—The first syllable of *comrade* has been forced by us to be a symbol of fellowship, by a violence to *camarade*, which indeed denotes companionship, but specifically that of a chum or *chamber-fellow*.†

We say *balance* for the complement or difference between two amounts. It should be *bilan*, a curious technicality in French book-keeping derived from *bilanx*—Latin for a pair of *lances*, i.e., dishes or *scales*.—It is likely that the Englishman who first transferred the French *limon* to our language intended that we would pronounce it *le-mon*, as he wrote it. At the same time it may be remarked as strange that the Frenchman who first heard the name of the Arab fruit, *laimûn*, should have jotted it down *limon*.

*Sangraal* figures in our story of King Arthur. *Holy grail* has

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\* *Elbow*. \* \* \* Bless you, good father friar.

*Duke*. And you, good brother father.

—*M. for M.*, iii, 2

† In Fanshaw's Translation (1655) of *The Lusiad*, we have *cam'rade*. (Vide-vii. 25.)

been made out of it, suggestive of nothing etymologically, but associated with the *santo catino* at Genoa—a bowl supposed to consist of a gigantic gem of inestimable worth, until the audacious French savans showed it to be nothing but common glass. The true form of the word is of course *sang-réel*.

We might pass over *sugar* without remark, as every one knows that it is the French *sucre*, which is the Arabic *sikkar* or *assikkar*—an old word, appearing also in the Greek *σάκχαρον*. But our *candy* (the French *candi*) is not generally debited so correctly. This is sometimes supposed—like *candidus*—to be derived from *candere*, to be white; it is in reality, however, oriental likewise—first, Arabic *gand*, the sap of the sugar-cane brought to a viscous state; and this, secondly, is the Hindoo *khandā*, a morsel—i.e., sugar in small crystals or morsels.

*Coterie*, which is properly a club in which each one pays his *quota* (to be pronounced *cota*) or scot, is now a “set”—a restricted circle of co-notionists. Under some circumstances it becomes a *clique*—a union for sensation-purposes—a combination to raise a *clack* either for or against a given measure or man.

In theory *pic-nic* has taken the place of *coterie* in its etymological sense, suggesting an *al-fresco* regale on cold fowl or similar contributed viands. A *Pic-nic*, however, in its primary association, was something much more *spirituel*. It appears to have been a sort of tournament of wit—a gentle passage of repartees—of retorts courteous and polite;—an encounter in which “*tu me piques, je te nique*”—*tit-for-tat*—was the motto.

We use the word *billet* to express a little note. Why do we apply the same term to a thing so dissimilar as a piece of cleft wood? By a now forgotten inaccuracy. The billet of wood in French is not *billet*, but *billot*—an allusion perhaps to the instrument by which it was cut or cleft; while *billet*, the letter, speaks of the *bullā* or seal, which was appended to it to attest its genuineness. *Bulletin* is a farther diminutive of the same word. Our English term *bill* has no connexion with this. *Bills*, as we have already seen, (p. 151), parliamentary and domestic, are properly *li-belli*; whence also our *libel*, the schedule in a Court of Justice detailing the charges against a man being put, by a metonymy, for the charges themselves. These must happily or unhappily have been so often proved groundless, that the

word at length has become invested, in ordinary language, with its present evil significance.

In writing *moiety* for *moitié* we have perpetrated another Anglo-gallicism; but we have retained the derivative meaning of the word, viz., *medietas*, i.e., half.—Out of *piété* we have made *pity*, and assigned a new sense to the term, introducing, however, besides, the original in its proper sense.—*Propriété* we have treated in a similar manner; only, to the blundered form *property* we allow the right sense of its original, viz., ownership, whilst to *propriety*, the later and purer word, we assign a sense quite novel.

Through some misapprehension, perhaps, at the moment of first hearing, *rivière* has been converted into *river*, although it is really the river's bank (*ripa*) and not the stream. So with us, *grap* has become *grape*, although *grap* is the bunch and not the berry (*raisin*).

*Vignettes* now seldom exhibit what *vignette* manifestly implies; nor are *miniatures* any longer little sketches in vermilion (*minium*), any more than the rules commonly called *rubrics* are necessarily things of red-letter.

*Promenade* we confine to an exhibition of ourselves on foot. In the Bois de Boulogne it is equally said of horseback or carriage airings. The connexion of *voyage* with *via* might suggest travel by land as well as by sea. To the latter however—in modern English at least—we have chosen to restrict the application of the term.\*

In the United States the word *trait* has become English. This jars upon our ears. The people of Plymouth in Devonshire have made out of *Haut*, *Hoe* (i.e., if the latter be not indeed *Hoo* or *How*.) It is almost a pity, since *trait* is to continue French in sound, that we have not in some way manipulated it into English form.†—The same thing may be said of *dépôt*—which among the mixed multitude on the railway platform suffers violence in several ways.

We appear to have formed our familiar term *Helot* by phonetically writing down the corresponding French *Ilote*, which we do not, from its appearance, readily recognize as the same word. So, however, it is. In Livy (34, 27, 9,) also, we find Εἰλωτες represented by *Ilotae*, and Philemou Holland, in his translation of Plutarch's *Morals* (p. 469, ed. 1603), speaks of "Ilotes." *Ilote*, it will be noticed, is

\* Dryden employs *voyage* in the general sense. Thus he makes the Sibyl say to Aeneas in Tartarus, "Let us haste our voyage to pursue." (See *Aen.* vi.)

† Bacon has "by the *tracts* of his countenance." See *Essay* vi.

written without the initial aspirate which it ought to have.—This is better than writing it and not in practice using it, as is so extensively done in French.—Query, Are we in any way to attribute to this French usage, the ignoring of *h*'s, which is so much laughed at in England?—Less just to this sound than the persons ridiculed, the French do not, I believe, in any case insert it where it is not. This is what—influenced perhaps by a notion of connexion with *hostis*—we have done in the case of *hostage*—which properly is *ostage*, Old French for the same thing, derived through *obsidiatus* (the act of giving a hostage) from *obses*.\*

Has the expression “to blaze,” as applied by surveyors to the marking of trees when running “lines” through a forest, arisen from a corruption of *briser*, technically used in this sense, as in the expression *marcher sur les brisées de quelqu'un*?

Is not “to stump,” as a synonym of “to pose, confound, and non-plus,” simply *estommir*, which denotes very much the same process? And has “mooning,” in such a phrase as “mooning along,” descriptive of a habit especially of short sighted persons who wear *spectacles*—anything to do with *lunettes*!

(To be continued.)

ADDENDA TO SECTION II., p. 147.

1. Further examples of literal abbreviations.—N. or M. is N. or NN. (*nomen* or *nomina*). M has arisen from the two N's as W from two U's.—O. P. (Old Price, i.e., the former price of the tickets).—U. E. (United Empire).—F. E. R. T. (on the shield of Sardinia) is, not *Fortitudo ejus Rhodum tenuit*, but *Foedere et Religione tenemur*.

2. Do. of abridged words.—*Par. affin.* (i.e., *parum affinis*.)—*aroph*—(*aro[ma] ph[ilosophorum]*.)—*Aur. pigment.* (*auri pigmentum, orpiment*).

\* The vagaries of the old so-called etymologists in their efforts to derive everything from the two or three ancient languages of which they had a very imperfect knowledge, are sufficiently amusing. One of them derives *rat* from *mus* thus: *mus* (*muris*), *muratus*, *ratus*, *rat*. Another, for *barde* (horse-armour), suggests *cooperta*, *cooparta*, *parta*, *barta*, *barde*. Another deduces *haricot* from *fabā*: *fabā*, *fabarius*, *fabaricus*, *fabaricotus*, *faricotus*, *haricotus*, *haricot*. By a like Darwinian process *larigot*, a musical instrument, hails from *fistula*: *fistula*, *fistularis*, *fistularicus*, *laricus*, *laricotus*, *larigot*.—But the following are legitimate: *operire*, to shut; *de-operire*, to open; hence *dub-rir*, *adubrir*, *aubrir*, *ow-rir*.—*Equaliscare*, *égalfier*, *égalger*, *egauger*, *gauger*, to gauge.—*Octroi*, the tax levied by the “Authorities” on the necessaries of life as they pass within the city-gates, has its rise in *auctoricare*, *auctorare*. *Ennui* = *in odio*,—the complete phrase being *est mihi in odio*.

3. Do. of words suffering apocope.—*Squad* (from *squadron*), *coz* (from *cousin*), *plenipo*, *photo*, *typo*, *pill* (for *pilula*), *barb* (horse of *Barbary*), *brig* (*brigantine*), *prim* (*primitive*), *alum* (*alumen*), *ipicac* (*ipicacuãha*), *joe* (*Johannes*, a Portugese coin), *sol* (i.e., *sou*, for *solidus*), *ink* (for *inch-iostro*, Ital., *encaustum*, Lat.), *buff* (from buffalo-leather), *post obit* (*post obitum*), *Punch* (from *Punchinello*—and this from *Puccio d'Aniello*, the inventor of the character).

4. Do. of words formed by an aphæresis.—*Tram* (in *tramway*) from *Ou-tram*; *spite* from *despite*; *pose* from *oppose*; *cess* from *assess*; *uncle* from *av-unculus*; *pert* from *malapert*; *doll* from *idol*; *moist* from *hu-mectus*; *age* (from *Old Fr. ed-age*, a derivative through *aetaticum*, of *aetas*); *plot* from *Fr. complot*; *megrin* from *he-micranium*; *lammas* from *ad vincu-la mass*; *Masaniello* from *Tom-mas' Aniello*; *Cola di Rienzi* from *Ni-cola di R.*, &c.

5. Do. of words arising from agglutination of the article or a preposition, or omission of apostrophe.—*Lisle*, *Lorient*, *Labbe*, *Doria*, *Townsend*, *Wallsend*, *Daisy*, *gendarm*, *marsh* (*marish*), &c. *Comp. aguilaneu* (=à qui l'an neuf.)

## ON SECLUDED TRIBES OF UNCIVILIZED MEN.

BY DAVID TUCKER, M.B., B.A., T.C.D., ETC.

WE are accustomed to group the whole human family into three grand divisions, which we severally style civilized, semi-civilized, and savage. However convenient this division may be for ordinary purposes, it is by no means philosophical or exact. As Horace experienced a difficulty in finding a line which should separate the sane from the insane, so should we be at a loss to discover the point at which civilization begins to merge into barbarism. The truth is, that, from the most highly organized and civilized member of the Aryan family, down to the most degraded and ferocious savage, there is a gradual and gentle descent. All who are styled savages are not equally savage. Many uncivilized tribes have made considerable advances in what we are accustomed to call the arts of civilization be-

fore they have had opportunities of intercourse with civilized men. Some who have bordered on the dwellings of the civilized have evinced a superior aptitude for learning the uses of certain mechanical appliances, and, though still continuing savages, have appropriated the inventions of civilization for the better prosecution of their savage practices. Several such tribes, as, for example, the Maoris, have proved themselves formidable antagonists to those who have possessed all the advantages of a high civilization; and this has been to a great extent brought about by their adopting the implements and practices of warfare as used by civilized men. Other savages are differently affected by the inroads of civilization upon their borders. The native Australian is endowed with a sort of pacific confidence in his intercourse with the civilized races. He frequently visits the settlements, but, being of a low type, as regards intellectual power, he does not avail himself of the superior arts of the civilized man for his own aggrandizement, yet can improve, by culture, in mental capabilities. But even in the abyss of barbarism itself, there are degrees. Some tribes are apparently of so low a standard of intellect that they evince no disposition to form those social bonds which other men, even in the savage state, generally adopt for their common welfare, or to profit by the opportunities afforded them of intercourse with superior races.

It is a very interesting fact that there exist, scattered throughout the world, several detached, though, in general, inconsiderable bodies of men, who have secluded themselves from intercourse with the rest of their species, in a most determined manner. Whatever communication they have had either with other wild tribes or with civilized men, has, for the most part, been forced upon them. Such has been their habit of life from the earliest times of which we have any record of their existence. In the case of some of these tribes a probable cause has been adduced for this secluded condition; and their early history, interwoven with mythical narrations, has been referred to in proof of their having been a fragment of a more considerable body broken off by persecution or separated by migration from the original mass. Although such tribes are to be found in different regions and climates, yet in their habits, characteristics and persons there is a general resemblance. For example, a majority of them are to be found in regions which are very scantily supplied with the means of supporting animal life. They are consequently, through



want of generous and regularly supplied nutrition, stunted in their physical development. In the children, particularly, alternate starvation and repletion produce an abnormal development and distension of the abdomen. The limbs, on the contrary, appear almost devoid of muscle. They are all filthy in their habits and unscrupulous as to the disgusting nature of their food—many eating insects and other vermin with avidity, though one known tribe, at least, refrains from certain kinds of wholesome flesh. In the construction of their dwellings and couches, which may with more propriety be termed dens and lairs, they approximate to the habits of the lower animals. Like most of the carnivora, they appear to have nothing gregarious in their nature. Sometimes a few families are to be found in the same district, but each has its own solitary abode. As might be expected they are wild and shy, often running at the approach of a stranger. Some are cruel and vindictive, others mild and harmless. In general they have hardly any tradition, an apparently imperfect language, and but vague ideas concerning the existence of spiritual beings.

In examining these characteristics it is exceedingly difficult to distinguish cause from effect. We may, of course, reasonably conclude that dietetic influences may produce unshapeliness of form; gorging, to an extent unknown amongst civilized men, distending the abdomen without permitting the due assimilation of the ingesta for the development of tissue. The nutrition of muscle would also be wanting in seasons of famine which with such people are exceedingly common, or, indeed, we might say that starvation with them is the rule and repletion the exception. The natural result of this deficiency and irregularity in diet would be an incomplete development and a deformed aspect. But concerning other peculiarities of their position and character there are several obvious questions which may be propounded, and which are not easy of solution. For example, as the majority of known secluded tribes dwell in sterile regions, is it their habitat which degrades the men, or is it their naturally degraded character which depresses their desires to so low a point that they long for nothing better? Is a love of seclusion a natural and innate characteristic of these tribes in contradistinction to the gregarious nature of other men, or has the accident of their seclusion engrafted that nature secondarily upon them? Has that seclusion been the chief cause of their present degradation? If fortuitous circumstances have originally caused their segregation from a large body of men, how is

it that no tradition of a region more abundantly supplied with the means of supporting animal life has stimulated them to migrate to a more favoured locality? With still more surprise may we ask how it is that some of these tribes when even but a short distance removed from the settlements of civilized men, appear content with their degraded and miserable lot, seeking no intercourse with or assistance from their more favoured neighbours? What is the cause of their persistent and determined seclusion? Is it natural ferocity and hatred towards all mankind? Is it an inherent timidity of character? Or is it a mere stolidity and incuriosity, the result of their degraded intellectual condition?

Such questions are more easily propounded than satisfactorily answered. Probably none of them, in our present state of ethnological and anthropological knowledge, can be thoroughly solved. But it is reasonable to suppose that the most direct way towards a solution of these will be an examination of the actual condition, character, habits, and (if possible) history of the tribes in question. As our time is limited, it will, of course, be impracticable for us to examine into such circumstances in connection with all known secluded tribes. I shall, therefore, in order to stimulate investigation and elicit opinions upon this important subject, give slight sketches of two of these segregated tribes, whose condition and history are peculiarly interesting. One of these tribes is of the vindictive and ferocious class: the other is of the mild and inoffensive. One resides on a group of sterile islands; the other in a region of great fertility.

The first of these tribes to which I shall call attention is found upon the Andaman Islands, lying on the eastern side of the Bay of Bengal. The people who compose this tribe are, in more ways than one, ethnological curiosities. In the first place, they are not of that Turanian family, to be found in their vicinity on the main-land, but of that dark-skinned race with frizzly hair, known formerly as the Negrillos, or Negritos, but now termed Melanesians. The great puzzle in their case is, how they became isolated from the rest of their race, and chanced to take up their residence upon these islands. There have been several wild conjectures upon this subject, on the supposition that they were of the same stock as the African Negro. It was supposed that a Portuguese slave-vessel had been wrecked upon the islands, and the crew murdered, the slaves landing and establishing themselves as lords of the soil. But this, as well as

another unauthenticated account of a similar fate happening to an Arabian ship, with like result, cannot be received. The former, indeed, must be an anachronism, as these islanders are mentioned by Ptolemy. The same race is to be found in the mountainous parts of the Malayan peninsula, under the name of Samangs or Semangs, and it is conjectured that these Melanesians once held the whole of that peninsula. If such were the case, we might account for the presence of the same race in the Andaman Islands, by supposing that a small section, perhaps guilty of treasonable or other reprehensible conduct, had been sent adrift or banished to these islands. Most probably the original home of this race was in some of the Oceanic islands. It is a curious coincidence that the inhabitants of the Andamans, and the Fijis, who are also of the Melanesian race, have both adopted the same custom in dressing their hair, namely, colouring it a reddish-brown with some ochreous earth. The character and habits of these people are also very extraordinary. They are exceedingly shy of strangers, but will occasionally, on provocation, turn upon them with great ferocity. Hospitality is certainly not one of their virtues, and it is extraordinary that they bear the same animosity to all races of men, white and black. It will be recollected that it was to one of these islands the King of Delhi was banished by the British. There was also a stronghold on one of them in which several rebel Sepoys were imprisoned. Some of these succeeded in making their escape. So unfriendly was the reception which they met with at the hands of the natives, that the majority of them were exceedingly glad to return to imprisonment. A few never returned, and were supposed to have perished by the violence of the inhabitants or by hunger. Two girls were once found on the beach in a state of starvation. The boat's crew that found them, enticed them by the sight of food to come near. They took them on board ship, attended to their wants, and treated them with great consideration. Their conduct on board was shy and suspicious. They would not both sleep at the same time; one always kept watch whilst the other reposed. When they had recovered their strength, and the ship approached within half a mile of one of the islands, they slipped into the sea by night and swam ashore.

As regards their personal appearance, it is such as we might expect, knowing their position and their race. Their stature corresponds with the usual stature of secluded savages—five feet in the case of males, and four in that of females. These islands not being

blessed with the cocoa-palm of the continent, and being in other respects extremely unfertile, with hardly any quadrupeds existing upon it, the inhabitants are often driven to straits, and pick up their living to a great extent by traversing the sands and mud-banks in search of shell-fish. An inspection of their feet would have delighted the heart of Lamarck, whose development theory was that the necessities of existence cause new developments of organs—*rasores* being supplied with long and strong claws when they discovered that their circumstances obliged them to scratch, and *nata-tores*, by the continual expansion of their digits, being supplied with webs when they found that they must swim for a living. So the Andaman Islander has, at the present day, a foot most admirably adapted to his position and labours on the yielding soil of the sea-coast. The foot is exceedingly large, and the *os calcis* so greatly exaggerated and projecting posteriorly, that, favoured still further by the lightness of his body, he can safely traverse surfaces into which an ordinary mortal would sink. His cranial type is not by any means low. These people have the usual spindle-shanks of ill-developed men, but the length of the limbs is proportionate to that of the body. Their couches are like the lairs of the Bushmen. They do not trouble themselves with any clothing, and they have a community of wives. Professor Owen regards them as at the lowest point in the scale of humanity. He states that they have no notion of a Deity, of a future state, or of spiritual beings. But this assertion, as Mr. Bruce very justly remarks, is not easily proved. We usually find that the most degraded savages have some idea of the existence of spirits good or bad. At a meeting of a scientific society lately held in Sydney, I perceive, by the report of proceedings, a similar assertion made concerning some of the Australian aborigines was stoutly denied upon good authority.

The Andaman Islanders are a comparatively ancient tribe. They are stated by Ptolemy to be cannibals, but this charge, though repeated by Marco Polo, and by so eminent an authority as Dr. Latham, has been found to be incorrect. They may, as has been the case with other tribes, even of superior races, been driven to cannibalism on a rare occasion, through danger of imminent starvation, but the eating of human flesh is not their regular practice. The population is about two thousand, and is kept down by checks as severe as even Malthus himself could desire. They have no regular social organization, but live in gangs.

We may naturally inquire what can be the cause of their determined isolation, wildness, and untameable ferocity. The most reasonable solution of the difficulty is merely a conjecture. We surmise that those who first planted the colony must have experienced cruelty, at the hands either of their own or some other race of men. It is possible that the stock may have originally migrated from the Melanesian islands of Oceanica, and gained a footing in the Malayan peninsula, whence they may have been driven under circumstances of cruelty. They attack Malays with as much ferocity as they do Europeans. Another section of the race may have taken refuge in the mountain fastnesses of the peninsula itself, where it exists at the present day, as formerly mentioned, under the name of Samangs or Semangs. I cannot find that there have been any opportunities of forming further conjectures from the language of these strange people.

Another secluded tribe to which I shall refer is to be found in the island of Ceylon; and I must confess that it was in order to correct some current errors and to bring some recent information concerning it before the Institute, that I selected the subject of this paper. Ceylon, from the various vicissitudes of its history and from its having been the resort of merchants through a long succession of ages, presents an interesting object of study to the ethnologist. At the present day there are to be found there, especially in the seaports, representatives of at least three, and probably of all, of the great human families. The Aryan, or Indo-European is represented by the British, Dutch and Portuguese, or their descendants; the Semitic by the Moormen, or traders of the island, who are really Arabian in origin; and the Turanian, which is the family to which those called Malabars belong, who are identical with the Damilos or Tamils, a race that migrated at an early period from southern India to Ceylon. In addition to these there are specimens of other races whose connection with any one of the great families ethnologists cannot as yet trace, such as the Kaffirs and the Chinese.

The aboriginal inhabitants of Ceylon are supposed to have been of the Malay race. But there are no reliable records on which to base such a supposition. The character of the canoes which are to this day to be seen on the coast has been adduced as a proof of this assertion. These are supplied with that peculiar appendage styled an "outrigger," which appears in all countries where Malaysans

have settled, and is not to be found on the Arabian side of India. It is probable that whether any traces of the Malay type can be discovered, as some suppose, in the personal appearance of the native population or not, that the country was originally settled by tribes similar to those which at a remote period colonized the Dekkan. These aborigines had, however, to retire before a more powerful race about 543 years before the Christian era. At that time they were called "Yakkos" and "Nagas;" which literally signify "demons" and "snakes." They were so termed, it is supposed, by neighbouring tribes contemptuously, from the circumstance of these aborigines being divided into two classes, one of which was addicted to the worship of demons, and the other to that of the cobra, as an emblem of destroying power. In 543 B.C. Wijaya, a prince from the valley of the Ganges, who had got into bad repute at home, landed with a number of followers near Putlam, and established a dynasty which lasted for several centuries. This invasion was followed by an influx of Malabars or Tamils, who ultimately gained possession of the island. They were driven thence in 1071, A.D., but again returned and established themselves in 1211. In 1266 another invasion took place, this time from the Malayan peninsula, and was followed by fresh incursions from the coast of India. In the fifteenth century the island was visited by the Chinese, with hostile intent, and the celebrated commander, Ching Ho, attacked the capital and carried off the king into captivity. For several years after this, Ceylon paid a yearly tribute to China. The Portuguese were the next visitors. They first landed in 1505. In 1597 the King of Cotta died, and left the King of Portugal heir to his crown. In 1617 the Portuguese took Jaffna, and assumed the command of the country. After the Portuguese the Dutch became masters of the island. The first Dutch ship arrived at the island in 1602. The Dutch contended with the Portuguese for 20 years, finally prevailing against them. In 1795 the British united with the Kandians to expel the Dutch from the island, and in the following year Ceylon came into the possession of England.

A country, therefore, which has been the scene of so many invasions, which has changed masters so many times, and which, from its fertility, has been an attraction to merchants from all parts of the globe, it is said, even since the days of Solomon, must present a mixture and a variety of human beings well worthy of the study of

scientific men. None of the other races, however, specimens of which abound in the island, possess an equal interest for the philosophic mind with the despised and degraded remnant of the aborigines who are styled "the wild hunters" of Ceylon. This wretched race has existed in a state of comparative seclusion for 2000 years, retaining during that time its ancient habits, customs, superstitions and modes of life. These people have no proper distinctive appellation, being merely called "Veddahs," which term in India is applied to hunters generally. They inhabit extensive districts which are called "Widdirata," or country of Veddahs. It so happens that the history of those extraordinary people can be traced with considerable precision. Ceylon is fortunate in having records of its early history on which some reliance can be placed. Among the earliest notices we have of the existence of Ceylon we may mention the Hindoo Ramayana, one of the oldest epics in existence. In this work the island, under the Sanscrit name of *Lanka*, figured conspicuously. In perusing this, however, we must make great allowance for poetical exaggerations and invention. But there is in existence another very important work, a record of the history of Ceylon from the landing of Wijaya in 543 B.C., down to the year 1758 of our era. This work, which is called Mahawanso, or "Genealogy of the great," was discovered in the year 1826. It was written in the Pali tongue, a classical form in ancient Behar of a modification of Sanscrit speech which is to be found in the Hindoo drama. Mr. Turnour, of the civil service in Ceylon, has translated a large portion of the work. This was a difficult task, as the Pali was a language known only to the Buddhist priests, and imperfectly by them in Turnour's time. The history was written in verse, and, in order to render it more intelligible, there accompanied it a *tika*, or running commentary in prose, probably resembling the *interpretatio* of the old Delphic editions of the Latin classics. This was a great assistance to the translator in his arduous undertakings. Now in this "genealogy" there are descriptions given of the condition and pursuits of the inhabitants of Lanka, before their conquerors had taught them the art of agriculture; and, strange to say, the condition and pursuits of the modern Veddahs correspond exactly with these descriptions. Pliny in his Natural History, (lib. iv., ch. xxiv.) informs us that the Singhaiese envoys, who visited Rome in the time of Claudius, state that it was the custom of their countrymen, when foreign merchants visited

the island, to go to the further side of a river where the strangers had laid their goods, leaving other commodities in their place. The same practice is alluded to by Fa Hian, a Chinese Buddhist, who wrote in the third century. This peculiarity is also recorded by several other writers in succession, until we come to the time of Robert Knox, who published in 1681 an "Historical Relation" of the island, in which he was a captive from 1659 to 1679. From this author we have a good deal of valuable information concerning these tribes, though I believe he wrote from the testimony of others. Dr. John Davy has also contributed some information concerning the Veddahs; and, subsequently, Sir Emerson Tennent has with praiseworthy zeal investigated their history and condition. His testimony is, however, founded chiefly on report. His opportunities of personal observation were not favourable or numerous, and in the only interview with any of them which he records, he appears to have been misinformed as to the real character of the natives who were brought before him for exhibition. These he himself suspected to be not the genuine troglodyte, or Rock Veddahs, but a partially tamed and partially settled portion of the aborigines, who are distinguished by the appellation of Village Veddahs. This suspicion is confirmed by the testimony of Mr. Bailey, who has written the fullest, most interesting and most reliable account of the Veddahs which I have yet seen, and who distinctly states that those whom Tennent describes were not by any means the wildest description of Veddahs. Mr. Bailey being employed in the civil service in Ceylon, and his duties bringing him into those districts where he could, by personal observation, learn the condition and usages of these wild people, is an excellent authority on the subject which he undertakes to elucidate. His statements do not in all cases correspond with those of Tennent, and in several instances he points out where Tennent must have been misinformed. In fact in reading Tennent's description of the Veddahs, it is almost impossible to avoid being struck with the conviction that there must have been a very high colouring on their part, of the statements made to him by his informants. Probably with these the rule may have been *omne ignotum pro magnifico*, or at least *pro mirifico*.

The Veddahs are divided by Mr. Bailey into the wild and settled ones. It is chiefly on the north-eastern side of the island that these creatures are to be found. They dwell in greatest number in the



neighbourhood of Batticalloa. They are also to be found near Badulla. But in these localities they are not so wild, nor so much isolated as in other parts. The very wildest are to be found in the district of Nilgala and in the forests of Bintenne. If there be any difference between the two, as Mr. Bailey thinks there is, those of Nilgala are the most wild. The settled Veddahs associate with the Singhalese, but do not intermarry with them. They live in huts formed of boughs and bark, when caves cannot be obtained, and cultivate small patches of ground. But their instincts appear to lead them to hunting, and on this they chiefly rely for subsistence. They are also fond of honey, and procure large quantities of it. Efforts have been made for several years to civilize these creatures, and they appear to be gradually losing their wild habits.

Tennent draws a most deplorable picture of the whole race. He states that so degraded are some of these people that it has appeared doubtful in certain cases whether they possess any language whatever—that, on the authority of a gentleman who resided in their vicinity, their dialect is incomprehensible to the Singhalese—that their intercommunication is carried on by signs, grimaces, and guttural sounds unlike words or language—that they have no marriage rites—that the community is too poor to allow polygamy—that they have no knowledge of a God, or of a future state—no prayers or charms, no instinct of worship, except some addiction to ceremonies analogous to devil-worship, in which the performer dances in front of an offering of something eatable. At first he shuffles with his feet to a plaintive air, and then works himself into a paroxysm. Writing of the village Veddahs, he afterwards states that “they have no games, no amusements, no music,” which is extraordinary, as he has just informed us previously that the less civilized, or rather totally wild portion, of the race have men amongst them who can dance to a plaintive air.

Many of the above particulars are denied by Mr. Bailey, though even his portrait of these outcasts is melancholy enough. He states that he never knew them at a loss to convey their ideas either to their own fellows, or to the Singhalese. The latter seem to comprehend their language tolerably well. As to marriage rites they have something approaching to a ceremony. The man selects a present, and carries it to the front of the dwelling of his intended father-in-law. The object of the visit being known, the girl, if she accepts him

comes out with a cord of her own twisting, and ties it around the bridegroom's waist. The man always wears the string, and when it wears out the woman twists another. The string is useful for supporting a small dirty rag which hangs in front. This practice appears somewhat analogous to the use of the ring in marriage amongst civilized people. As to polygamy, it is not, according to Mr. Bailey, poverty which prevents its practice, but a complete indisposition on the part of these people to enter into such alliances. That they have no idea of a God, in the light of an individual Supreme Being may be correct, but Mr. Bailey tells us that when it thunders, they say a spirit or a God has cried out, and in one of their invocations the expression "Mâ Deyâ"—My God—actually occurs. To say they have no idea of a future state is almost too much, when they are continually invoking the shades of their departed children. Mr. Bailey relates an instance of a Veddah who aimed a shot from his bow, and having missed the mark, exclaimed in chagrin, "That was because I did not invoke my Belindoo Yakkon!" This expression meant "the shades of his children." They also believe in a host of other spirits either harmless or benignant. They have one malignant spirit only in their mythology, which is supposed to lie in wait for women. It argues an instinct of worship that they fix an arrow in the ground, dance and chaunt around it, promising at the same time native offerings to spiritual beings. They certainly, according to Mr. Bailey, have charms to protect themselves from wild beasts, and if they do not use direct prayers, they are in the habit of invoking the shades of their ancestors, the sun and the moon, and beings of whom they knew nothing but their names, which leads to the supposition that they formerly were connected with a people which had a more systematized religion.

It is exceedingly interesting to recognize in the belief and the usages of these unsophisticated people a striking resemblance to the creeds and customs appertaining to an early period of society, as recorded in the works of ancient Greece and Rome. It is probable that from the conditions of human existence and the aspirations and passions of the human mind, there must in all cases of primitive society be a resemblance in these respects. The Veddahs attempt to propitiate the *Manes* of their ancestors. They promise votive offerings to those spiritual beings in whose existence they believe, and in the time of sickness present garlands to an imaginary afflict-

ing spirit. They acknowledge also that there are certain phantoms to be met with in the woods or among the rocks—*genii* of rivers and other natural objects. We can scarcely read their statements without reverting to the Oreads and wood-nymphs, to the votive tablets and the garlands of the temples, and to the romantic myths of Numa and Egeria. “The God who cries out when it thunders,” is also evidently a counterpart of the Roman Jupiter Tonans.

The physique of the Veddahs is wretched in the extreme. The tallest one which Mr. Bailey had ever seen was five feet three inches in height. He was more civilized than his fellows, and probably had been more favoured in the matter of nutriment. The shortest was four feet one inch. Tennent describes those whom he saw as having projecting mouths, stunted stature, their long black hair and beards falling down to their middle in uncombed lumps, their limbs misshapen and their eyes restless with apprehension. The children had deformed joints, huge heads and “protuberant stomachs.” The women were most repulsive in their appearance. The men, he says, were athletic, though deformed, and their heads large. On this last point he formed an erroneous judgment, as the crania of the Veddahs are really small, though the mass of tangled hair which surrounds them exaggerates their actual size. The same error was fallen into by the “Theban traveller,” whose experiences are recorded in the treatise *De Moribus Brachmanorum*, supposed to be written by Palladius in, I think, the early part of the fifth century. He calls these people *βισάδες*, adding the descriptive expressions—*ἀνθρωπάρια, κόλοβα, μεγαλοκέφαλα*. The skull of a female, twenty-eight years of age, was some time since sent to England. Mr. Busk had an opportunity of examining it, and stated that it was the smallest adult skull he had ever measured. If this skull was a fair specimen, the crania of the Veddahs must be less than those of the Australian, the Esquimaux, or the Negro.

There are several other points on which Tennent and Bailey are at variance. For instance, the former asserts that the Veddahs kill birds by the bow and arrow, and afterwards eat them. Bailey says they are too poor in ability as marksmen to strike a bird, and that they will not eat the flesh of oxen, elephants, bears, leopards, jackals or birds. He certainly acknowledges that they capture birds, with bird-lime, but for what purpose is not, I think, stated. He denies the correctness also of Tennent’s statement that the Veddahs occa-

sionally use the feet in drawing the bow. This practice, he states, has long ago been discontinued. Tennent had remarked that money is worthless to them, but Bailey states that he had never known any of them to refuse a rupee.

All, however, who have had any opportunity of judging of the fact agree in stating that their mental capabilities are of the very lowest kind. They cannot count beyond five. A gentleman gave twelve arrows to a head-man of the partially civilized Veddahs to divide equally amongst four families, but he was unable to accomplish the task. They have no names for days, months or years—no system of medicine—no literature, in its lowest sense. Their language is meagre—a sort of obsolete Singhalese, unenriched by Pali or Sanscrit, and supplied with a number of words not to be found in any vocabulary of eastern dialects. The same word expresses a bud and a child. For rice they have no distinctive appellation—it is merely “small, round things.”

Morally, their condition is strange. They detest polygamy, polyandry, (common enough among the Singhalese), and incest, save by marriage with a younger sister. But this unnatural custom is becoming obsolete. They are harmless, truthful, and honest; fond of their children, constant to their wives, but jealous. They will not marry out of their own race, and divorce is unknown amongst them, as well as infidelity amongst the wives.

The Veddahs have a great personal resemblance to each other, as might naturally be expected from their alliances. They are not a long-lived race. In a population of 50 adults, only one was found 70 years old, and eight of the age of 50 years. In another of 175, two were found 70 years old, and fourteen of the age of 50. Although there is no infanticide amongst them, large families are almost unknown, and the race is rapidly becoming extinct. There is not much madness, and even less idiocy amongst them; but they are all excessively stupid, and have a very vacant expression of countenance. They claim to be of royal descent, but know nothing of their history, and although they have no caste amongst themselves, the Singhalese regard them as of high extraction. The wildest of them are the fewest in number, and the smallest in stature. Each family lives by itself, and there is an approach to social organization amongst them, as their hunting grounds are apportioned, and the more settled class divide themselves into little communities or septs. The village Ved-

dahs have no intercourse with the wilder branches of the tribe, nor the wilder ones with each other; those, for example, of Bintenne with those of Nilgala, although the places are only about fifty miles apart. But it is observed that the usages and languages of all, however scattered, are similar, arguing, of course, a common origin.

Mr. Bailey's theory as to this origin is exceedingly plausible. Tennent, and I believe most ethnologists, have regarded them as the mere relics of the aborigines who retired before the invaders from the continent. But Bailey considers them, in accordance with their own tradition, and with the respect shown for them by the Singhalese, as really of royal stock. To make his argument clear it is necessary to give a sketch of the early history of Ceylon, intermingled as it is with fable. The King of Wanga, in the valley of the Ganges, had a daughter who wedded a lion. She bore him twins—a son and a daughter. The son escaped from the den, bearing off his brother and sister, and the lion, enraged, began to lay waste the country. The king being dead, the government offered a reward for the destruction of the lion; and the son presented the head of the lion, his father, to the subjects of his grandfather. He was then elected king, and married his sister. His wife bore twins sixteen times, and the eldest of the family was Wijaya, the invader of Ceylon. Wijaya proved to be a very troublesome prince, and the people demanded his execution. He was, however, turned adrift with seven hundred followers, without oars or sails, and was carried by winds and currents to Ceylon. On his landing, he had adventures precisely similar to those which befel Ulysses when he met with Circe. The Circe of Wijaya was Kuweni, a magician and Yakko. The invader married, but afterwards deserted her. She then sought refuge in the city of Lanka-pura, which she had formerly betrayed to her faithless husband. She was put to death, and her children were saved from a similar fate by their uncle escaping with them to the country near Adam's Peak. Here, the elder having married his sister, according to the custom of his royal ancestors, they relapsed into the wild life of the mother's race. The progeny of these are supposed by Mr. Bailey to be the Veddahs of the present day. He thus accounts for their various characteristics and usages. The dread of their ancient persecutors would in early times generate a feeling of timidity and a wildness of character, which we know from the testimony of the "Theban traveller, was quite marked in his day;

for in relating the particulars of his visit to Ceylon, he makes use of the expression *ἔφθασα ἐγγὺς τῶν καλουμένων Βισάδων*, which really means that he stole a march upon them, as upon deer, or other wild creatures. Kuweni's children being informed of their lofty antecedents, would look down upon those who were not of princely stock, and their posterity would naturally retain the same feelings. This theory will also account for the acknowledgement on the part of the Singhalese of the high rank of the Veddahs—for the custom, which has so long prevailed amongst the latter, of males marrying the younger sister, and for the prevalence amongst them of the names of deities now worshipped in India, proving them to have preserved a remnant of Wijaya's faith. Their crude ideas and practices in the matter of religion seem to correspond to a certain extent with the precepts of Menu, and there are strongly marked traces in these of the Nât worship of India. Their particularity in the selection of food also argues that at some remote period they have been more fully under the influence of religious prejudices.

We have strong cause therefore, even making all due allowance for the fable mixed up with their history, to believe that the secluded condition of the Veddahs, their shyness and their timidity, were the result of hostility manifested by more powerful neighbours at an early period of their existence. It is very possible that the same cause may have produced similar phenomena and characteristics in the Andaman Islanders. Such is decidedly the opinion of Petermann with regard to the Bushmen. Their superior activity and difference of dialect, as well as the distribution of their numbers, lead him to suppose that they are not merely degraded members of the Hottentot race, but a distinct nation of that race, probably the first that penetrated from the north into that portion of Africa, and had subsequently been overpowered by invasions of the Hottentots proper. To strengthen this supposition it may be stated that there exists to the present time a violent animosity between the two peoples. The Yamparicos, a tribe of Diggers, residing west of the Rocky Mountains, habitually shun the Shoshonees and Utahs, dwelling not far from them. It is conjectured that the original stock of this miserable and secluded people were outcasts from these tribes. The Fuegians, another degraded and isolated tribe, do not seem to associate with their neighbours the Patagonians, and differ from them greatly in physical marks, save in color. Whether they

have had any feuds with them it is impossible to say. They appear to have been originally landed in their present habitat from a considerable distance. Pickering states that a great resemblance has been traced in them to the Chinooks, dwelling at the Straits of Fuca, on the western coast of North America. There is a further similarity in the shape of the paddles used by both tribes. According to Pickering the Fuegians are identical in physical characteristics with the northern aborigines. It is worthy of observation that, although the most of the known secluded tribes reside in barren and unproductive regions, that circumstance alone is scarcely sufficient to account for their physical and mental degradation. Ceylon, for example, is an exceedingly fertile country, abounding in edible productions, both animal and vegetable. It is quite a contrast to the regions in which the Shoshokee, the Andaman Islander and the Bushman have to struggle for existence. We find that peculiarities in the habits or disposition of these curious tribes have much to do with their degradation. The Bakalahari, the poorest of the Bechuanas tribes, who reside in close proximity to the Bushmen, and under circumstances exactly similar, live in a very different style. The Bushman steals, hunts, attempts to satisfy his hunger with vermin, but will not tend cattle or cultivate the soil. The Bakalahari, wherever they can find a spot suitable amid their desert wastes, cultivate a few vegetables, and keep goats to assist in providing for their wants. The Bushmen, determined in their seclusion, will not mix with these although dwelling in their immediate neighbourhood.

Notwithstanding there may have been a difference originally in the mental qualities and powers of the various secluded tribes known to us, according to the races from which they have sprung, yet there can be no doubt that the causes which have stunted their physical growth have also arrested the due development of their intellects. Inadequate and irregular nutrition must cause a deficiency in the quantity and a deterioration in the quality of that vital fluid which, under favourable circumstances, keeps all the organs in a state of vigorous efficiency. And if, as we may reasonably suppose, either a failure in the quantity, or deficiency in the proportions of certain constituents of that fluid, compromise their functional efficiency, we may conclude that the brain must suffer as well as other portions of the body. In addition to such a cause of mental degradation we may enumerate the necessities, in a small and secluded community, for unions between those already related by consanguinity; as well

as the utter absence of any mental stimulant such as those which in civilized communities are called *aims*. Where the social condition admits of no ambitious aspirations, and where mental superiority would bring no commensurate advantages in its train, it is not likely that men will trouble themselves to exercise their minds about things foreign to the dull and daily routine of providing food and shelter.

The rarity of the reception of any idea except those which have existed in a limited community for thousands of years, must unfit the mind for any fresh excursions into the regions of thought. Such a position as some of these secluded tribes occupy, would, even in the course of a few generations, reduce the minds of tolerably intelligent savages to a state of dull imbecility or mere animal and ferocious instinct: but when we take into consideration the hereditary transmission through centuries of degradation, of these inactive and incurious brains, their efficiency, according to the law of nature, gradually diminishing, the wonder is that the line between these outcasts and the beasts is yet so clearly marked, and that there still lingers amongst any of them an instinct of worship, and a vague notion of a spiritual existence.

Yet it is astonishing how, by contact with the superior races, minds of low development will become improved. The Australian was long supposed to have mental capabilities as poor as those of any other race; but facts, well authenticated, prove that the aboriginal Australian possesses a mind superior to what was formerly imagined of it. A quotation from a report transmitted to the English Government on the subject, states that his mind is quick and keen, and "rather like a treasure sealed up than a vacuum." The children learn a science like geography, which appeals to their external senses, very rapidly, though in more abstract studies, when mental processes are required, as in arithmetic, they are as yet deficient. It is said on good authority that they evince as much average capacity for improvement as English children. Probably in a few generations if the race be so long persistent, the reflective faculties may be brought into efficient action.

Such assurances as these ought to stimulate our philanthropy, and impress us with a high estimate of the character and vitality of the human intellect, which, as in this case, after so many ages of degradation, can by the exercise consequent on the communication of new ideas be gradually elevated to a higher and perhaps a normal standard.



## REVIEWS.

*Énumération des genres de plantes de la flore du Canada précédée des tableaux analytiques des familles, et destinée aux élèves qui suivent le cours de botanique descriptive donné à l'université Laval.* Par l'abbé Ovide Brunet, professeur de Botanique.

We cordially welcome every attempt to encourage and assist the study of Botany in this country, and we therefore received with much interest the little work just issued by the learned professor at Laval University. It is probable, however, that its usefulness will not extend much beyond the students in Professor Brunet's classes, for whom it is immediately designed. To those not very familiar with scientific names a list of genera in the order in which they are to be treated of may prevent some embarrassment, and the analytical tables, though not the best we have seen, will greatly assist the beginner. Botanical classification is at present in a very unsettled state. The natural groups which it is the custom in this science to call orders, but which correspond with what in Zoology are termed families, are pretty well determined, though further study may lead both to division and combination to a certain extent. There is also pretty general agreement respecting the highest divisions of the vegetable kingdom, which, though commonly called classes, bear more relation to the Zoological sub-kingdoms or branches; but the intermediate divisions which are obviously required, and which, if really natural, would at once enlarge the student's views and facilitate his labours, must be regarded as altogether unsettled. Amongst the MONOCOTYLEDONÆ or ENDOGENÆ Lindley's *Dictyogenæ* may make a good class: *Glumifera* perhaps another, whilst the remainder must for the present be accounted a third which has been named *Floridæ*. Advancing to the DICOTYLEDONÆ or EXOGENÆ, the highest vegetable sub-kingdom, the difficulty becomes much greater. The *Gymnospermæ*, indeed, which have but slender claims to be made a division of equal rank with the Monocotyledonæ and Dicotyledonæ, will clearly form one class in this great sub-kingdom, but beyond this we have as yet no great divisions of Exogens which are not merely artificial, and even so ill-defined as often to occasion great difficulty to the inexperienced student. Without referring to those which are less known in this country, and quite as liable to objection, we may mention the method of DeCandolle, its modification by Dr. Gray, and Dr. Lindley's

method. De Candolle's method with the Exogens is founded on the idea of proceeding from the most highly developed forms in which there is most multiplication and separation of the floral organs down to those in which from union or abortion the structure of the flower is apparently simplest. This is worked out by a quadruple division into sub-classes or great sections having the following names and characters:—1st. *Thalamifloræ*—petals distinct, stamens hypogynous, that is to say, the several circles of organs springing from the receptacle neither adhering together outwardly so that the stamens should seem to arise from the corolla or calyx, or adhering inwardly, the calyx or receptacle being attached to the ovary so as to place the fruit apparently below the flower. 2nd. *Calycifloræ*—with petals distinct or coherent, stamens perigynous or epigynous. 3rd. *Corollifloræ*—having a synpetalous corolla with hypogynous insertion bearing the stamens. 4th. *Monochlamydeæ*—having a single envelope or no proper floral envelope. That the series adopted by this great philosophical botanist is not perfectly satisfactory need be no objection, since no series can exhibit the real affinities of organised beings. That his divisions run into one another and are separated by very shadowy lines, leaving us in doubt on which side we ought to place particular forms, is hardly an objection since it is probable that no plan was ever devised to which it does not apply; but when we examine his arrangement in his own philosophical spirit, under the guidance of principles which we have learned from him, we cannot help seeing difficulties which it is, to say the least, very desirable to overcome. It may be acknowledged that the separation or mutual adherence of the circles of parts forming the flower, depending as it does on the closeness of their origin and the pressure to which they are exposed, is a valuable, and being easily observed, a convenient character, so that, though not giving us the natural classes which we earnestly seek, it deserves attention as a source of sectional divisions, but when we look to the application of the principle we find that whilst the hypogynose character distinguishes *Thalamifloræ*, *Calycifloræ* combines cases in which by outward adherence the petals and stamens seem to be inserted on the calyx, and those in which, the adherence being inward, the whole of the exterior circles invest the ovary, a structure entirely distinct in its nature, which is termed *Epigynose*, the other being *Perigynose*. It would almost seem as if, adherence of circles being at all admitted as of importance, the distinction of these two varieties necessarily followed.

Then in the *Corollifloræ* we have a synpetalous corolla to which the androecium entirely adheres, whilst the calyx exteriorly, and the gynoecium within, remain distinct. This is not unnaturally regarded as a special form of structure, yet if we make the adherence of the androecium outwardly without attachment to the ovary the main point, this will be, as Lindley makes it, only a variety of Perigynose structure. De Candolle's *Monochlamydeæ* is a very miscellaneous group, for the separation of which a new principle is introduced and one which forms very harsh and unnatural combinations. It is plain from his own words that this great botanist only considered his subdivision of *Exogens* as a temporary expedient to which he attached no importance, and in fact the prevalence of his method is to be attributed much more to its being the method of his invaluable *Prodromus* than to its own intrinsic merit.

Dr. Gray, whilst following pretty exactly De Candolle's series, neglects his sectional divisions, substituting a very simple triple division of *Exogens* into Polypetalous (much better called Apopetalous) in which division are included those plants in which, whilst all the exterior circles adhere over the ovary, the parts of the corolla above the inferior fruit are separate; Monopetalous (rather say synpetalous) where the petals cohere into a tubular corolla; and Apetalous in which the corolla is entirely absent. Under each of these divisions the orders are collected into groups intended to be more or less natural and thus imitating Lindley's alliances. This latter arrangement is a decided improvement, and the former may be considered as affording practical facility to the working botanist without the sacrifice of any principle. There are, indeed, numerous exceptions, but the student soon learns to be on his guard against them, and does not find them a source of serious difficulty.

The method of Dr. Lindley is explained and applied in his valuable work, "*The Vegetable Kingdom.*" His division of *Exogens*, excluding from them the *Gymnogens* or *Gymnosperms*, is founded first on the completeness of the flower as to its reproductive system, or its diclinous character, which consists in the suppression in each flower of one of the reproductive circles of parts. The former group is subdivided according as the flower is hypogynous, perigynous, or epigynous in the insertion of its organs. Thus we have four sub-classes or great sections of *Exogens* as in De Candolle's method: but according to Dr. Lindley's view, the divisions are somewhat more natural and considerably easier

of application—and this view we are, from long experience of both methods, prepared to sustain, although we are far from thinking these sections really natural or likely to express the ideas of botanists after some years of further investigation and study. But Lindley's sub-classes have the great additional merit of being connected with his system of alliances, a set of more extended orders, which he has worked out with great labour and skill, and with such success that, notwithstanding the occurrence of what may appear to many botanists errors or serious difficulties, the advantage gained both in increased knowledge of the relations of plants, and in facility of examination, is too great to be neglected by any who have once appreciated it. Another great merit of Lindley's system is found in the nomenclature. He names all the orders from a genus assumed as a type by an adjective terminating in *aceæ*, leaving the other forms of Latin adjectives to express other degrees of affinity, and he names the alliances on the same principle by typical names terminating in *ales*, so that, instead of the confusion arising from miscellaneous terminations only chosen by the ear, or copied from the older authorities, we have a regular plan which is at once comprehended by the student and is an important aid both to his understanding and his memory. We cannot say that our taste is very indulgent to Dr. Lindley's English family names, but they are perhaps as good as any, and are really of little importance since a science cannot exist without scientific terms to express its teachings, which ought to take the form of a language common to the whole civilized world, and leading to no jealousies among the scientific labourers of various nations, and those to whom a Latin termination is a serious obstacle will never render much service to science, or derive much pleasure from it. On the whole, without attaching to it undue importance, and acknowledging that the natural grouping of plants between the sub-kingdoms (as we would call the three great well established divisions) and the so-called orders is as yet in its infancy, we recommend Lindley's method, given in a book which is indispensable to all botanists, as practically the best and the most desirable for application to local Floræ.

The Botanical collections of the University of Toronto, including above 8,000 species, are being arranged according to this plan, which is also taught in the classes of University College, and has thus become familiar to many zealous young botanists in Western Canada, and an important service would be rendered by any one who could

give a convenient summary of our local Flora, unembarrassed by the Southern forms which Dr. Gray has had occasion to include, and arranged according to Lindley's system, but with analytical tables adapted specially to our convenience.

Professor Brunet has the reputation of being an enthusiastic botanist, particularly well acquainted with the historical botany of Lower Canada, and zealous in promoting the science, so that with the aid of other earnest labourers that we know to be found in Quebec, the flora of that district ought to become well known. Considering what has been done at Montreal and Kingston, at Toronto, Hamilton, London, Belleville, and some other points, we must be steadily advancing towards a degree of knowledge of the vegetable productions of the country, which, with a little combination and intercommunication of observations would ensure a good national Flora.

W. H.

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*Synopsis of Canadian Ferns and Filicoid Plants.* By George Lawson, Ph. D., LL.D., Professor of Chemistry and Natural History in Dalhousie College, Halifax, Nova Scotia.

(From the *Edinburgh New Philosophical Journal* for January and April, 1864).

We have been favoured by the author with a copy of this Synopsis, and we are anxious for several reasons to direct to it the attention of Canadian Naturalists. We need not say here that Dr. Lawson, whilst Professor at Queen's College, Kingston, made great exertions to promote Canadian botany, and that to him chiefly we owe the Botanical Society of Canada, which, though not perhaps very fortunate in its locality, and assuming too much in its origin, as if first promoting botanical pursuits in Canada, was in many respects well devised, and will, we hope, permanently promote and encourage a science which well deserves the attention of the more cultivated portion of our people. We wish it were extended to British North America, with the various portions of which our intercourse may soon be greatly facilitated, in which case Dr. Lawson, in his new sphere of action might continue to be amongst its most active members. All lovers of science in Canada regret that his connection with this Province was so soon broken, and heartily wish him success in his new field. The paper which we now notice is in some respects more adapted for

botanists and Fern-fanciers in Great Britain than for Canadians, yet the minuteness of its references to the localities of our Ferns is a feature which would have a special Canadian interest, only that, contrary to the general practice in such cases, localities are given as much for the commonest and most diffused species as for those of rarer occurrence, so that the botanist of a particular neighbourhood wonders to see ferns which he meets with in every walk, and believes to be diffused throughout the country, spoken of as if they were to be sought chiefly in a few specified spots. The list of Canadian Filiform plants is very satisfactory—a little, we agree with the author in thinking, in advance of the true number, yet with the doubts that unavoidably arise, as near to it as can be expected.

We may add a few notes relating to the species. *Polypodium Vulgare* seems to be well diffused but not common. It seems to be confined to rocks in this country, not growing on trees or even sheltered banks as in the British Islands. This circumstance sufficiently accounts for its comparative rarity. *P. hexagonopterum* is in our Toronto list, though by no means common. *P. Phegopteris* is exceedingly common and abundant in all parts of Canada which we have visited. *P. Dryopteris* is even still more abundant, contributing much by its great beauty to the adornment of our forest scenery. Like Dr. Lawson, we have thus far failed to obtain Canadian specimens of *P. calcareum* or *Robertianum*. We have visited no part of Western Canada where *Adiantum pedatum* is not abundant. *Pteris aquilina* is as common with us at Toronto as elsewhere throughout the Province. *Struthiopteris germanica* is very generally diffused in Canada, and occurs in great abundance. *Onoclea sensibilis* is in every moist grassy spot. The var. which gave rise to *O. obtusilobata*, Schkr, has been obligingly sent to us by Mrs. Traill from the Rice Lake district. We have a strong impression of having seen Canadian specimens of *Asplenium ruta muraria*, yet cannot at this moment remove the doubt which Dr. Lawson has been obliged to leave respecting its occurrence. Little as is the importance of priority in such a matter, we may as well state the fact that *Scolopendrium vulgare* was found at Owen Sound by Professor Hincks in 1857, being then laid before the Canadian Institute, and specimens placed in the University Museum, whilst Mr. Robert Bell, junr., to whom Dr. Lawson ascribes the discovery, found it in 1861.

The species of *Lastraea* of the *dilatata* group are very uncertain, and we have great doubts respecting our Canadian forms. We have

not seen filix mas from Canada. We have found *cristata* in swamps in several places, as at Woodstock, County of Oxford, C.W. *Goldiana* has been found near Toronto. *Marginalis*, and in moist places *Thelypteris*, are every where common. *Noveboracensis* is not very uncommon, and we think it is a distinct species.

*Polystichum angulare* is not common. *Lonchitis* is abundant at Owen Sound, where Professor Hincks gathered it in 1857, not 1859, as stated by Dr. Lawson. *Acrostichoides* is found in moist woods, and is one of our commonest ferns. We have lately seen a very remarkable fern, exactly resembling a barren frond of *Polystichum Acrostichoides* (to which species we have no doubt that it belongs,) but in full fruit, without the contracted fertile portion, the sori being on all the leaflets, not very close, and with the indusium approaching the *Lastraea* form. We take this to be a mere anomalous individual, but it gives an instructive lesson on the variability of some of our best characters. We have found *Cystopteris fragilis* at Whitby, C.W., and we have Canadian specimens of var. *angustata*, a very distinct form, though we believe rightly regarded only as a variety. *Cystopteris bulbifera* is one of our handsomest ferns, and very common in moist spots in woods. We gathered *Woodisia ilvensis* on Belœil Mountain as long ago as 1848. The *Osmundas* are all common. *Botrichium Virginicum* is very common in the Toronto district. *Lunarioides* is also found. We have not distinguished *B. obliquum*, nor have we any evidence of the occurrence of *B. Lunaria* in Canada.\* In the *Lycopodium* family we have found all the species indicated by Dr. Lawson. We have the *Isoetes* from the North of Lake Simcoe. *Equisetum fluviatile*, Linn, for which Dr. Lawson adopts Ehrhart's name *Telmatea*, and Dr. Gray prefers Schreber's name *eburneum*, is by no means common, though an undoubted Canadian plant. We can affirm positively that the European *Equisetum palustre* is a native of Canada, having found it five or six years ago in a ditch near the river Don a few miles north of Toronto, and being well acquainted with the plant from our English experience.† *Equisetum sylvaticum* grows finely and abundantly on the

\* Whilst passing this paper through the press, we have seen a fine Canadian specimen of *B. Lunaria*, which settles the question.

† Since this was written we have received a letter from a very zealous and acute botanist, Mr. Macoun of Belleville, stating that amongst plants sent by him to Sir W. J. Hooker, *Equisetum palustre* was found; it is therefore certain that this plant grows as far south as the northern shore of Lake Ontario, and it becomes very probable that Pursh had seen it in the Northern United States.

Humber plains near Toronto and is probably not uncommon in Canada. *Equisetum arvense* is but too common everywhere. *Equisetum limosum* is common in watery places. *Equisetum pratense*, Ehrh., for which Dr. Lawson adopts Willdenow's name *umbrosum*, is very common near Toronto. *Equ. hyemale* is exceedingly abundant in Western Canada generally, and *Equ. robustum* grows near Toronto, where it was first observed by Dr. Lawson. *Equ. variegatum* is we believe rare. *Equ. scirpoides* occurs almost universally in damp woods. In Dr. Lawson's paper descriptions and synonyms are given, and the chief varieties of each species are carefully noted, so that it is a summary of the information at present possessed on the subject.

W. H.

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THE METEOR OF 14<sup>TH</sup> MAY, 1864.

AEROLITES AND SHOOTING STARS.—BY M. J. JAMIN.

(Translated from the "*Revue des deux mondes*," 15th July, 1864.)

On the 14th of May last, M. Bronghiart, of the *Académie des Sciences*, being in the country near Gisors, saw at eight o'clock in the evening a very brilliant meteor. It was seen towards the south, passed from West to East, and did not attain an elevation greater than from fifteen to twenty degrees above the horizon below which it shortly vanished. Such meteors are common enough, but this particular one is remarkably interesting, for, on the morrow, all the newspapers of the South West of France informed us that it had been seen at the same hour from Paris to the Pyrenees, and a great number of letters were addressed to the Academy describing all the circumstances of the phenomenon. There could be no doubt that it was a grand scientific event, and the investigation it demanded has been made with conscientious care, by M. Daubréé, who was naturally marked out for this pursuit by the nature of his previous studies, and authorized to undertake it by his double capacity of member of the Institute—and Professor at the Museum. Thanks to the documents he has published and the researches he instigated, we now know all that observation can tell us of this memorable occurrence.

Since the meteor was seen in the South by the cities of Gisors and Paris, it was in that direction that the enquiries into the particulars of its appearance proceeded. On interrogating the inhabitants of the zone which comprises Laval, Le Mans, Blois, Tours and Bourges, it was learnt that these cities on the same date and hour had been all at once flooded with a vivid light, and that numerous persons, attracted to a promenade by a beautiful spring evening, had at once, as in Paris, followed with their eyes a ball of fire half as large as the moon. It left behind it a luminous train which gradually melted into a white trace like a cloud elongated. At all these stations the ball was seen still in the South, and it was therefore to be sought for further down. If we notice in passing, so as not to



neglect any intermediate station, the accounts from Napoleon Vendée, Poitiers, Saint-Amans, . . . it becomes evident that we are approaching the phenomenon, because on the one hand the size of the meteor increases, and on the other it becomes more elevated in the heavens; the explanation of which is found in the sphericity of the earth, being the same facts that are observed on gradually approaching a mountain or a distant coast. Continuing then our progress southwards, we come to the line passing through Saintes Angoulême and Tulle, and here we learn a new and characteristic circumstance. The ball, appearing still more elevated above the horizon, suddenly burst, throwing out sparks in all directions, and this explosion, as in a rocket, ended its appearance: and in order that no particular of this resemblance should be wanting, there remained above the spot where the final disruption took place, a cloud-like appearance, white, immovable, rounded, and lasting for a long time. We come at last to the very seat of the phenomenon, on a line nearly straight, which starts from Nérac and goes towards the villages of Nohic and d'Orgueil, passing a little to the South of Agen and Montauban. Along the zenith of this line the meteor passed. The inhabitants saw it over-head, larger than the moon. It appeared to have movements of oscillation or rotation, and threw behind it very vivid sparks and a sort of jet of white vapors comparable to the smoke which escapes whistling from an overheated stick of wood on the hearth. When the final explosion took place, an immense and splendid sheaf of fire threw fragments in all directions, a cloud formed, and then everything disappeared, according, at least, to most of the witnesses, but two of them affirm that they saw the meteor, stripped of its brightness, proceed as a dark red ball and become extinguished in the distance. After an interval of time, which varied according to the position of the observers, but which, noted carefully by each of them, extended from twenty-four seconds to five minutes, there was heard a dull but very intense sound, compared to a discharge of artillery or the roll of thunder. It was not a single detonation like that which follows the explosion of a rocket, but a long continued noise, as if it had been generated at the successive points of the meteor's path, and had reached the ear after different intervals by reason of the unequal distances it had to traverse. This circumstance is deserving of remark. The disruption of the meteor had scarcely ended, and the following report ceased to resound, when the final phenomenon, as might have easily been foreseen, occurred in an abundant downpour of meteoric stones. They were seen to fall beneath the point where the explosion took place in a narrow tract comprised between the villages of Mont-Bequi, Campsas Nohic, and Orgueil. They descended obliquely from West to East, the natural consequence of the combination of their initial velocity and gravity, and they were hot on reaching the ground: a peasant burnt himself by attempting to pick up one which had fallen in his granary, and it was remarked that the grass where they fell was turned yellow by the contact. The surface of these stones was covered with a black coating like varnish (as may be noticed on bricks too much baked), and this proves that they had undergone a superficial fusion, which indeed can be reproduced on them by cutting and exposing the surface to the flame of a blow-pipe; and since it is necessary, in order to effect this, to raise them to a red-white heat, it must follow that they had reached this temperature at least before the fall.

As these stones come from the heavens, our first curiosity naturally is to know their chemical composition, and it is almost with disappointment that we learn that they differ in no respect from earthly substances. The meteorite of Orgueil has been analysed by M. Cloez: it is black, soft, of an almost pasty consistence marks like a chalk, contains magnetic sulphuret of iron in little crystals which sparkle through its mass, and has about five per cent. of charcoal which gives it its color. The presence of carbon in aerolites had been previously established, but it is of so rare occurrence that only three examples could be cited previously to this. The carbon, however, is not in a free condition, but is combined with hydrogen and oxygen, and (which is very singular) forms a combination almost identical—so to speak—with the turf which is formed in bogs by the decomposition of aquatic plants. As to the origin in such a situation of this curious substance, it is clear that it is and possibly may always remain unknown. Lastly, M. Cloez found in this new meteorite a large quantity of soluble salts which served as a cement to bind the mass together and preserve its coherence, so that on being immersed in water it becomes disintegrated, and falls to the bottom of the vessel. The rains, therefore, will have caused such fragments as were not picked up to crumble on the ground, and our globe will thus have gained, without keeping the least trace of it, these masses borrowed possibly from other worlds.

All these details, rather picturesque than scientific, are enough to give a general idea of the phenomenon, but they teach us absolutely nothing touching its nature, origin, or course. A number of questions present themselves to the mind, and to answer them, it is seen to be, above all, necessary to trace in the heavens the path taken by the meteor, or, as philosophers call it, its *trajectory*. M. Daubrée has entrusted this part of the work to Commander Laussedat, Professor in the Polytechnic School, whose speciality in matters of this sort has been legitimately gained, and he has applied himself to the task assiduously.

In order to render intelligible the possibility of such an investigation, let us take a simple example. Imagine a telegraphic wire stretched parallel to the course of the Seine at a certain height above the houses on the banks. An observer who places himself at night on the right bank would see it projected in the neighbourhood of certain stars in the South, while another on the opposite side would see the black line of the wire towards the north across different stars. It is certain that the visual lines which, starting from the eyes of each observer, pass to the observed stars on each side, cross each other above the Seine upon the wire itself; and that, if we could lay down or calculate the positions of the stars, we could easily lay down or calculate the line of intersection of their visual lines, that is the wire itself. Returning home, the two observers can communicate their observations, and measure on a celestial sphere the direction and height of the stars in question, as seen from the places of the observers at the time of observation. They will thus obtain the direction and inclination of the visual lines. This done, they will mark on a map of Paris the stations they severally occupied, and will thence draw lines in the direction of the visual lines, and these will intersect in points situated on the trace of the wire at heights which it is easy to calculate, and thus the position of our imagined telegraph wire will be exactly determined.

It is evident that we can make the same observations on the luminous track marked out in the heavens by the passage of a meteor as on the wire above spoken of, and can thus trace on a chart the series of points it has passed through, as well as the height of those points above the ground. Now it turns out very fortunately that three experienced observers, MM. Lajons at Riemes, Lespicault at Nérac, and Pauliet at Montauban, had noted very precisely the stars through which the meteor passed, and the exact points where it had appeared and exploded. Thanks to their observations, M. Laussedat has succeeded in reconstructing the trajectory of this meteor. An accidental but valuable circumstance furnishes the first confirmation of his work. One of his correspondents at Ichoux near Landes saw the ball fall vertically, like a stone falling freely under the action of gravity. This illusion proceeded from the fact of the trajectory being exactly in a vertical plane passing through the observer's eye; and, accordingly, it was found that the curve traced on the chart by M. Laussedat did pass through the village of Ichoux. Another more delicate and complete example of verification is the following: the trace on the chart assigns for the place of explosion a point situated above Nohic at a height of from fifteen to twenty kilometres; at this point, therefore, the sound produced must have been the most intense, and must have thence radiated to the surrounding stations through distances which can be easily calculated. As sound travels at the rate of three hundred and forty metres a second, it was equally very easy to calculate the time at which it ought to arrive, or the interval elapsing between the sight of the explosion and the perception of its sound. On the other side, nearly all the observers, notwithstanding their surprise, had approximately estimated the length of this interval, and their estimation can be compared with the results previously given by the calculation. The agreement of these numbers having been very nearly complete, we cannot retain any further doubt as to the exactness of the results which it remains for us to make known.

The meteor came certainly from spaces inaccessible to our senses, but when its glow was first seen, it was at a height of fifty kilometres above the ground. We may pause on this first fact. We do not know the exact height where the stratum of air which envelopes us terminates, but it is ascertained by experiment as well as by reasoning that the atmosphere grows rarer as we ascend, and that at a height of 50 kilometres the pressure is reduced to one-thousandth of what it is at the sea-level. The meteor had then already entered our atmosphere when it was first perceived, and afterwards continued its course, approaching the ground till within 16 or 20 kilometres, or about four or five leagues, nearly four times the height of Mont Blanc. At this point it was over Nohic and exploded. Now the air is the vehicle of sound; in proportion as we rise from the ground and the air becomes rarified, sounds lose their intensity. In the celebrated voyage which Gay-Lussac and Biot made in a balloon, they were astonished at the weakness of their voices, and found that at a height of eight kilometres the report of a pistol was like the crack of a whip. No one has ever risen to a height of 20 kilometres, still we know that the pressure there is reduced to one tenth, and that all sounds must be weakened in a proportion much more considerable than in the instance just cited. Now, since the explosion of our meteor rendered it audible at a dis-

tance of 20 leagues, it follows that it must have been generated of a magnitude and intensity which afford us the first appreciation of the grandeur of the phenomenon. This appreciation is confirmed in another way. Most of the observers have compared the size of the meteor to that of the moon, and though possibly there is some exaggeration in this assertion, yet making all allowance for this, we may ask what would be the real size of this ball of fire in order that it might have at the distance in question the apparent diameter of the moon. It is easily found that the diameter must be between four and five hundred metres. According to this calculation, it was from four to five times larger than the Cathedral of Paris, and we cannot help a sort of retrospective apprehension while thinking of the inhabitants of Montauban :

Nons l'avons cette nuit, Madame, échappé belle,  
Un monde près de nous a passé tout du long. . . .

To these weighty results the calculations of M. Laussedat add a more serious subject of astonishment. As the precise places and times of the appearance and extinction of the meteor were noted, it has been possible to calculate the space it passed through in a second of time, and this is found to have been 20,000 metres or five leagues. Let any one represent to himself a distance of five leagues between two places with which he is familiar, say from Paris to Versailles, and then let him fancy himself carried over all this distance during a single pulsation, he will then appreciate the velocity of our meteor and will recognise it as altogether out of proportion to such as we are capable of producing or observing on our earth. If we wish to find velocities at all comparable, it is not on the earth but in the heavens that we must seek them. There indeed all the stars move with inconceivable velocity, the terrestrial globe itself, making the circuit of the sun in a sidereal year, is whirled at the rate of 30 kilometres per second, and with a velocity comparable to this did the meteor of Orgueil travel. From this indication alone we might infer that it came to us from the planetary spaces, and that in fact it is a real star of which we are endeavoring to trace the history ; but, as what we are about to say is the result of antecedent investigations, common to all the asteroids of this kind, it will be convenient to drop the particular example we have chosen and to generalise and thus elevate the subject.

In many places we meet with malleable masses, composed almost entirely of iron, the nature of which is in strong contrast with that of all the neighbouring rocks but is identical among themselves. Everywhere that we meet with them, some tradition preserved amongst the inhabitants tells us that they have fallen from the sky. A very celebrated one, of which a fragment is in the museum at Paris, was found by Pallas in Siberia. The greatest known is that which is to be seen at the source of the Yellow River ; this is 15 metres in height, and the Mongols, who call it the North Rock (*le Rockér du Nord*), relate that it fell in the track of a fiery meteor. The most numerous have been found in Chili, in the desert of Atacama, where they form two distinct collections in very confined spaces, lying on the ground half-buried as at the moment when they fell, and so abundant that they were formerly carried to the port of Cobija and used to shod the mules. Besides iron, these masses contain nickel ; they are so malleable as

to be easily forged, and there is no doubt the inhabitants of the old world used them in their employments as easily as gold, and thus may be explained at once their scarcity in our countries, and their abundance in the American deserts. Dr. Wollaston demonstrated quite recently this conjecture by analysing the knives used by the Esquimaux of Baffin's Bay, and as they contained nickel, he justly inferred that they were produced from the iron fallen from the sky. It is in fact probable that such is the common origin of these divers masses; still there was only known one authentic fall, namely in 1751 at Hradschina near Agram. But putting aside uncertain traditions, we find in history numerous accounts of events like this of Orgueil. The oldest of the known aerolites fell in Crete 1478. B.C. The priests of Cybele preserved it in their temple as a personification of this goddess, and in old days every fresh fall was naturally attributed to the gods. The Chinese annals, very fully kept in this respect, abound in accounts of meteors of which the description would apply without change to this of Orgueil. An author, named Ma-tonau-li has given a circumstantial catalogue by which we see that the Chinese entered on this question long before our era. Chladni undertook the same enterprise for Europe, and collected the localities and dates of more than 200 falls. No time or country has been free from such occurrences, always observed with curiosity, related with eagerness, and frequently made use of by credulity.

The learned societies, to their honor be it said, required positive proofs before admitting as realities these showers of meteoric stones. The Academy of Sciences was so little in favor of this belief that it declared in 1769 that a stone, picked up at the moment of its descent by many persons who had followed it with their eyes to the instant when it reached the ground, *had not fallen from the sky*. The opposition of public opinion lasted till 1802, but at that period, an abundant shower of stones having been observed at Laigle, the Academy seized the opportunity thus offered to it of enlightening itself on this subject, and commissioned Biot, then the youngest of its members, to open a severe inquiry. There could not have been a better choice for so delicate a mission, nor one more capable of enforcing its convictions. He found the stones to be all identical with one another, some of them having been picked up by himself; he made an elegant report of his mission, and the cause was decided. The most able chemists, among whom may be cited Langier, Thénard and G. Rose, analysed the aerolites, and found them to possess a character in common. Systems were imagined; some thought that the aerolites were projected from volcanoes of the moon, now extinct; others invoked the intervention of electricity which is the *deus ex machina* for all unsolved questions; while others said they were fragments of planets and comets destroyed by mutual collision. Finally they ended where they ought to have begun, and took observations. The number of persons devoted to this troublesome task is now very considerable. We may cite among the most distinguished, M. Haidinger, member of the Academy of Vienna, Father Secchi, Director of the observatory of the Roman College, and Prof. Heis of Munster, who brings to these questions as much perseverance as talent. In England, a commission of philosophers undertook the duty of collecting and instigating observations; it reckons among its members MM. Glaisher, Brayley.

Prestwich, Alex. Herschel and Baden Powell. Every year it publishes a programme of the investigations it thinks most useful to make, and a summary with notes of those which have been executed. In this list, already long, we must still include M. Schmidt at Athens, M. Poey at Havana, and lastly a gentleman who has gained in France on this occasion a kind of celebrity, M. Coulvier Gravier.

It might have been predicted, from such a number of philosophers devoting themselves to this study, that the history of meteorites would gradually be settled, and so in fact it has turned out. We proceed to relate its principal features. Meteors, when their size is considerable, present the same characteristics as distinguished that of May 14th; the same brilliancy, the same train of sparks followed by a persistent cloudiness, often an explosion, and lastly, though less frequently, a fall of aerolites. They are observed of all magnitudes, but, the smaller they are, the shorter is the extent of their path, the more rarely does an explosion take place, and the train grows weaker. Finally, but without specific lines of demarcation and by insensible degrees, we come to mere shooting stars. The nature, origin, and laws of these latter should therefore be carefully studied, and the conclusions drawn will apply to those which by way of exception are large enough to constitute meteors.

We may possibly be astonished to learn that these shooting stars, which on the first aspect present an image of the most desperate irregularity, nevertheless, on the whole, obey well demonstrated laws of periodicity. These laws have been discovered by observations continued during a great number of consecutive nights, and by taking at the end of each year the mean number of shooting stars that have been observed in each successive hour from evening to morning; this is called the *horary number*, and, omitting certain exceptional nights of which we will speak presently, it is found that this number increases progressively from 6 P.M. to 3 A.M., then diminishes till day break, and probably throughout the day till the next evening. In fact the number is 6 between 6 and 7 P.M., 10 between midnight and 1 A.M., 17 between 2 and 3 A.M., and falls to nearly 13 between 6 and 7 A.M. In taking these observations, it was speedily noticed that all these nights did not give identical results, and that those of the 10th, 11th, and 12th August are so rich in shooting stars as to count as many as 110 in an hour. This superabundance at this epoch has been established since the commencement of the century by a very great number of observers, and it is still more remarkable that it appears to have existed from all antiquity. The proof of this is found in the Chinese annals of which I have spoken, and which were examined by E. Biot. These note particularly in the years 830, 833, and 835, a large maximum which fell towards the end of July, reckoning this date by the Gregorian calendar. It is known, however, that the axis of the earth does not retain an invariable direction in space but describes, like the axis of a top, a cone the circuit of which it completes in 23,868 years. It results from this that the time of the equinoxes is continually changing, and that at the same dates from year to year the earth occupies in its orbit progressively differing positions. Now, taking this circumstance into account, it is found that at the epoch when the Chinese observed the maxima of the years 830, 833, and 835, the earth occupied in its orbit the position it now has on Aug. 10th, where the maximum is now reproduced. The regularity

of this phenomenon is thus demonstrated by a long period of observations. Regarding it more closely and examining each year, it is found that this maximum number is subject to deviations both of excess and defect. In 1800, on Aug. 10th, there were only counted 59 stars per hour; in 1848, there were 110; ten years after, in 1858, the horary number fell to 88, and since that year it has been gradually recovering. There is possibly a law of periodicity in these oscillatory movements, as there was in the maximum recorded by Olbers and observed by him on Nov. 12th, 1799; it was extremely rich at its commencement, but gradually diminished almost to zero, afterwards as gradually increasing till it regained its original brilliancy in 1833, when 130 per hour were counted; after this year, it again decreased and has disappeared; but, as the interval between the first two appearances was 34 years, a third is expected in 1867. Seeing that these excessive showers occur always at the same epoch, it must necessarily be admitted that the earth in its annual course meets at the same points of its path with banks of corpuscles disseminated through planetary space, and in this view there has been proposed a hypothesis as ingenious as seductive. It is suggested that these asteroids are scattered on the circular contour of an immense ring, having the sun in its centre, along which they travel, one after the other, each individually completing like a small planet a regular circuit round the sun. This great bank would be crossed by the earth on August 10, and we should perceive traversing our atmosphere all those corpuscles which passed in our neighbourhood. One circumstance, not yet well determined, but generally suspected by all observers, tends to augment the probability of this hypothesis—it has been remarked that on Aug. 10, the greater part of the shooting stars seem to proceed from one and the same point in the heavens. The real situation of this point is not agreed upon; some place it in Cepheus, and others in Cassiopeia or Aries; but wherever it may be, this common track which all the shooting stars of Aug. 10 follow, would be the path of the corpuscles in the ring which includes them, during their revolution round the sun. It is not my wish to write a romance, and yet I cannot pass over in silence some results which Prof. Twining has announced, and the responsibility for which I leave to him. According to this author, the grand ring of corpuscles has a diameter nearly equal to that of the earth's orbit, to the plane of which it is inclined at an angle of 96 degrees; its breadth is from 2,000,000 to 5,000,000 leagues, and it consists of 300,000 milliards of corpuscles, which revolve about the sun in 281 days. Supposing each of these to have a radius of one metre, and that they were all united to form a single sphere, the volume of this would be scarcely one tenth of the earth's. I repeat that I do not believe we are yet in a position to state numbers so precise, but we may certainly predict thus far—that a continuation of the observations will be sufficient to establish a theory in which reality will replace imagination. But in order to arrive at this, it will be necessary in the first place to calculate the trajectories of these wandering bodies. This work has long ago been commenced in the case of the meteors, as these have a long course, and are visible to a great number of persons, and thus there are always notices enough of this appearance to calculate the conditions of their passage. This is what has been done for the meteorite of Orgueil, and which had already been

done, and possibly with more precision, for other similar meteors. M. Petit, director of the Toulouse Observatory, proved long ago that these fiery globes describe hyperbolas, a kind of trajectory which goes off to infinity. Last year on March 4, a meteor which appeared over the north sea, and was observed at different places in England and Belgium, was calculated by M. Heis; it also had a hyperbolic trajectory, and its initial and terminal heights were 174 and 23 kilometres with a velocity of 63. Prof. Newton has also executed some similar determinations, and quite recently M. Alex. Herschel communicated to the Royal Society a list of eleven whose orbits were determined. By all these well ascertained cases, we have acquired the certainty that these apparitions are caused by actual asteroids coming from planetary spaces which enter our atmosphere where they describe hyperbolas, and move with velocities comparable to those of the planets themselves.

The question presented more difficulties in the case of more shooting stars, but a new instrument came to the help of astronomers—the electric telegraph. M. Heis was the first to make use of it in 1851 between Munster and Herbersthal. Two observers established at these stations examined simultaneously the same part of the heavens; when a shooting star appeared, they announced it by telegraph, and the signals coincided if it was the same star they both saw. Then they noted carefully its apparent path among the constellations, and this was sufficient to enable them afterwards to calculate its trajectory by the method already explained for the meteor of Montauban. Ten years afterwards Father Secchi between Rome and Civita-Vecchia recommenced the same investigation by the same method, which he believed original. A great number of illustrious persons assisted at these investigations, which resulted in proving for the second time, as they had for the first, that the shooting stars are actual meteors, only of inferior dimension, projected in space at a rate of many kilometres per second, and reaching our atmosphere to become inflamed.

It was necessary to enter on these various explanations before considering how the cosmical corpuscles become heated to such a degree as to melt and be dissipated. The theory I proceed to describe is the result of successive labors in which many philosophers were concerned. In 1848, Sir J. Herschel in the *Edinburgh Review* traced the first outlines of it; then M. Haidinjer, in 1861, developed its principle consequences before the Academy of Sciences, but it is only in 1863 that M. Reinholds Reichenbach has submitted to rigorous calculation the principles adopted by his predecessors. These investigations allow us to construct theoretically the history of these shooting bodies; let us see how far it is conformable to the observed facts.

As soon as a meteoric globe with its enormous velocity enters the atmosphere it encounters a resistance which slackens its progress, this resistance being very great on account of its rapidity; it can be easily calculated, and, according to M. Reichenbach, it would be sufficient to destroy almost completely in ten seconds the velocity of a bullet which had been projected at a rate of 100 kilometres per second. Suppose that the meteor had lost only one hundredth part of its velocity through this cause, there would have been generated a quantity of heat which can be exactly calculated, and which would have been employed in heating the



globe and the air surrounding it. We learn from M. Reichenbach that it would be effective in raising the temperature by 75,000 degrees, supposing that no heat was lost by radiation, or by only 5,000 degrees if it is admitted that it escapes immediately after its production. The real elevation of temperature is therefore included between 5,000 and 75,000 degrees, considerably exceeding anything that we can produce artificially. Under these conditions, the globe melts, and the surface becomes covered with this vitreous glaze which is characteristic of the fallen stones. Not only does it melt, but at a temperature of 5,000, iron and carbon burn, throwing out brilliant sparks in all directions, and all known substances are reduced to incandescent vapors. The meteorite will then be seen in flames, and will be followed by a fiery train which will give it the appearance of a rocket. This train will then be extinguished, but the substances, which have produced it, remaining suspended in the atmosphere, will then leave a persistent cloud. If the stone be of small dimensions, as is generally the case, it will be entirely burnt up; we see a star shoot, reduce itself to smoke, and all is over; when it is of larger size, it lasts longer, and has a longer path in which we can follow it; it drives before it the layers of air in its way, and these are compressed, heated, and become inflamed. By a contrary reason, it makes a vacuum behind into which the anterior air rushes round the contour of the ball, and the meteorite is thus wholly enveloped in an atmosphere of gas and inflamed vapors. We may pause at this result, as it is of a nature to relieve our apprehensions. In these meteors it is not the solid part, but the surrounding atmosphere, which we see in flames; it is this latter which attains such large dimensions, while the nucleus which is hidden from us is incomparably smaller. This atmosphere has certainly a very menacing appearance, but it becomes dissipated as soon as the velocity diminishes, and this is why history has had no catastrophe to record, why the fragments are almost always very minute, and why such formidable appearances end in such small realities.

While the meteor compresses the air, this latter by the reaction of resistance presses its anterior face, and if we wish to have an approximate estimation of this force, let us consider what happens during storms. When these reach their most terrible intensity, they have a velocity of 40 metres per second, and exert a pressure equal to 38 lbs. on every square foot of surface exposed to them. This pressure will remain the same, if, by a mere change of relative conditions, we projected with that velocity a meteorite of one square foot anterior surface in the atmosphere at rest; but, if instead of 40 the velocity were 40,000, the pressure increases in an enormous proportion, and M. Reichenbach tells us that it reaches 700 atmospheres at a height of 18 kilometres above the ground. There is nothing but iron which could resist such a pressure without being destroyed. Now these conditions being very similar to those of the Orgueil meteor, it must be admitted that it underwent a similar pressure, and that was the reason why it split suddenly into splinters as a stone does when thrown against a wall. At the moment when this disruption was effected, the whole phantasmagoria of its surrounding atmosphere vanished, and we could at last put a finger, not without astonishment, on the ridiculous cause of so mighty a fuss—some fifty stones

weighing in all 20 pounds! Yet, small as they may be, they bring us lessons of a varied and precious kind. Coming to us from the heavens, they bring us the matter which revolves among the stars, and of which probably these are composed; they tell us that, even in the most remote spaces, the material world is built of the identical materials that we find on our earth; the method by which M. Kircher has been able to analyse the sun has been much, and very justly admired, but it is only just to call attention to the fact that in the meteorites we find the metals which compose that luminary, and that besides we there meet with carbon, chlorine and ammonia, which escape the analysis of the spectrum.

If, by a concurrence of circumstances unhappily but little probable, one of these stones were to fall at the feet of a philosopher prepared to examine it on the spot, it would reveal to him another mystery. It is known that the temperature diminishes as we rise above the ground, and that it must be very low in the celestial spaces, but we are altogether ignorant of the degree of depression; this we might learn from the aerolites. Some of these being almost entirely composed of iron, are good conductors of heat, and the enormous heat which melts their surface may be propagated into the interior of this mass so that they reach the ground as red-hot balls, from which no conclusion can be drawn. But this is not the case with such aerolites as are of an earthy composition; these transmit the heat through their mass only slowly; their exterior surface alone may be heated during the short interval of their passage through the air, and the cold which they retain in the centre would return to the surface after the fall. It was in fact observed that the stones which recently fell in the Punjab froze the hands of the persons who lifted them. Now it is this temperature of the centre of large meteoric masses which it would be so desirable to measure, for it is that of the celestial spaces from whence they set out to reach our earth.

My object has been to describe results which are acknowledged by science in earnest; may I be permitted to indicate in one word some fantastic notions which are cherished by the vulgar but repudiated by scientific men! Some persons have done shooting stars the honor to affirm that they preside over the changes of weather, or at least that they enable such to be foreseen; they are driven to appeal to these as a last resort after having vainly invoked all the constellations of the sky, the planets, the moon and the comets. The Academy, on being consulted, answered that such an influence was not proven—a polite reply! On the other side, MM. Heis and Secchi, the acknowledged astronomers, whose competency is undeniable, declare that such indication,—given by those celestial corpuscles, is absolutely false. The public will do well to be on their guard against these inexact predictions which are as often contradicted as confirmed by the event. With this reservation, everybody may encourage M. Coulvier Gravier to persevere in the study he has begun of shooting stars, and even to publish his observations, for it may well happen that a scientific discussion will draw from them grave results, which they probably involve but which he has not been able to find in them.

## CANADIAN INSTITUTE.

## SIXTH ORDINARY MEETING.

30th January, 1864.

The President, The Rev. J. McCaul, LL.D., in the Chair:

I. *The undernamed Gentleman was elected a Member :*

II. W. LAUDER, ESQ, Barrister, Toronto.

II. Some remarks were made by Rev. H. Scadding, D.D., on Greek and Roman coins in the collection of the Institute.

## SEVENTH ORDINARY MEETING.

6th February, 1864.

The President, The Rev. J. McCaul, LL.D., in the Chair.

I. *The following donation for the Library was announced.*

" Report on the construction of a military road from Fort Walla-Walla to Fort Benton, by Captain John Mullen, U. S. A., per Hon. J. M. Broadhead, Washington. 1 Vol.

II. *The following Paper was then read :*

1. By D. Tucker, Esq., M.D. :

" On certain modern views concerning the ordinal arrangement of the higher mammalia."

## EIGHTH ORDINARY MEETING.

13th February, 1864.

The President, The Rev. J. McCaul, LL.D., in the Chair.

I. *The following Paper was read :*

1. By Prof. E. J. Chapman, Ph. D. :

" On the comparative anatomy and geological relations of the archæopteryx."

## NINTH ORDINARY MEETING.

20th February, 1864.

The President, The Rev. J. McCaul, LL.D., in the Chair.

I. *The following donations for the Library were announced.*

FROM THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

The Journal of .....	Vol. 31,	1861.	1
The Proceedings of .....	Vol. 6, No. 3,	1862.	1
" .....	" " 4,	" "	2
" .....	" " 5,	" "	1
" .....	Vol. 7, " 1,	" "	1
" .....	" " 2,	" "	1
" .....	" " 3,	" "	1
" .....	" " 4,	" "	1
" .....	" " 5,	" "	1
Not bound, total .....			10

## FROM THE GEOLOGICAL SOCIETY OF LONDON.

The Quarterly Journal of.....	Vol. 18,	Nov. 1,	1862.	No. 72,	Part 4	
	Vol. 19,	Feb. 1,	1863.	" 73,	" 1	
	"	May 1,	"	" 74,	" 2	
	"	Aug. 1,	"	" 75,	" 3	
	"	Nov. 1,	"	" 76	" 4	
List of the Geological Society of London		Nov. 1,	"			1
Charter and Bye Laws.....			1862.			1
Not bound, total.....						7

## FROM THE ROYAL ASIATIC SOCIETY.

The Journal of.....	Vol. 20,	Part 1,	1862	1
	"	"	1863	1
Not bound, total.....				2

II. Professor Chapman laid on the table a specimen of allanite, a mineral newly found in Canada, and also a short communication upon it.

Doctor McCaul in the absence of Doctor Wilson's paper, made some remarks upon the Roman army of occupation in Britain.

## TENTH ORDINARY MEETING.

27th February, 1864.

Vice-President, S. FLEMING, Esq., C.E., in the Chair.

I. The Vice-President announced the Resignation of Mr. Wilson as Recording Secretary from ill health, and stated that the council had appointed in his place Mr. W. Mortimer Clark and hoped he would accept the office.

II. *The following donations for the Library were announced.*

## FROM THE ROYAL SOCIETY OF EDINBURGH.

Transactions of.....	Vol. 23,	Part 2,	Session 1862-63.	1
Proceedings of.....			Session 1862-63.	1
Not bound, total.....				2

## FROM T. C. WALLBRIDGE, M.P.P.

Le Rougisme en Canada, Pamphlet.....				1
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## FROM NATURAL HISTORY SOCIETY, DUBLIN.

Proceedings of.....	Vol. 3,	Part 1,	1859-60	1
" .....	"	" 2,	1860-62	1
" .....	" 4,	" 1,	1862-63	1
Not bound, total.....				3

*The thanks of the Institute were voted to the donors.*

III. *The following Paper was then read:*

By Prof. Kingston, M.A.:

"On the abnormal variations of the meteorological elements at Toronto, and their relation to the direction of the wind."

## ELEVENTH ORDINARY MEETING.

5th March, 1864.

In the absence of the President, and the three Vice-presidents, on motion of Prof. Croft, seconded by Prof. Chapman the Rev. Dr. Scadding was called to the Chair.

I. *The following donations for the Library were announced, and the thanks of the Institute voted to the donors.*

FROM THE ROYAL SCOTTISH SOCIETY OF ARTS, EDINBURGH.

The Transactions of ..... Vol. 6, Part 3, Pamphlet. 1

FROM THE AUTHOR, J. W. DAWSON, LL.D.

Flora of the carboniferous period of Nova Scotia..... 1\*

On the Devonian Plants of Maine, Gaspé, and New York.. Nov. 1863 1\*

FROM T. C. WALLBRIDGE, M.P.P.

Explorations de Quebec a Lac St. Jean ..... 1\*

Correspondence and documents referring to the clerk of the Peace, Montreal..... 1\*

La Revue Canadienne, Tome Premier..... 1\*

II. *The following Paper was read :*

By Prof. D. Wilson, LL.D.:

“On some of the supposed traces of human art in the Post-pliocene strata.”

Afterwards a discussion took place on the subject in which Prof. Chapman, Prof. Hincks, Dr. Tucker, Dr. Barrett and the Rev. Dr. Scadding took part.

The thanks of the meeting were then voted to Prof. Wilson.

TWELFTH ORDINARY MEETING.

12th March, 1864.

The President The Rev. J. McCaul, LL.D., in the Chair.

I. *The following donations for the Library were announced.*

FROM HAWARD COLLAGE.

List of nebulae and star clusters seen at the observatory 1847—1863 1\*

On the new Form of the achromatic object glass, &c., by G. P. Bond 1\*

FROM T. C. WALLBRIDGE, M.P.P.

Supplementary catalogue of the Library of Parliament ..... 1\*

List of Bills Introduced, &c., &c..... 1\*

FROM FINANCE.

Annales des mines Tome IV. Livra , 5 and 6 ..... 2\*

II. Prof. Chapman in default of regular papers gave two verbal communications. (1) “On a peculiarity connected with the presence of Phosphorus in Iron Wire.” (2) “On certain distinctive characters of the Rhizopoda.”

The thanks of the Institution were conveyed to Professor Chapman by the President for his communications.



REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JUNE, 1864.

recorded in any June during the series, being less than one-fifth of the average.

COMPARATIVE TABLE FOR JUNE.

YEAR.	TEMPERATURE.			RAIN.		SNOW.		WIND.		
	Mean.	Maximum Observed.	Minimum Observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Mean Force or Velocity.
1840	50.8	78.5	37.1	41.4	11	4.86	...	...	...	0.36 lbs
1841	65.6	92.8	45.7	47.1	9	1.30	...	...	...	0.31 "
1842	55.6	73.9	28.0	45.9	15	5.75	...	...	...	0.27 "
1843	58.4	82.8	33.1	49.7	9	3.53	...	...	...	0.19 "
1844	59.9	83.6	40.9	42.7	11	3.71	...	...	...	0.27 "
1845	61.0	83.3	41.5	41.8	10	1.92	...	...	...	0.32 "
1846	63.3	82.0	36.7	41.6	14	2.65	...	...	...	0.30 "
1847	58.4	81.5	38.3	43.2	8	1.81	...	...	N 61 W	1.90 4.51 ms
1848	62.9	92.5	45.2	47.7	7	2.01	...	...	S 61 E	0.49 3.32 "
1849	63.2	91.0	42.5	48.5	10	3.35	...	...	S 60 W	0.38 4.51 "
1850	64.3	86.2	45.0	41.2	10	2.65	...	...	S 2 W	1.26 4.42 "
1851	60.8	79.2	43.6	35.0	11	2.65	...	...	S 2 W	1.49 4.09 "
1852	65.5	86.1	43.3	43.0	9	1.55	...	...	N 1 W	0.10 3.73 "
1853	64.1	88.7	47.4	41.3	9	1.40	...	...	N 24 E	0.71 4.15 "
1854	64.1	90.7	40.6	50.1	17	4.07	...	...	N 69 W	1.33 5.70 "
1855	60.9	82.6	48.3	34.3	13	3.20	...	...	S 21 W	0.90 5.30 "
1856	62.1	82.6	48.3	34.2	21	2.06	...	...	S 49 W	1.15 7.60 "
1857	56.9	75.1	40.9	34.5	12	0.94	...	...	S 90 E	0.25 5.53 "
1858	66.2	86.3	48.7	37.6	10	2.94	...	...	S 77 W	1.59 7.19 "
1859	58.3	80.2	33.9	31.3	14	4.08	...	...	N 44 W	3.13 7.61 "
1860	63.2	81.1	50.0	31.1	14	2.13	...	...	N 30 W	2.29 6.11 "
1861	61.3	86.5	49.2	38.3	13	3.32	...	...	N 26 W	1.77 6.98 "
1862	60.5	83.2	44.3	38.9	10	1.07	...	...	N 50 W	2.26 5.24 "
1863	60.1	79.3	45.0	34.3	13	1.62	...	...	N 55 W	1.72 4.53 "
1864	63.0	92.6	41.7	50.9	5	6.57	...	...	...	...
Results to 1864	61.34	83.92	41.64	42.28	11.6	2.867	...	...	N 61 E	0.98 5.27
Exc. for 1864	+1.60	+8.68	+0.06	+8.62	0.6	2.207	...	...	...	-0.74

North.—The monthly means do not include Sunday observations. The daily means, except those that relate to the wind, are derived from six observations daily, namely, at 6 a.m., 9 a.m., 2 p.m., 4 p.m., and 10 p.m., and midnight. The means and results for the wind are from hourly observations.

Highest Barometer . . . . . 23.061 at 8 a.m. on 28th. } Monthly range = 29.007 at 11 a.m. on 9th. }  
 Lowest Barometer . . . . . 29.007 at 11 a.m. on 9th. } 0.054 inches.  
 { Maximum temperature . . . . . 98.4 on p.m. of 25th } Monthly range = 35.8 on a.m. of 7th }  
 { Minimum temperature . . . . . 34.8 on a.m. of 7th } 58.6  
 { Mean maximum temperature . . . . . 73.06 } Mean daily range = 20.19  
 { Mean minimum temperature . . . . . 52.87 }  
 { Greatest daily range . . . . . 31.87 from a.m. to p.m. of 16th.  
 { Least daily range . . . . . 7.92 from a.m. to p.m. of 6th.  
 Warmest day . . . . . 25th. Mean Temperature . . . . . 81.77 } Difference = 34.932  
 Coldest day . . . . . 10th. Mean Temperature . . . . . 47.45 }  
 Radiation { Solar (Vacuum) . . . . . 135.2 on p.m. of 25th } Monthly range = 108.4  
 { Terrestrial . . . . . 24.98 on a.m. of 7th }  
 Aurora observed on 5 nights, viz.—on 7th, 9th, 10th, 11th and 28th.  
 Possible to see Aurora on 24 nights; impossible on 6 nights.  
 Tearing on 5 days; depth 0.576 inches; duration of fall, 11.8 hours.  
 Mean of cloudiness = 0.30, or 0.22 below average. Most cloudy hour observed, 6 a.m.; mean = 0.35; least cloudy hour observed, 10 p.m.; mean = 0.23.

Sums of the components of the Atmospheric Current, expressed in Miles.  
 North. South. East. West.  
 1489.06 760.03 454.53 1444.69

Resultant direction, N. 55° W.; Resultant Velocity, 1.72 miles per hour.  
 Mean velocity 4.53 miles per hour.  
 Maximum velocity 27.5 miles, from 2 to 3 p.m. on 9th.  
 Most windy day 28th.—Mean velocity 11.60 miles per hour. } Difference 11.60.  
 Least windy day 17th.—Mean velocity 0.60 miles per hour. }  
 Most windy hour, 2 to 3 p.m.—Mean velocity, 7.45 miles per hour. } Difference  
 Least windy hour, 4 to 5 a.m.—Mean velocity, 2.15 miles per hour. } 5.30 miles.

7th, 5 a.m., hoar frost on the 30th footpaths, 10 p.m. to midnight; auroral arch, streamers, and pulsations—9th, Thunderstorm, lightning and rain, 11.40 a.m. to 12.10 p.m.; auroral light at midnight—10th, Faint auroral light at midnight—11th, Faint auroral light at midnight—22nd, Distant Thunder 11.40 a.m. to 12.30 p.m.—25th, Thunderstorm, lightning and rain 1.30 to 2.20 p.m.—25th, Auroral arch, band, and streamers, 9 p.m. and midnight.

Dew recorded on 11 mornings during this month.

June, 1864, was very warm, dry, clear, and calm. The depth of rain was the least,

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—JULY, 1884.  
 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 Normal.			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Re-sultant Direc-tion.	Velocity of Wind.			Rain in Inches.	Snow in Inches.			
	6 A.M.		10 P.M.	6 A.M.		10 P.M.	6 A.M.		10 P.M.	6 A.M.		10 P.M.	6 A.M.		10 P.M.	6 A.M.		10 P.M.		6 A.M.		10 P.M.			6 A.M.		10 P.M.
	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.	MEAN.		MEAN.	MEAN.	MEAN.			MEAN.	MEAN.	MEAN.
1	29.531	29.496	29.421	61.9	64.8	68.05	+ 3.28	425	604	582	555	76	72	95	81	NW	bN	SSE	EbN	S79E	0.6	1.93	2.52	0.440			
2	319	404	479	67.0	60.1	66.82	+ 1.82	636	513	439	546	96	67	84	83	Calm.	WN	WNW	WNW	N71W	0.0	9.82	10.04	0.007			
3	512	511	—	58.0	71.7	59.8	- 2.10	313	411	291	347	68	53	56	59	WN	WNW	WNW	N49W	10.2	12.66	12.69	—				
4	597	610	626	65.3	66.3	67.48	+ 2.10	310	433	382	426	70	48	74	68	WN	WNW	SW	SWbW	62W	8.5	4.96	5.65	—			
5	589	542	589	55.8	66.3	67.48	+ 4.95	445	563	527	513	71	60	63	68	WN	WNW	SW	SWbW	52W	10.0	2.2	4.48	—			
6	589	542	589	55.8	66.3	67.48	+ 4.95	445	563	527	513	71	60	63	68	WN	WNW	SW	SWbW	52W	10.0	2.2	4.48	—			
7	517	513	503	51.27	65.9	67.0	+ 0.38	527	498	485	500	83	76	83	88	WN	WNW	NE	N47E	6.5	5.07	5.82	0.065				
8	598	683	745	68.25	66.3	75.9	+ 5.43	548	450	537	507	85	45	82	69	WN	WNW	SE	S37E	3.0	0.50	3.53	—				
9	823	777	678	75.02	65.2	70.17	+ 4.18	484	487	535	518	86	48	86	72	Calm.	SE	SE	S40E	0.0	1.76	2.51	—				
10	595	450	—	65.2	—	—	+ 5.36	706	—	—	—	86	90	—	—	—	—	—	S18E	0.5	0.88	1.32	0.165				
11	422	375	488	43.07	68.1	72.72	+ 6.53	594	388	433	489	87	41	62	63	SW	SW	SW	N85W	2.2	16.8	9.5	7.89	10.80			
12	568	645	743	66.33	64.8	68.58	+ 2.28	444	407	280	376	75	46	61	54	WN	WNW	SW	N17W	5.0	12.4	10.5	10.22	10.48			
13	807	803	792	80.40	67.3	67.3	+ 1.97	346	434	418	416	63	52	61	60	WN	WNW	SW	S60W	8.8	7.7	4.2	1.64	5.01			
14	806	765	721	76.08	68.1	71.03	+ 4.62	402	374	459	423	74	37	67	67	WN	WNW	SE	S88E	3.0	5.0	3.5	3.73	4.47			
15	737	700	687	70.18	66.6	62.9	+ 5.75	490	556	484	512	74	49	77	66	WN	WNW	SE	S72E	4.0	3.4	0.8	2.03	3.80			
16	691	667	677	68.02	84.7	74.976	+ 10.03	514	548	517	536	80	48	59	59	WN	WNW	SE	N79E	0.2	0.0	3.8	0.77	4.08			
17	755	773	—	75.0	80.3	—	+ 5.18	575	—	—	—	89	56	—	—	—	—	—	S18E	0.5	3.0	5.8	5.0	3.55	4.48		
18	806	811	788	79.57	68.3	72.076	+ 8.65	542	561	598	595	77	48	76	69	WN	WNW	SE	N70E	3.0	5.8	5.0	3.55	4.48			
19	831	722	629	72.068	71.3	67.376	+ 7.98	622	520	566	552	81	42	78	63	WN	WNW	SE	S65E	2.8	5.5	4.4	3.16	3.67			
20	554	604	690	55.65	68.4	85.4	+ 6.8	873	393	434	444	75	32	62	56	WN	WNW	SE	S13W	0.5	8.8	2.0	4.37	4.51			
21	721	704	701	71.200	58.0	61.42	+ 3.35	337	205	208	256	70	29	43	40	WN	WNW	SE	S38W	0.4	21.5	12.0	12.02	13.01			
22	766	698	735	73.000	57.6	62.72	+ 5.15	276	203	262	235	58	25	69	44	WN	WNW	SE	N28W	7.2	18.5	14.0	13.77	13.82			
23	741	692	706	70.777	65.5	66.22	+ 0.67	274	407	319	343	69	41	53	54	WN	WNW	SE	N37W	6.5	15.2	0.8	8.57	8.53			
24	780	688	—	77.1	—	—	+ 3.78	487	—	—	—	70	62	—	—	—	—	—	S73W	1.5	0.0	4.0	2.18	3.83			
25	642	638	469	64.68	63.4	62.365	+ 1.22	483	494	497	490	82	62	88	78	WN	WNW	SE	S51E	1.5	0.0	4.0	2.18	3.83			
26	593	596	664	60.95	62.3	66.80	+ 1.67	610	615	577	556	90	68	92	85	WN	WNW	SE	N1W	5.2	7.0	13.5	3.46	7.81			
27	739	714	738	70.671	73.3	70.671	+ 4.15	484	639	589	582	92	63	79	74	WN	WNW	SE	S65W	2.0	5.2	1.4	3.27	5.10			
28	696	552	459	65.30	67.7	86.1	+ 8.37	491	518	614	568	83	42	75	67	WN	WNW	SE	S68W	2.0	7.5	3.5	1.92	3.62			
29	608	486	459	64.02	67.0	73.175	+ 8.37	491	518	614	568	83	42	75	67	WN	WNW	SE	S68W	2.0	7.5	3.5	1.92	3.62			
30	471	458	453	46.42	65.2	80.3	+ 5.83	359	469	524	511	83	47	68	66	WN	WNW	SE	S16W	1.0	5.0	6.8	2.05	4.50			
...	492	448	—	69.2	87.9	—	+ 5.83	497	531	551	535	79	51	80	—	—	—	—	S18W	0.0	5.0	1.9	2.45	3.25			
M	29.645	29.6210	29.6220	63.377	65.460	66.73	+ 3.48	464	470	470	473	78	50	71	66	—	—	—	—	—	3.00	8.53	4.93	6.00	1.332		



REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1864.

Notes.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 a.m., 9 a.m., 2 p.m., 5 p.m., and midnight. The means and results for the wind are from hourly observations.

Highest Barometer..... 29.831 at 8 a.m. on 9th; 6 a.m. on 19th } Monthly range = 0.512 inches.  
 Lowest Barometer..... 29.319 at 6 a.m. on 2nd }  
 { Maximum Temperature ..... 90°2 on p.m. of 31st } Monthly range = 41°2  
 { Minimum Temperature ..... 61°42 }  
 Mean maximum Temperature ..... 79°36 } Mean daily range = 20°16  
 Mean minimum Temperature ..... 59°79 }  
 { Greatest daily range ..... 31°2 from a.m. to p.m. of 23rd.  
 { Least daily range ..... 5°8 from a.m. to p.m. of 7th.  
 Warmest day ..... 19th } Mean temperature ..... 76°17 } Difference = 15°26.  
 Coldest day ..... 21st } Mean temperature ..... 61°42 }  
 Maximum Solar Radiation ..... 130°9 on p.m. of 16th } Monthly range = 91°0  
 Maximum Terrestrial ..... 30°9 on a.m. of 5th }  
 Aurora observed on 3 nights, viz.—on 12th, 18th and 19th.  
 Possible to see Aurora on 19 nights; impossible on 12 nights.  
 Running on 8 days, depth 1.332 inches; duration of fall 24.7 hours.  
 Mean of cloudiness = 0.44; be. w. average 0.04.  
 Most cloudy hour observed, midnight; mean = 0.47; least cloudy hour observed, 8 a.m.; mean, = 0.40.

Sums of the components of the Atmospheric Current, expressed in miles.  
 North. South. East. West.  
 1836.42 710.63 2166.12  
 Resultant direction N. 61° W.; Resultant velocity 2.23 miles per hour.  
 Mean velocity ..... 6.00 miles per hour.  
 Maximum velocity ..... 23.4 miles, from 3 to 4 p.m. on 20th.  
 Most windy day ..... 21st ..... Mean velocity, 13.82 miles per hour. } Difference = 12.30 miles.  
 Least windy day ..... 10th ..... Mean velocity, 1.52 ditto }  
 Most windy hour ..... noon to 1 p.m. ..... Mean velocity, 9.43 ditto. } Difference = 6.30 miles.  
 Least windy hour ..... 5 a.m. to 6 a.m. ..... Mean velocity, 3.33 ditto. }  
 1st. Sheet lightning in S.E. at 10 p.m.—2nd. Fog at 0 and 8 a.m.—6th. Distant thunder 5 to 7 p.m.—9th. Solar halo at 5 p.m.—10th. Thunderstorm noon to 1 p.m.—12th. Aurora arch and streamers at midnight.—18th. Aurora arch, patches and streamers from 1 a.m.—19th. Aurora patches and streamers 10 to 10.30 p.m.—26th. Fog 6 to 8 a.m.; thunderstorm 3 to 4 p.m.—28th. Thunderstorm 8 to 9.45 p.m.—29th. Sheet lightning in S. and S.W. at 10 p.m.—30th. Sheet lightning in N.W. 10 p.m. and midnight.—31st. Thunderstorm 4 to 6 p.m.  
 July, 1864, was comparatively warm, dry, windy, and clear. The Rain recorded was less than half the average.

COMPARATIVE TABLE FOR JULY.

YEAR.	TEMPERATURE.				RAIN.				SNOW.				WIND.		
	Mean.	Excess above average (80°).	Max. of day.	Min. of night.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Force or Velocity.	No. of days.	Inches.	Direction.	Force or Velocity.
1840	65.8	0	79.4	48.2	31.2	6	5.270	...	...	...	...	...	...	...	0.27 lbs.
1841	65.0	-2.0	86.3	43.2	43.1	10	8.160	...	...	...	...	...	...	...	0.33
1842	64.7	-2.3	90.5	42.0	48.5	4	3.050	...	...	...	...	...	...	...	0.44
1843	64.5	-2.6	86.1	40.2	45.9	8	4.605	...	...	...	...	...	...	...	0.19
1844	66.0	1.0	86.1	40.5	45.6	12	2.815	...	...	...	...	...	...	...	0.30
1845	66.2	0.8	94.0	45.6	49.0	7	2.195	...	...	...	...	...	...	...	0.29
1846	68.0	1.0	94.0	44.0	49.1	9	2.895	...	...	...	...	...	...	...	0.19
1847	68.0	1.0	87.5	43.8	43.7	8	3.355	...	...	...	...	...	...	...	0.19
1848	65.5	1.5	82.7	46.7	36.0	10	1.890	...	...	...	...	...	...	N 14° W	0.75
1849	68.4	1.4	84.9	51.0	38.1	4	3.415	...	...	...	...	...	...	S 5° W	0.75
1850	68.9	1.0	84.9	52.8	32.1	12	5.270	...	...	...	...	...	...	N 81° E	0.69
1851	65.0	-2.0	82.7	52.1	30.6	12	3.625	...	...	...	...	...	...	N 60° W	0.83
1852	66.3	0.2	90.1	49.5	40.6	8	4.025	...	...	...	...	...	...	N 43° W	0.93
1853	65.6	1.4	85.4	49.4	36.0	10	0.815	...	...	...	...	...	...	S 58° E	0.33
1854	72.5	5.5	93.6	53.0	40.6	9	4.805	...	...	...	...	...	...	S 49° W	0.37
1855	67.9	0.9	88.4	53.1	35.3	13	3.245	...	...	...	...	...	...	S 19° W	0.73
1856	66.9	0.9	92.0	51.4	40.6	8	1.120	...	...	...	...	...	...	N 79° W	1.57
1857	67.8	0.8	85.4	52.4	33.0	13	3.475	...	...	...	...	...	...	S 68° E	0.81
1858	67.8	0.9	85.4	55.9	27.5	13	3.672	...	...	...	...	...	...	N 15° E	1.13
1859	66.9	0.1	87.7	50.5	37.2	12	2.611	...	...	...	...	...	...	N 56° W	1.48
1860	63.9	-3.1	85.8	47.5	38.3	14	4.356	...	...	...	...	...	...	N 69° W	2.15
1861	65.4	-1.6	82.9	49.4	33.5	16	2.635	...	...	...	...	...	...	N 74° W	1.43
1862	66.7	-0.3	88.6	52.6	36.0	15	5.344	...	...	...	...	...	...	S 89° W	1.42
1863	67.6	0.6	82.3	49.3	33.0	15	3.405	...	...	...	...	...	...	N 38° W	0.40
1864	68.7	2.7	87.9	52.9	35.0	8	1.532	...	...	...	...	...	...	N 61° W	2.23
1865	66.08	...	87.10	48.72	38.33	10.3	3.474	...	...	...	...	...	...	N 66° W	0.63
Exc. for 1864.	2.75	...	0.80	4.18	3.98	2.3	2.142	...	...	...	...	...	...	.....	1.03