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SOME ETHNOGRAPHIC PHASES OF CONCHOLOGY.

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Read before the Canadian Institute, 5th Dec., 1857.

The existence of a singular class of rude primitive weapons and implements, made of stone, shell, or bone, in nearly every quarter of the globe, has excited a very general interest of late years among the archæologists of Europe. Made, as these simple relics of primitive art are, of the most facile and readily wrought materials, and by the constructive instincts rather than the acquired skill of their rude artificers, they belong to one condition of man, in relation to the progress of civilization; though pertaining to many periods of the world's history, and the most widely severed areas of the globe. In one respect, however,—and not in this one alone,—such relics possess a peculiar value to the Ethnologist, when searching into the primeval condition of our race. The materials of such infantile processes of manufacture have within themselves most frequently the evidences of their geographical origin, and in some of them also of their chronological eras. The periods to which numerous ancient sepulchral and other British and European relics pertain may frequently be determined, like those of inferior and older strata, by their embedded fossils. The bones of the *Bos primigenius* have been found indented with the primitive stone javelin of the aborigines of Northern Europe; while those of the *Megaceros Hibernicus* have been discovered alongside of the more artistic bronze weapons of

ancient Ireland. The skulls and bones of the *Bos longifrons*, tell in Britain of relics pertaining to an era not later than the Roman times; and the ornamented tusks of the Wild Boar, the bones of the Brown Bear, the teeth and skulls of the Beaver (*Castor Europæus*.) the carvings wrought from the Walrus ivory, the skates formed from the metatarsal and metacarpal bones of the Red Deer and small native Horse; with numerous kindred relics of palæontology within the era of the occupation of the British Islands by man: all serve to assign approximate dates to the examples of his ancient arts which they accompany. Thus within the historic period, as in geological eras prior to the creation of man, the progress of time is recorded by the extinction of races. His advent on our earth was speedily marked by the disappearance of numerous groups of ancient life which pertain to that transition era where geology closes and archæology begins. So also the intrusion of the Roman into Britain is recorded in the extinction of many of its ancient fauna; even as the progress of the European colonist of the New World inevitably involves not only the disappearance of the wild animals which haunt its forests, but also of the Aborigines who made of them a prey.

But while the remains of extinct species thus serve—like the graven Roman or runic inscriptions on the sepulchral slab,—to fix the dates at which certain eras had their close, other accompanying objects, and chiefly the traces of living or extinct fauna, are no less valuable as fixing the geographical origin of the colonists of ancient areas, amid whose relics they are found; just as the elephants, the camels, the monkeys, and baboons, of the Nimrod Obelisk, or the corresponding sculptures on the walls of Memphis or Luxor: serve to indicate the countries whence tribute was brought, or captives were carried off, to aggrandise the Assyrian or Egyptian conquerors. Among such relics, which serve to fix the geographical centres of ancient arts, the sources of early commerce, or the birth-places of migrating races, might be noted the tin and amber of the Old, and the copper of the New World. So also in minuter analysis, we recognise among primitive American relics the local origin of various favourite materials: as the Mexican obsidian, the clay slate of the Babeens, and the favourite red pipe-stone of the *Couteau des prairies*. But it is to a more widely diffused and greatly varied class of natural products that I now refer, alike in their bearings on the chronological and geographical relations of ancient and living races, and on

the affinities traceable between primitive and modern arts and customs.

Among the productions of nature employed as materials for ornament and use, scarcely any have commanded more universal acceptance than the shells which abound, under such varied forms, on every sea coast, as well as in the deposits of fresh-water lakes and rivers. To the Conchologist they present an interesting and singularly beautiful department of nature, inviting to research amid their seemingly endless forms, and to inquiry into the habits of the "living will" that once tenanted each lovely cell :—

Did he stand at the diamond door
Of his house in a rainbow frill?
Did he push, when he was uncurl'd,
A golden foot or a fairy horn
Thro' his dim water-world? *

To the geologist the shells of the testaceous mollusks offer a department in palæontology of very wide application and peculiar value. They constitute, indeed, one of the most important among those records which the earth's crust discloses, whereby its geological history can be deciphered. But to the ethnologist and the archæologist also, they have their phases of interest, not unworthy of attention.—The mere beauty and variety of many marine shells sufficiently account for their selection as ornaments, or objects specially prized by their possessors, whether civilized or savage. These, indeed, constituted at first the sole attraction to the most intelligent collector, when enriching his cabinet with rare and costly shells, and laying the foundations for the science of conchology. To him these coveted treasures were each only "a thing of beauty," or, as in the French title of Knorr's celebrated work : "Les Delices des Yeux et de l'Esprit." But the conchologist is not singular in this respect. Other sciences besides his have had their origin in the mere aimless cupidity of the collector, which has thus amassed the materials wherewith to build a new temple to truth.

Like the precious metals, shells have been used, both in the old and new world, not only for ornament, but as a recognised currency. Of such the *cypræa moneta* is the most familiar. The cowrie shells used as currency are procured on the coast of Congo, and in the Philippine and Maldivé Islands. Of the latter, indeed, they constitute the chief article of export. On the Guinea coast, and through-

* Tennyson's Maud.

out a considerable portion of Central Africa, the cowrie is still the current coin. In many parts of India, in Siam, and throughout the Burmese empire, it is universally employed as small change, and has a recognised though fluctuating value. About the middle of last century, 2400 cowries were equivalent, in Bengal, to one rupee, but increasing facilities of intercommunication have tended to multiply them and depreciate their worth. The influence of European civilization, under British rule, has in many districts displaced the primitive cowrie, by a copper and a silver currency, while the increasing monetary transactions of the most favored districts lead to the circulation even of the gold mohur, so that now, in Bengal and similar centres of commercial exchange, it requires nearly an additional thousand cowries to make up the value of the silver rupee.

Corresponding to the cowrie currency of Asia and Africa, is the use by the American Indians of the North West, of the iouqua, a shell found on the neighboring shores of the Pacific, and employed by them both for ornament and as money. The Chinooks and other Indians wear long strings of iouqua shells as necklaces and fringes to their robes. These are said to be procured only at Cape Flattery, at the entrance of the Straits of De Fuca, where they are obtained by a process of dredging, and have a value assigned to them increasing in proportion to their size. This varies from about an inch and a half to upwards of two inches in length. They are white, conical, and slightly curved in form, and taper to a point. Their circumference at the widest part does not greatly exceed the stem of a clay tobacco pipe, and they are thin and translucent. Mr. Paul Kane writes to me in reference to them: "A great trade is carried on among all the tribes in the neighborhood of Vancouver's Island, through the medium of these shells. They are valuable in proportion to their length, and their value increases according to a fixed ratio, forty shells being the standard number required to extend a fathom's length. A fathom thus tested is equal in value to a beaver's skin, but if shells can be found so far in excess of the ordinary standard that thirty-nine are long enough to make the fathom, it is worth two beavers' skins, if thirty-eight, three beavers' skins, and so on: increasing in value one beaver skin for every shell less than the standard number."

No evidence has yet appeared to indicate the use of the marine or fresh water shells of Europe as a species of currency during the era

of its primitive barbarism; but it is interesting to notice the fact that the same simple mode of employing the spoils of the sea for personal decoration, as is found prevalent among the rude Indians of the North-west at the present day, prevailed among the primitive occupants of the British isles in that dim dawn of their primeval history revealed by the disclosures of their most ancient sepulchral deposits. Among the personal ornaments found in early British graves, seemingly pertaining to a period long prior to the acquisition of the simplest metallurgic arts, are necklaces formed of the small shells abounding on the neighboring coasts, such as the *nerita littoralis*, the *patella vulgata*, and others equally common at the present day. These are perforated, like the iouka shells of the Chinook Indian, apparently by the simple process of rubbing the projecting point on a stone, and thus converted into shell-beads; they were strung together with a fibre or sinew. It may also be noted that, as among the savage Indians of this continent such personal ornaments are not confined to the squaws, but more frequently adorn the person of the brave, and mingle with the scalp-locks and other war-trophies of the most celebrated chief: so was it with the allophylian savages of Britain's primeval centuries. Bead necklaces occur alongside of the stone war-hatchet and flint lance-head, as the property of the warrior, and one of his most prized decorations. Possibly, indeed; they may have constituted the symbols of rank, and the special badge of office, as considerable variety marks their forms. An Orkney stone cist, for example, contained about two dozen of the common oyster shells each perforated, and in all probability designed to be strung together as a collar, abundantly noticeable for size, if not for beauty. In some cases, the form of these shells, as well as of those of the limpet (*patella vulgata*), and of the cockle (*cardium commune*), are taken advantage of to form a novel shell-ornament. They are rubbed down until they are reduced to rings, which were either strung together, or attached, as ornaments, to the dress. Underneath a large cromlech, accidentally discovered in the Phoenix Park at Dublin, in 1838, in the process of levelling a mound, which thus proved to be an ancient tumulus, two male skeletons were found, and beside each skull lay a quantity of the common littoral shells, *nerita littoralis*. "On examination," it is noted in the report of the Royal Irish Academy, "these shells were found to have been rubbed down on the valve with a stone, to make a second hole, for the purpose, as

it appeared evident, on their being strung to form necklaces; and a vegetable fibre, serving this purpose, was also discovered, a portion of which was through the shell." Alongside of these also lay a knife, or arrowhead, of flint, and a small fibula of bone, but no traces of metallurgic arts.

Sir Thomas Browne has remarked in one of his quaint, beautiful fancies: "Time conferreth a dignity upon the most trifling thing that resisteth his power;" and as the uses to which the primitive British savage applied the commonest and least attractive of the shells of his Island coasts, for the purposes of personal adornment, confer an interest on them for us, as illustrations of the universal prevalence of certain innate ideas which may almost be characterised as instincts in man: so too may we discover, even in the rudest traces of primeval culinary arts, some glimpses of forgotten truths, that will help to illuminate the past history of the human race. Amid the widening clearings of this new continent, where the natural forest still bounds our horizon, and the rude Indian savage who once found in it his free hunting-grounds, has not yet entirely disappeared from our midst, it requires no great stretch of imagination to picture to our own minds what the researches of the archæologist have disclosed relative to Europe's primeval human era. From evidence of a very varied kind, for example, it has been deduced, that, many ages prior to the earliest authentic historical notices, the British islands were occupied by a human population, even more imperfectly furnished with the means of coping with the difficulties and privations of savage life than the rude tribes of our north-western wilds. Nor was it man alone that then existed in a savage state. Searching amid the records of that debateable land to which the geologist and the antiquary lay equal claim, we learn that vast areas of the British islands were covered at that remote era with the primitive forest; that oaks of giant height abounded where now the barren heath and peat-bog cumber the land; and that even at a period recent, when compared with that primeval era, the fierce Caledonian bull, the wolf, and the wild boar, asserted their right to the old forest glades. The scanty human population was thinly scattered along the skirts of this continuous range of forest, occupying the coasts and river valleys, and retreating only to the heights, or the dark recesses of the forest, when the fortunes of war compelled them to give way before some more numerous or warlike rival tribe. Thus confined

to the open country along the coasts and estuaries, the products of the sea, and especially the edible mollusca, formed no unimportant source for their precarious supplies of food.

Among the interesting illustrations of that common transitional ground on which the geologist and the archæologist meet, few have attracted greater attention than the celebrated Kent's Hole Cave, near Torquay, Devonshire. It has furnished many of the later palæontological specimens which now enrich the collections of the British Museum; and to its disclosures both Buckland and Owen have acknowledged their obligations for some of their most important data. The roof of the cave is clustered with pendant cones of stalactite, and the floor thickly paved with concretions of stalagmite, the accumulations of many centuries. Beneath and embedded in this have been found numerous relics of primitive savage life, intermingled with the remains of the rhinoceros, the hyena, and great cave-tiger, *felis* and *hyena spelæa*, the *ursus spelæus* or cave bear, along with those of other extinct mammals. Among these, though in more superficial deposits, lay traces of the rude culinary practices, illustrative of the habits and tastes of the primeval British savage. These are minutely described in the notes of the Rev. J. McEnery, by whom the cave was first explored. Fragments of sun-baked primitive pottery of the rudest description, rounded slabs of slate of a plate-like form, broken and calcined bones, charcoal and ashes, all served to show where the hearth of the old barbarian Briton had stood; and along with these lay dispersed, flints in all conditions, from the rough pebble as it came out of the chalk, through the various stages of progress, on to the finished spear and arrow-heads and hatchets of flint; indicating that the ancient British troglodyte had here his workshop as well as his kitchen, and wrought the raw material of his primitive manufactures into the requisite tools and weapons of the chase. Other articles, including lance-heads, bodkins, and objects of unascertained uses,—hair-combs or netting tools,—all made of bone, lay amid the accumulated chips and splinters of flint and bone; while nearer the mouth of the cave lay a larger collection of shells of the muscle, limpet, and oyster, indicating that the ancient British aborigines found their precarious subsistence from the alternate spoils of the chase and of the sea. Nor were indications wanting of just such applications of the pearly inner luminæ of the oyster and other shells for the purposes of ornament, as may be observed in the grotesque inlaid carvings of the

Polynesian savage at the present day. The like traces of the primitive habits of the aboriginal allophylise of the northern parts of the British mainland and the neighboring islands have been noted. On exploring, one remarkable example of the subterranean stone dwellings of the ancient population of the Orkneys,—opened by Lieutenant Thomas, R. N., and a party of the Admiralty Survey Service in 1848,—the remains of the charcoal and peat-ashes of the long-extinguished hearth lay intermingled with bones of the horse, ox, deer, and whale; and also with some rude implements illustrative of primitive Orcadian arts; while a layer of shells of the oyster, scallop and periwinkle, the common whelk, the purpura, and the limpet, covered the floor and the adjacent ground, in some places half a foot deep. Of these, the limpet, though common on the coast, formed only a very small proportion of the whole; while the periwinkle was the most abundant. The relative accumulations of the other shells,—differing as they did from the present ratio of the various mollusca on the neighboring shores,—in like manner furnish some slight index of the culinary taste of the aboriginal Briton in those long-forgotten centuries.

It is curious and instructive thus to note even so small a matter as the tastes of the rude barbarian Briton of these long-forgotten centuries, for they supply a means of comparison between the very diverse races of the British Islands in remotely ancient and modern times. The periwinkle is now annually shipped in large quantities from the Scottish coasts to supply the markets of the British metropolis; and at the recent meeting of the British Association at Dublin, Mr. Patterson read a paper before the zoological section, tending to show that such is the demand for that favorite mollusk that it is in danger of being extirpated on the Irish coasts. The quantity of *Litorina*, littoral periwinkles, shipped at Belfast during the four previous years, according to the returns of the Secretary to the Harbor Commissioners of that port, amounted in 1853 to 1,034 bags, containing 181 tons; in 1854 to 2,626 bags, or 459½ tons; and in 1855 to 2,286 bags, or 400 tons; while in 1856 it fell off to 786 bags, or 137 tons. The diminished exports of the last year have not arisen from any decrease in the demand. Such of the mollusca as are not procured for this export trade in the Bay of Belfast are principally collected on the coasts of the County of Down; but the banks from which they were formerly derived are no longer capable of supplying the market, and the deficient quantity is at present brought from Stanraer to Belfast,

and thence reshipped to London. But the attention of the scientific zoologist must now be turned to the habits of these and others of the favorite mollusca, and to the circumstances and seasons in which their ova are developed, otherwise they will speedily be classed among those extinct species which have owed their extirpation to the presence and influence of man.

By such facts the remote past is brought once more into intimate relation with the present; and even in matters so apparently trivial as the nice discrimination of the palate between the *Patella vulgata* and the *Turbo littoralis*, we thus detect a correspondence between the tastes of the rude aboriginal savage of primeval centuries, and the civilized Anglo-Saxon of the British metropolis; though even now it is as a popular favorite, and not as a coveted delicacy, that the periwinkles, and also the larger *Buccinum undatum* or waved whelk, are imported into London, and gathered on the Scottish and Irish coasts.

At Skara, near the house of Skail, in the west mainland of Orkney, one of a singular class of stone structures, designated *Pict's houses*, is remarkable for an immense accumulation of ashes around it, several feet in thickness, plentifully mixed with shells, and the horns and bones of deer and other animals. The building itself has been only very partially explored, but many curious relics have been recovered from the surrounding debris. Among these are circular discs of slate, similar to those found in Kent's Hole Cave, a large tusk of a wild boar, horns of the red deer, and numerous implements made of horn. But not the least curious of these primitive relics was a box—already referred to,—constructed of stones laid together, in the form of a miniature cist, within which lay about two dozen oyster shells, each pierced in the centre with a hole about the size of a shilling. Oysters, it may be remarked, are rare in Orkney. They now occur only at two places, Deersound and Frith, the nearest of which is eight miles distant from Skail; while the osteological remains which accompanied them are those of long extinct Orkney mammals. There is no tradition of the presence either of the deer or the boar in the Orkney islands, unless the names of the Deerness headland and the neighbouring sound be assumed as topographical memorials of the presence of the former within Norse or Saxon times. It is scarcely possible, indeed, to conceive of the existence of such *feræ naturæ* for any length of time, within so small an area, after the occupation of these islands by a human population.

At a period which may be assumed as greatly more modern than the era of those singular subterranean dwellings of primitive centuries, we once more meet with extensive accumulations of oyster shells, with those of the cockle and muscle, among the miscellaneous remains on Romano-British sites of the first centuries of the Christian era, alongside of bones and tusks of the British boar, and of other extinct animals, deer and oxen, the latter the *bos longifrons*, which appears to have been the domesticated ox of early Celtic times. But such Roman deposits of the shells of British mollusca are no longer confined to coast stations; as indeed might be anticipated when it is remembered that the voluptuous Roman esteemed the oysters of the British seas so great a delicacy, in comparison with those of his own mediterranean shores, as to transport them to Italy to add a new zest to his luxurious board. Pliny records the high estimation in which the British oyster was held at Rome, and Juvenal has satirized the excessive refinement of the epicurean taste which could discriminate between the oyster of the Kentish coast, and those of Circæan sands or rocky Leucrine shores:—

“Circæis nata forent, an
 Lucrinum ad saxum, Rutupinove edita fundo,
 Ostrea, callebat primo deprendere morsu;
 Et semel adspecti littus dicebat echini.”—Sat. IV., l. 140.

It may also be noted that the shell of the common snail is found in such quantities on Roman sites, and occasionally also in Anglo-Saxon graves, as to lead to the belief that it constituted another choice delicacy at the tables of those successive colonists of celtic Britain.

Considerable interest has been excited among Danish antiquaries, in recent years, by the explorations of large accumulations of the shells of mollusca, met with at various points on the coasts of Denmark. These, which were at first regarded merely as natural deposits, the remains of the abundant fauna of the neighbouring seas, have proved on examination to come within the province of the archæologist, and special steps have been taken to secure their thorough investigation. Within them have accordingly been found implements of bone, pottery, hatchets formed of stags' horns, &c., and in one examined by the distinguished Danish antiquary, Mr. Worsaae, chiefly consisting of oyster-shells, he found numerous skulls and bones of animals, flint celts and arrow-heads, bones broken, as has been supposed, for the purpose of extracting the marrow, charcoal, and other traces of the early occupants of the Danish coasts.

Similar accumulations of the shells of a species of *Ampullacera*, largely eaten by the New Zealanders, have been observed, along with various marine and other debris, including relics of native art, on deserted sites along the New Zealand shores, although they have not hitherto attracted more than a passing notice. But a greater interest has been excited by extensive deposits of marine shells on different points of the North American coasts, accompanied with evidence of artificial accumulation, not likely to escape the attention of those who in this New World watch with so keen an eye for the slightest traces of an ante-Columbian history. The abundant and large sized edible mollusca of the North American sea-coasts could not fail to attract the notice of an improvident and savage people, dependent on the precarious products of the chase. Large banks of fossil shells occur in many localities, where the changes in the relative levels of sea and land have left these at considerable elevations, and far removed from the modern beach. On such a bed of shells, of the *Gnathodon*—formerly a favorite food of the Indians—the city of Mobile is built; and amid these natural accumulations of older centuries, occasional indications of the former presence of the American aborigines have been met with on the site of the modern city. But the following narrative, by Sir Charles Lyell, in his second tour in the United States, furnishes an interesting illustration of primitive American traces of ancient culinary tastes and habits, analagous to those of Europe already referred to. Describing his journey through a part of Georgia, and his explorations of the lagoons of the Altamaha, Sir Charles remarks: “We landed on the north-east end of St. Simon’s island, at Cannon’s Point, where we were gratified by the sight of a curious monument of the Indians, the largest mound of shells left by the aborigines in any one of the sea islands. Here are no less than ten acres of ground, elevated in some places ten feet, and on an average over the whole area, five feet above the general level, composed throughout that depth of myriads of cast away oyster shells, with some muscles, and here and there a *mediola* and *helix*. They who have seen the Monte Testaceo, near Rome, know what great results may proceed from insignificant causes, when the cumulative power of time has been at work, so that a hill may be formed out of the broken pottery rejected by the population of a large city. To them it will appear unnecessary to infer, as some antiquaries have done, from the magnitude of these Indian mounds, that they must have been thrown

up by the sea. In refutation of such an hypothesis, we have the fact that flint arrow-heads, stone axes, and fragments of Indian pottery have been detected through the mass. The shell-fish heaped up at Cannon's Point must, from their nature, have been caught at a distance, on one of the outer islands, and it is well known that the Indians were in the habit of returning with what they had taken, from their fishing excursions on the coast, to some good hunting ground, such as St. Simon's afforded." This remarkable "Monte Testaceo" of the New World is interesting to us as one of the melancholy memorials of its aboriginal races, already vanished, or hastening to extinction; while in this case the edible treasures of the deep, unlike those of the cleared forests, still remain to supply the means of subsistence, or to furnish coveted luxuries for the tables, of the old Indian's supplanters.

Another interesting class of illustrations of the subject in hand might be derived from tracing in the diverse applications of convenient or graceful univalve and bivalve shells to purposes of ornament or use, affinities in the tastes and ideas of man under the most diverse social conditions, and in ages widely remote from each other. In the mother-of-pearl work, and other applications of shells in modern ornamentation, we have examples of art which find their analogous types in the rudest traces of primitive taste and artistic skill. Still further in the adaptation of many beautiful marine shells as brooches, jewel cases, drinking cups, bowls, and lamps, and even as reliquaries and fonts, we may study the matured development of such applications of these spoils of the ocean to the purposes of personal adornment or of convenient use. But it would tempt us into too wide a field to illustrate all such economic and artistic adaptations of shells from the *fusus antiquus*, still used as a lamp in the humblest cottages of the Zetlanders, to the varieties of the exquisitely graceful and often richly jewelled nautilus cup, or to the *Tridacna gigas* employed in churches for benitiers or holy water stoups, and the still larger bivalve, the *Chama gigas*, which may be seen tastefully adapted, not only as the basin for the ornamental garden fountain, but even as the singularly appropriate and beautiful baptismal font.

Among the charges of medieval heraldry, the scallop shell, *pecten Jacobæus*, plays a prominent part as the ancient badge of pilgrimage. Fuller, in his *Church History*, repeatedly refers to such heraldic bearings; noting, for example, in his own quaint way, in reference to

the arms of St. James' Abbey, Reading : *azure, three scallop shells, or* ; "Here I know not what secret sympathy there is between St. James and shells, but sure I am that all pilgrims who visit St. James of Compostella in Spain (the paramount shrine of that saint,) returned thence *obsciti conchis*, all beshelled about on their clothes, as a religious donative there bestowed on them." On another occasion the old Church Historian suggests no unlikely origin for the escallop as the pilgrims' badge, noting in reference to the Dacres Arms: *gules, three scallop shells, argent* ; "which scallop shells (I mean the nethermost of them, because most concave and capacious), smooth within, and artificially plated without, was oftentimes cup and dish to the pilgrims in Palestine, and thereupon their arms often charged therewith." But though the scallop undoubtedly came to be adopted as the general badge of the palmer, its true heraldic symbolism is referred to St. James the Great ; whence its designation as St. James' cockle shell, *coquille de S. Jacques* and *Pecten Jacobæus* ; and its strict ecclesiastical significance was as the memorial of pilgrimage to the shrine of St. James of Compostella. Southey has translated from the *Anales de Galicia*, the ancient legend of the *Sanctoral Portugues*, relative to the origin of St. James' cognizance, and the miraculous conversion of a Paynim knight of Portugal to the Christian faith ; the truth of which legend is avouched by the Bulls of three successive Popes, which empower the Archbishops of Compostella to excommunicate all who sell the scallop shells to pilgrims except in the city of Santiago. A still more extraordinary and miraculous legend of "Saint Cock and the Holy Hen of Compostella," derived from the *Acta Sanctorum*, and other equally authentic sources, forms the subject of the metrical tale to which the poet Southey has appended the notes above referred to in vindication of Santiago of Galicia's exclusive right to the scallop badge.

The poor with scrip, the rich with purse,
They took their chance for better or worse,
From many a foreign land,
With a scallop shell in the hat for badge,
And a pilgrim's staff in hand.

For the scallop shows in a coat of arms,
That of the bearer's line,
Some one in former days hath been
To Santiago's shrine.

From the adoption of the cognizance of St. James of Compostella as the general badge of pilgrimage, the scallop not only took its place

in the arms of various religious houses, as well as of individual palmers and crusaders of rank: but it was adopted among the insignia of more than one medieval order, and as such re-appeared in a form analogous to the more ancient collars and necklaces of primitive British graves. The knights of the Order of St. Louis, instituted by that royal crusader, Louis IX., received from their escallop badge, the title *du navire et des coquilles*; and those of St. Michael, another French order instituted by Louis XI., wore a golden collar of scallop shells, and thence were styled *chevaliers de la coquille*.

A reference to these relics of medieval pilgrimage would not be complete without noticing the convenient argument resorted to by Voltaire, to upset the evidence adduced by the geologists of the eighteenth century, from the abundance of fossil shells found in the interior of continents, and at high elevations, in proofs of a universal deluge. Compared with the conclusions of the diluvial geologist, even the exploded theories of the sixteenth and seventeenth centuries recovered favor in the estimation of the sceptical philosopher. "Perhaps," says Dr. Plot, in his *Natural History of Oxfordshire*,"* they may have remained from the creation, when God dispersing the seminal virtue of animals through the universe, where it met with an agreeable matrix, as in the waters, there it produced shell fish in their perfection, and where it met with an improper matrix, as in the earth, imperfection only. However, as Gaffarell thinks, it proceeded as far forth as it could, and gave the same shape to stones, earths, &c., as it should have done to the shellfish!" Shifting his ground, however, from such pleasant fancies of older philosophers, which, like the ingenious analogies of the modern author of *Omphalos*, thus easily accounted for fossils as the abortions or mere sports of nature: Voltaire admitted the marine origin and genuineness of fossil shells gathered on the Alps and other elevated inland regions, but with specious sophistry accounted for their presence in such unlikely localities, by affirming that they were eastern specimens dropped by pilgrims returning from the Holy Land! The sophistical argument, could it only be maintained, would furnish evidence of an antiquity and universality of pilgrimage to eastern shrines, such as never entered into the most enthusiastic dream of medieval hagiologist, or monkish chronicler of palmers' adventures.

*Plot's Nat. His. of Oxfordshire, 2d edition, p. 144. N. & Q., 2d series, p. 82, Jan. 31, 1858.

To the absence of all knowledge of the metallurgic arts among primitive nomade tribes, or to the want of the metals themselves, as among the natives of the Australasian Archipelago, may be ascribed many of the economic uses to which sea shells have been so widely applied. They illustrate in a striking manner the adaptability of man to the most varied physical conditions of the globe, and frequently exhibit the imperfectly developed reasoning faculties of the savage, working within narrow limits, akin to the instincts of the lower animals. Thus we find curious accidental affinities between the rude primitive arts of the European savage in the dim dawn of the ancient world's prehistoric centuries, the equally rude arts of the Carib or the Guanche of the Antilles when brought to the knowledge of the old world in the fifteenth century, and the simple devices of the Polynesians occupying the Volcanic, or Coral Islands of the Southern Ocean, first visited by Europeans in the eighteenth century. Owing to the absence, on many of the islands of the Australian Archipelago, not only of metals, but even of stone and wood, marine shells form the most important available material alike for economic utility and ornament; and the same appears to have been the case, to a great extent, among the Indians of the Antilles in ante-Columbian centuries. The extreme beauty of many of the marine productions of the tropics and the Southern Ocean, sufficiently accounts for their adoption for personal adornment, as in the case of the *Cypræa aurantia*, or beautiful orange cowry, of which specimens are rarely to be met with undrilled, owing to its use as a favorite ornament of the natives of the Friendly Islands. But these spoils of the ocean acquire an additional value, when, as in Central Africa, or among the American Indians around the head waters of the Mississippi, they have all the added virtues which rarity confers. Dr. Livingston, when leaving the Belondas after a brief sojourn among them, thus records his friendly parting with their chief: "As the last proof of friendship, Shinte came into my tent, though it could scarcely contain more than one person, looked at all the curiosities, the quicksilver, the looking-glass, books, hair brushes, comb, watch, &c., &c., with the greatest interest; then closing the tent, so that none of his people might see the extravagance of which he was about to be guilty, he drew out from his clothing a string of beads, and the end of a conical shell, which is considered, in regions far from the sea, of as great value as the Lord Mayor's badge is in London. He hung it round my neck, and said,

'There, now, you have a proof of my friendship.' My men informed me that these shells—a species of conidæ—are so highly valued in this quarter as evidences of distinction, that for two of them a slave might be bought, and five would be considered a handsome price for an elephant's tusk worth ten pounds." But even more curious is it when such sea-wrought treasures are found employed not as the ornaments, but as the substitutes for dress, as among the natives of Darnley Island, an island of volcanic origin, off the coast of New Guinea, visited by Her Majesty's ship *Fly* in 1842-6. The natives are described as fine, active, well-made fellows, rather above the middle height, of a dark brown or chocolate color. "They had frequently almost handsome faces, aquiline noses, rather broad about the nostrils, well-shaped heads, and many had a singularly Jewish cast of features. * * * They were entirely naked, but frequently wore ornaments made of mother-of-pearl shells, either circular or crescent-shaped, hanging round their necks. Occasionally, also, we saw a part of a large shell, apparently a *cassis*, cut into a projecting shield-shape, worn in front of the groin." Among these islanders also, the larger sea shells have to perform the functions which are so abundantly provided for, in the western Archipelago, by the Calabash. Their adaptability for this purpose, indeed, naturally suggests such an application of them wherever they abound, as in the case of the *Buccinum dolium*, frequently in use by the fishermen and mariners of the tropics as a convenient utensil with which to bale their boats. So in like manner the graceful trumpet-like form, and richly variegated colors, of the larger species of the Tritons, such as the beautiful *Triton variegatus*, render their early and independent application as horns or musical instruments, alike by the islanders of the Pacific and the Carribean sea, sufficiently natural and obvious.

Though the rude natives of the Antilles, when first visited by the Spaniards, possessed some natural advantages over the inhabitants of the volcanic and coral islands of the Pacific, yet the large marine shells with which the neighboring seas abound, constituted an important source for the raw material of their primitive implements and manufactures. The great size, and the facility of workmanship of the widely diffused *pyrulæ*, *turbinella*, *strombi*, and others of the larger shells, have indeed led to their application, wherever they abound among uncivilized nations, to numerous purposes elsewhere supplied from other sources. Of these the Charibs made knives,

lances, and harpoons, as well as personal ornaments; while the mollusk itself was sought for and prized as food. The *strombus gigas* is still fished for the table off the Island of Barbadoes, and numerous ancient weapons and implements made from its shell have been dug up on the island. Pearls also, of a beautiful pink color, are occasionally formed by this shell-fish, and from their rarity are greatly valued; while the modern adaptation of the ancient cameo-engraver's art to shells, as well as their employment in the production of the finer porcelain and miniature statuary, have led to those beautiful marine products of the American tropics being more sought after, in Europe, for the manufacture of personal ornaments and other works in the highest class of art, even than the coveted secretions of the *meleagrina*, brought from the pearl fisheries of Ormus or Ceylon, or from the Bahrein Islands in the Persian Gulf.

Thus the necessities of man in the savage state, and the ever-varying devices to gratify the luxurious exactions of civilization, have equally contributed to the ingenious application of the shells, and other products of molluscous animals, to the use of man. Under this head we might refer to the *murex trunculus* of the Mediterranean, the source, as is believed, of the celebrated Tyrian purple of the ancient world; and to others of the genus *purpura*,—such as the *purpura lapillus*,—which have also been turned to use, by the dyer. The various pearl-producing species of the *meleagrina*, in like manner illustrate the refinements and excesses of ancient and modern luxury. The orient pearl of the Egyptian queen, “The treasure of an oyster,” and the occidental pearl of Philip II., from St. Margaritas, the pearl island of our New World, which weighed 250 carats, and was valued at 150,000 dollars; or again the still more costly pearl of Louis XIV., brought from Catifa on the Arabian Coast, by his excentric protégé, Jean Baptiste Tavernier, the son of an Antwerp engraver whom the Grand Monarch created Baron d'Aubonne, and who paid for his Arabian pearl the almost incredible sum of £110,000. Great as are the sums still annually expended on the produce of the pearl fisheries for the gratification of eastern and western luxuriance of ornamentation, the Antwerp adventurer has secured the palm for the licentious Court of Louis le Grand. The most abundant annual pearl harvest in the world is believed to be the product of the Bahrein Island fisheries, in the Persian Gulf, but the revenue of this falls somewhat short of £100,000 sterling, even in the most prolific years. Pearls to the

value of from forty to sixty thousand pounds sterling are annually imported into Britain. France and other countries of Europe also receive large annual importations of the same costly marine production; while oriental luxury absorbs a still greater amount. Ingenious means are accordingly resorted to for supplying the enormous demand. The Chinese practice one successful mode, by inserting into the living animal a silver wire with a nucleus for the pearl to form upon. Still further improving on this process of making the living pearl-muscle an obedient worker in their service, they not only produce pearls of various sizes and qualities by the introduction of pieces of wood, baked earth, &c., into the living animal, which it covers with the nacreous deposit which converts them into marketable pearls; but also small metal figures of Buddha, in the sitting posture in which the divinity is usually portrayed, are treated in a similar manner. These miniature pearl-encased penates are highly valued by the Chinese as charms, and produce large prices. But while thus dwelling on the prolific pearl productions of southern seas, it must not be forgotten that Britain has also her pearl-producing bivalve. The river pearl-muscle, *unio margaritiferus*, is found in various Scottish rivers, but chiefly in the Tay. There was formerly an extensive pearl-fishery extending from Perth to Loch Tay, and the pearls sent from thence from 1761 to 1764 have been estimated in value at £10,000. Single pearls are still procured from the Tay, which readily sell at from one to two pounds sterling.

The discovery of the economic use of the larger *strombinæ* as an important material in the manufacture of porcelain, as well as the introduction of the practice of working camei on these shells, and the increasing demand for this beautiful and artistic class of personal ornaments, have united to create a novel trade in the gigantic tropical shells. Immense quantities of the *strombinæ* are now annually brought to Europe, and so many as three hundred thousand shells of the *strombus gigas* and *strombus pugilis* have been imported from the Bahamas to Liverpool alone, in a single year.

Did the object of this paper require a minute consideration of the modern economic applications of shells and other marine products, it might be greatly extended by reference to the varied applications of mother-of-pearl shells to all the purposes of inlaying, carving, and decorating. The value of the shells imported in recent years into Britain for this class of manufactures alone, has fallen little short,

annually, of £40,000 sterling. The uncut cameo shells of various kinds, including the products of widely distant seas,—*e. g.*, the *cassis rufa*, or bull's mouth; the *cassis Madagascariensis*, the black helmet, or queen couch; the *cassis cornuta*, or horned helmet; the *strombus gigas*, or fountain shell: the *strombus pugilis*, and the *pyrula carnaria*, are annually imported to the value of upwards of £3,000 sterling, and, in the hands of the cameo engraver, are speedily converted into valuable works of art. But the modern application of marine shells for the purposes of ornament and utility, bring them within the range of most modern trades. Buttons, studs, knife-handles, paper-cutters, pen-holders, card-cases, parasol handles, card-counters, jewel and needle cases, snuff-boxes, thimbles, richly carved and jewelled brooches, beads, necklaces, and artificial flowers, are all made from these varied spoils of the sea. The ingenious Chinese turn them to numerous uses, one of the most noticeable of which is to supply a substitute for glass. Various species of the *placuna*, as the *p. sella*; and *p. placenta*, being thin and translucent, are used in China for glazing windows and for lanterns; while the powdered dust of the same shells furnish the silver pigment for their water-color drawings.

While thus noting with interest the development of novel and varied modern arts which turn the spoils of the ocean to such diverse uses; and lead to the transport of the gigantic marine shells alike of the Indian Ocean and the Antilles, to the marts of the old world, to contribute to European luxury and refinement: a greater interest attaches to the evidences, still traceable, of an ancient trade in the same products of the Florida Gulf, carried on among the widely scattered tribes and nations of the New World, before its discovery by Columbus. Reference has already been made to the varied uses to which these tropical shells were applied by the insular Indians of America, when first discovered by the Spaniards, but their economic employment was not limited to the inhabitants of the islands. Abundant evidence exists to prove that they were greatly valued, and even regarded with superstitious reverence, both by the more civilized nations of the neighboring mainland around the Gulf of Florida, and also by the rude Indian tribes even so far north as beyond the shores of our Canadian Lakes. In one of the singular migratory scenes of the ancient Mexican paintings, copied in Lord Kingsborough's "Mexican Antiquities,"* from the Mendoza Collection, preserved among

* Lord Kingsborough's "Mexican Antiquities," Vol. I., plate 68.

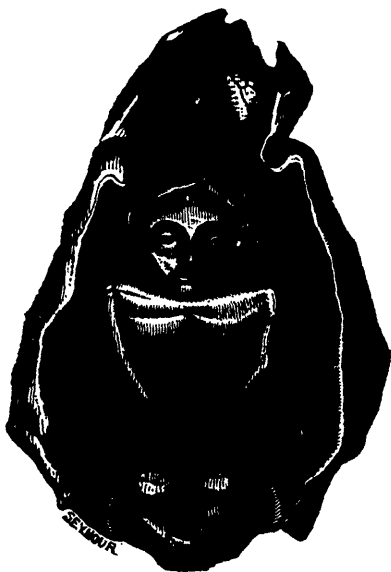
the Selden MSS. in the Bodleian Library, at Oxford, a native figure is represented carrying a large univalve shell in his hand. He is barefooted, and dressed only in a short, spotted tunic, reaching to his loins. In his right hand he bears a spear, toothed round the blade,—it may be with inserted flints or points of obsidian,—while he holds the large shell in his left hand. A river which he is passing is represented by a greenish stripe winding obliquely across the drawing, and his track, as indicated by alternate footprints has previously crossed the same stream. On this trail he is followed by other figures nearly similarly dressed, but sandalled, and bearing spears and large fans; while a second group approaches the river by a different trail, and in an opposite direction to the shell-bearer. Other details of this curious fragment of pictorial history are less easily interpreted. An altar, or a temple, appears to be represented on one side of the stream; and a highly colored circular figure, like a shield, on the other, may be the epitomised symbol of some Achæan land or Sacred Elis of the New World. But whatever be adopted as the most trustworthy interpretation of the ancient hieroglyphic painting, its general correspondence with other migratory depictions is undoubted; and it is worthy of note, that, in some respects, the most prominent of all the figures is he who is represented as fording the stream, bearing one of the large tropical univalves in his hand.

The evidence which such a remarkable native record affords of an importance attached to the large sea shells of the Gulf of Mexico, among the most civilized of the American nations settled on its shores, is well deserving of notice; but the same class of tropical marine products acquire a new and still more important significance when they are met with among the relics pertaining to Indian tribes settled in the northern regions of this continent, some of them two to three thousand miles distant from the native habitat of the mollusca by which these coveted treasures of the ocean are produced, and separated by hundreds of miles from the nearest sea coast.

Tracing them along the northern route through the Mississippi and Ohio valleys, these shells have been found in the ancient graves of Tennessee, Kentucky, and Indiana, and northward to the regions of the Great Lakes. Dr. Gerard Troost, in a communication to the American Ethnological Society,* has described a singularly

* Transactions Amer. Ethnol. Soc., Vol. I. pp. 355—365.

interesting series of disclosures of ancient relics and sepulchral remains in Tennessee. The crania of the graves were characterized by remarkable artificial compression, as in the example figured by Dr. Morton, plate 55, *Crania Americana*. These ancient graves abounded with relics, "Cases, trinkets, and utensils; all of a very rude construction, and all formed of some natural product, none of metal." From an examination of these, Dr. Troost was led to the conclusion that the race to whom they pertained came from some tropical country. Numerous beads were formed of tropical marine shells of the genus *marginella*, ground so as to make a perforation on the back, by means of which they could be strung together for purposes of personal ornament. Plain beads were made from the columellæ of the *strombus gigas*; and such columellæ were found worn to a uniform thickness, perforated through the centre, and in all stages of manufacture, from the rude state in which such are found on the island shores of the West Indies, to their condition as perfected beads and links of the much prized *Wampum*. But another conchological relic of the same locality possesses a much greater



interest. Dr. Troost describes and figures various rudely modelled and sculptured idols found in the same locality; from some of which

he was led to assume the existence of Phallic rites among the ancient idolators of the Ohio valley. One of these specimens of aboriginal sacred sculpture was accidentally discovered in ploughing a piece of land newly reclaimed from the forest. The utensils found in the Tennessee graves have all been made of stone or obsidian; and the greater number of the idols are in like manner sculptured in stone of various kinds and degrees of hardness. But the figure now referred to is made of clay and pounded shells, and, like other examples which have been met with, has been hardened in the fire. It represents a naked human figure, kneeling, with the hands clasped in front; and when found, it still occupied as its primitive niche or sanctuary, a large tropical shell, (*Cassis flammaea*), from which the interior whorles and columella had been removed, with the exception of a small portion at the base, cut off flat, so as to form a pedestal for the kneeling figure. The special application of this example of the tropical cassides, thus found so remote from its native habitat, adds a peculiar interest to it, as manifestly associated with the religious rites of the ancient race by whom the spoils of southern seas were transported inland, and converted to purposes of ornament and use.

The discovery of examples of similar tropical relics, or of articles of personal ornament fashioned from them, when found to the north of the Great Lakes, is still more calculated to excite surprise, though the chief interest they possess is from the light they are calculated to throw on the traces of ancient migration, or of traffic between the north and south, in ages prior to the displacement of the Red Man by the European. Two of such large tropical shells, both of them specimens of the *pyrula perversa*, the native habitats of which are the Antilles, and the Bay of Campeachy on the main land, have been presented to the Canadian Institute; not as additions to its specimens of native conchology of the tropics, but as Indian relics pertaining to the great northern chain of fresh water lakes. The first of these was discovered on opening an Indian grave-mound, at Nottawasaga, on the Georgian Bay, along with a gorget made from the same kind of shell. The second example was brought from the Fishing Islands, near Cape Hurd, on Lake Huron, and a third specimen, now the property of James Beaty, Esq., Toronto, partially honey-combed by age and decomposition, constituted one of the contents of a large sepulchral depository in the same Northern Lake

district. It was found lying at the head of one of a group of Indian graves, along with a copper kettle, and other relics; and belongs, I believe, to an interesting series of Indian relics, discovered, along with sepulchral remains, in 1846 and 1847, in different parts of the district lying between Georgian Bay and Lake Simcoe, and described by Dr. E. W. Bawtree, in the Edinburgh Philosophical Journal for July, 1848. In one pit, about seven miles from Penetanguishene, three large couch shells were found, along with twenty-six copper kettles, a pipe, a copper bracelet, a quantity of shell beads, and numerous other relics. The largest of the shells,—a specimen of the *pyrula spirata*,—weighed three pounds and a quarter, and measured fourteen inches in greatest length. But a piece had been cut off this and another of the large shells, probably for the manufacture of beads. It exhibited abundant marks of age and frequent handling, its outer surface being quite honey-combed, while the inside retained its smooth lamellated surface. Another sepulchral depository, about two miles from the former, yielded a large number of shell-beads of various sizes, along with other relics; a third, discovered on elevated ground in the neighboring Township of Oro, contained twenty-six copper kettles, underneath one of which lay another of the large tropical shells, seemingly carefully packed in beaver-skins and bark; while in a fourth cemetery in the same district, among copper arrow-heads, bracelets, and ear-ornaments, pipes of stone and clay, beads of porcelain, red pipe-stone, &c., sixteen of the same prized tropical univalves lay round the bottom of the pit arranged in groups of three or four together. Numerous skeletons, or detached skulls and bones promiscuously heaped together along with these relics, attested the sepulchral character of the depository. The kettles also had been rendered useless by the blows of a tomahawk, according to the invariable practice of the Indians with the offerings deposited alongside of their dead. In more than one of these cemeteries there were also found iron axes and other relics which sufficed to fix the date of some, at least, of the interments subsequent to intercourse having been established between the Indians of this district and Europeans. More recently, in 1856, an extensive Indian cemetery was disturbed in the same locality, and found to correspond very closely to those already described. About six miles from Orillia, where the North River crosses the Coldwater road, which is on the line of the old portage between Lake Couchiching and the Georgian Bay, it runs through a valley with low heights rising on either side.

On the northern height, about a quarter of a mile from the road, the Indian relics now referred to were found. Many skeletons were disturbed, and along with these were numerous specimens of native art, beads and other ornaments of bone, some curious rings made from the vertebræ of the sturgeon; and also glass beads and copper kettles, some of the latter with handles and rims of iron. Beside these miscellaneous relics lay two of the large univalve shells of the tropics. In this, as in the former cases, the traces of European art fix the date of the deposit at a period subsequent to the discovery of America by the Spaniards, and in all probability to the explorations of the French among the Hurons of this district in the early part of the seventeenth century. It is not improbable, however, that some, at least, of the shells, may have been preserved and handed down from one generation to another as *great medicines*. One example which I have examined, found lying at the head of a skeleton in an Indian grave on Georgian Bay, has the upper whorles removed, so as to expose the internal canal. Five lines, or notches, are cut on the inner face of the canal, and it is perforated on the opposite edge, showing in all probability where the wampum, scallock, or other special decoration of its owner was attached. It also exhibits abundant traces of its long and frequent use. The surface is smooth and polished, as if by constant handling, except where it is worn off, or decayed, so as to expose the rough inner laminae of the shell: and all the natural prominences are worn nearly flat by frequent attrition. The specimen in the collection of the Canadian Institute, brought from the fishing islands on Lake Huron, is also cut and greatly worn, and exhibits abundant traces of long exposure.

Other examples of these large tropical shells which have been found in Canada, and also in the State of New York, were probably deposited at an earlier date: but all, or nearly all, appear to have been offered as tributes in honor of the dead. The modes of sepulture of the different tribes greatly vary, and some of their rites are peculiarly characteristic, but all of them included the deposition of valued gifts, or the favorite weapons and implements of the deceased, alongside the corpse. One manner of disposing of the dead consists in placing the body on a scaffold, or raised platform, around which the last gifts and offerings are suspended, after they have been rendered unserviceable to the living by some process of injury. This constitutes the final sepulchral rite of the Chinooks, Kliketats, Cou-

litz, and all the Indians of the Columbia River. The most common and characteristic elevated bier of these western tribes is the canoe, raised on poles, and decorated with relics pertaining to the deceased; and with the offerings of his friends. These Indian biers are invariably erected on an isolated rock or island, or some equally inaccessible spot, so as to be beyond the reach of beasts of prey, and are the final resting places of the dead. Mr. Paul Kane has a highly characteristic oil painting of the cemetery of the Couliutz Indians, executed by him from sketches taken at the spot, on the Couliutz river, where these singular canoe-biers are erected on a small island. Among the Babeens this mode of scaffolding the dead is confined to females, while the males are invariably burned. But different ideas regulated the final honors paid to the dead among the eastern tribes settled around the great lakes. Among the Pottowatamays, the Menamonies, the Ottawas, the Indians of the Six Nations, and other tribes, the practice prevailed of interring their dead in large sepulchral depositories, into which the bones were promiscuously gathered, after the final honors and sacrifices had been offered to the deceased. This custom fully accounts for the large ossuaries brought to light within the original localities of these tribes; and as the custom of depositing the favourite weapons and implements of the deceased along side of him, is common to nearly all savage people, and appears to have been universal among the Indians of the new world, this shews the origin of the interesting objects of native art which many of these cemeteries have disclosed.

About the year 1837, one of a class of extensive ossuaries, which have furnished many relics pertaining to the period of ancient Indian occupation of the Canadian clearings, was accidentally discovered in the township of Beverly, twelve miles from Dundas. An elevated ridge, running from north to south, is covered by an old growth of full-grown beech trees, standing somewhat widely apart; and across this, and consequently running from east to west, a series of deposits of human bones were exposed, ten or eleven of which were opened. They contained an immense number of bones, of both sexes and of all ages, promiscuously heaped together, and interspersed with many Indian relics, which furnished the chief temptation to their exploration; and from their extent and the evidence they disclosed of repeated interments, they undoubtedly indicated a permanent location of the tribe, of which so many members had there

found their last resting place. One of these remarkable sepulchral depositories which was carefully explored, was found to measure forty feet in length, with a breadth of eight feet ; and throughout this entire area it consisted, to a depth of six feet, of a solid mass of human crania and bones. Along with numerous specimens of clay pipes, beads, amulets of red pipe stone, copper bracelets, and personal ornaments of different kinds, obtained from those Beverly osuaries, there were found various shell-beads, a worked gorget made from a large sea-shell, with the original nacre of red not entirely gone, and two entire specimens of the large tropical sea-shells already referred to. One of these furnishes another specimen of the *pyrula perversa*, and the other is described by Mr. Schoolcraft, as the *pyrula spirata*, a shell said to be peculiar to the western coasts of Central and South America. The beads found along with these tropical univalves, and made apparently from others of the like kind, appear to have corresponded to those of a remarkable southern discovery in the Grave Creek mound, Virginia, described by Mr. Schoolcraft in the Transactions of the American Ethnological Society.

The interest which pertains to such Indian relics, manifestly depends on the fact of thus discovering along the shores of our great inland chain of fresh-water lakes, specimens of the large sea-shells of the Atlantic and Pacific Coasts of Central America, and of the West Indian Isles. The attractions offered by this and other allied species of the large and beautiful tropical shells are sufficiently apparent, and, as we have seen, are by no means limited to the untutored tastes of the American Indian, nor to the products of the Mexican coasts. Their employment in the construction of vessels for ordinary use has already been referred to ; but other and more important applications of some of them to special and sacred uses among the inhabitants of the old world seem to offer illustrations more in accordance with the discoveries here referred to. In India, China, and Siam, this is especially the case. There the *Pyrum*, and others of the large and beautiful shells of the Indian Ocean, of the species *Turbinella*, are highly prized by the natives of the neighbouring districts ; and this is especially the case with a sinistrorsal variety found on the coasts of Tranquebar and Ceylon, and made use of by the Cingalese in some of their most sacred rites.

The greater number of the genus *Pyrula*, are dextrorsal, or rise in a spiral line from right to left, so as to present the mouth on the right side when held with the elongated canal or tube downward. Such is not the case, however, with the two species referred to as belonging to the American continent, and hence apparently the origin of the name given to the more abundant of these, the *Pyrula Perversa*. But in the East Indian Seas, examples of sinistrorsal monstrosities of the native species are occasionally met with, and are highly prized. Such reversed shells of the species *Turbinella*, are held in special veneration in China, where great prices are given for them. They are kept in the pagodas by the priests, and are not only employed by them on certain special occasions as the sacred vessels from which they administer medicine to the sick; but it is in one of those sinistrorsal turbinellæ that the consecrated oil is kept, with which the Emperor is anointed at his coronation. It is probably in reference to this custom that Meuschen, who considered what is now recognised as the full grown shell a different variety from the smaller one,—called by him the *Murex Pyrum*,—gave to it the name of *Murex Sacrificator*.

These shells are often curiously ornamented with elaborate carvings, fine specimens of which are preserved in the British Museum. In the Synopsis of the Zoological Galleries in that Museum, it is remarked, “The *Turbinellæ* from their form have been called turnip shells, or rape shells. These are often used as oil vessels in the Indian temples, and for this purpose are carved and otherwise ornamented, as may be seen by some in the collection. When reversed, they are much sought for by the Ceylonese, and highly valued; one of these reversed clamp shells is in this collection. They are said to sell for a very large price in Ceylon and China.”

The *Turbinella Pyrum*, which is one of the most prized of these Ceylonese *Turbinellæ*, is also an article of great importance in the ornamental manufactures of the East Indies, and is so extensively employed that upwards of 4,300,000 shells have been exported in a single year, from Ceylon to the ports of Calcutta and Madras. These are chiefly employed in the manufacture of armlets, and anklets, often highly ornamented, and generally known by the name of *bangles*. The process at the apex of each shell is also made into a button or bead. These are the *Krantahs*, necklaces of which have been so commonly worn by the Sepoys in the East India Company's service, as almost to be deemed a regular part of their uniform.

Some of these personal ornaments of the modern Hindoo, manufactured from the solid porcellaneous *pyrum*, closely correspond to the relics of similar construction found in ancient American grave mounds, and supposed by their first discoverers to be wrought in ivory. The chief value of the latter, however, arises from their discovery in latitudes altogether remote from the native habitat of the living mollusk, and the consequent traces which they disclose of ancient migration, or of trade and traffic between widely severed tribes of the American continent. While the tropical shells thus met with in the regions of the Great Lakes may be assumed to represent one among the prized treasures of southern latitudes, the north had its coveted mineral wealth, of the diffusion of which throughout the whole tribes of the northern continent we have abundant evidence from various sources, and referring to very different periods. Among the relics entombed in the sacrificial mounds of the Mississippi valley have been found objects formed from the mica of the Alleghanies, and the native copper of Lake Superior, mingling with others modelled from the tropical fauna of the southern continent.

It is in the western region of the great lakes that the mineral treasures are found which attracted the attention of the Indians long before the discovery of this continent by Columbus or Cabot, and, in that prehistoric period of America, furnished the chief element of traffic, and the source of intercourse between the north and south. The traces of mining operations afford abundant proof of the working of the copper by the Indians of Lake Superior, without any skill in the metallurgic arts, and indeed without any precise distinction between the copper which they mechanically separated from its native matrix, and the unmanageable stone or flint out of which they were ordinarily accustomed to fashion their spear and arrow heads. This metal, Mr. Schoolcraft remarks, "was employed by the Indians in making various ornaments, implements, and instruments. It was used by them for arm and wrist bands, pyramidal tubes, or dress ornaments, chisels and axes; in all cases, however, having been wrought out exclusively by mere hammering, and brought to its required shape without the use of the crucible or the art of soldering. Such is the state of the manufactured article, as found in the gigantic Grave Creek mound, and in the smaller mounds of the Scioto Valley, and wherever it has been scattered, in early days, through the medium

of the ancient Indian exchanges. In every view which has been taken of the subject, the area of the basin of Lake Superior must be regarded as the chief point of this intermediate traffic in native copper. In exchange for it, and for the brown pipe-stone of the Chippewa River of the Upper Mississippi, and the blood-red pipe-stone of the Coteau des Prairies west of the St. Peters, they received certain admired species of sea-shells of the Floridian Coasts and West Indies, as well as some of the more elaborately and well-sculptured pipes of compact carbonate of lime, grauwacke, clay-slate, and serpentines, of which admirable specimens, in large quantities, have been found by researches made in the sacrificial mounds of the Ohio Valley, and in the ossuaries of the Lakes. The makers of these may also be supposed to have spread more northwardly the various ornamented and artistic burnt-clay pipes of ancient forms and ornaments, and the ovate and circular beads, heart-shaped pendants and ornamented gorgets, made from the conch, which have received the false name of ivory, or fine bone and horn. The direction of this native exchange of articles appears to have taken a strong current down the line of the great lakes, through Lakes Erie and Ontario, along the shores of the States of the Ohio and New York, and into the Canadas. Specimens of the blood-red pipe-stone, wrought as a neck ornament, and of the conch bead pendants and gorgets, &c., occur in the ancient Indian burial grounds, as far east as Onondaga and Oswego, in New York, and in the high country about Beverly, and the sources of the several small streams which pour their waters into Burlington Bay, on the North shores of Lake Ontario." *

The conchological relics now referred to are of peculiar value, from the illustration they afford of the area embraced by this ancient traffic between the north and south. Whatever doubt may be thrown on the derivation of the specimens of ancient native manufacture, or of the copper found in sepulchral and other deposits in the Southern States, and in Central America, no question can exist as to the tropical and marine origin of the large shells exhumed not only in the inland regions of Kentucky and Tennessee, but in the northern peninsula lying between the Ontario and Huron Lakes, or on the still remoter shores and islands of Georgian Bay, at a distance of upwards of two thousand miles from the coast of Yucatan, on the main land: the nearest point where the *pyrula perversa* is found in its native locality.

* "History, &c., of Indian Tribes," vol. 1, p. 67, 68.

It is obvious from the large and cumbrous size of the American *strombi* and *pyrulae*, that they must have possessed some peculiar value or sacredness in the estimation of the Indian of the northern regions, to encourage their transport from so great a distance, through regions beset by so many impediments to direct traffic. Their transport to Canadian Lake districts appears to have been practised from a very remote period. Mr. Schoolcraft describes specimens of the *pyrula perversa* obtained by him in these regions, in an entire state, among traces of Indian arts and customs: "deemed to be relics of the ante-Cabotian period;" and from the circumstance of their discovery in sepulchral mounds, and laid at the head of the buried chief, with his copper kettle and other peculiarly prized relics, the *pyrula* of this continent would appear to have been held in no less veneration by the natives of America, than the Asiatic species now are by the Cingalese, or the more civilized and cultivated priests of China. Their appearance when found among sepulchral deposits, as already described, exhibits abundant traces of constant handling in the uses to which they were applied. But whatever these were, we can scarcely doubt, that they were connected with Indian superstitions, and not with any purposes of mere practical utility, such as they sufficed for with the ancient inhabitants of the Antilles, and as are provided for in like manner; by means of other species of similar large shells of the Southern Ocean, among the Australian Islanders. It seems not improbable that the gigantic univalves thus brought from the Gulf of Mexico, and introduced among a people familiar only with the miniature shells of the fresh-water mollusks, owed not a little of the veneration in which they appear to have been held, to the natural wonder with which the untutored mind is apt to regard whatever greatly exceeds the scale of its ordinary knowledge. Magnitude, rarity, and difficulty of acquisition, give their chief value to many of the treasures of civilized, as well as of savage life. In all probability the *pyrulae* thus venerated by the ancient Indians of Canada West, closely corresponded to the *Conopas*, or rude Penates of the Peruvians, as described by Rivero and Von Tschudi. Any singular or rare object in nature or art seems to have sufficed for one of these Peruvian minor deities, amulets, or charms. "Every small stone or piece of wood of singular form was worshiped as a Conopa. These private deities were buried with their owners, and generally hung to the neck of the dead."

Trifling as such relics of Indian superstition, or of the rude traffic of barbarous tribes, may appear, they are not without some value to us, both in regard to the light they throw on the ancient history of this continent, and also, perhaps, in respect to some of the forms in which the progressive civilization of its new occupants may be modified by the same physical causes which largely controlled the ancient intercourse between north and south, and between west and east.

In no respect is the continent, to which these relics pertain, more strikingly diverse from that of Europe, than in its broadly-marked physical characteristics. The greatest diameter of Europe is from east to west, so that its chief area of occupation is embraced within a nearly similar range of temperature. Yet along with this great uniformity of climate, its surface is broken up by mountain ranges, its coasts are indented by bays, estuaries, and land-locked seas, and its border tribes and nations are isolated by means of peninsulas and islands, so that, amid all the resources of modern civilization, the individuality of nations has been preserved to a remarkable degree, and we still study among its diversified populations the relics of people and languages pertaining to ante-Christian centuries. Altogether different is it with the American continent, where the great levels are so little broken, that not only the boundaries of properties and townships, but even of states, provinces, and dominions, are drawn without reference to any natural features of the country, except in such cases as the great lakes, the St. Lawrence, the Rio Grande, and very partially in that of the Mississippi. The most important navigable river of Europe, moreover, flows from east to west, in one parallel of latitude, and through a population in all ages rendered somewhat homogeneous by influences of climate and all external circumstances; but the Mississippi and the Missouri together flow through 20° of latitude, with all the varieties of climate still further increased on a continent which extends its widest area within the Arctic circle, and where consequently the curves of equal temperature, in the isothermal lines drawn across the two continents, approach as much towards the equator in the meridian of Canada as they recede from it in that of the west of Europe.

Looking back into the most ancient history of Europe, we find that that continent also had its northern mineral treasures: its tin, pertaining to the Kassiterides, or British Islands, and its amber, found then as now in most abundance on the shores of the Baltic. But it was by maritime intercourse, through the agency of the Phœnician

merchantmen of Asia, that the north of Europe exchanged its mineral treasures for the coveted possessions of regions lying towards the tropics. Herodotus, in the earliest known reference to the British Isles as the source of tin, refers to them only to declare his total ignorance of them; and in noticing the rumour that amber is brought from the northern sea in which they lie, he says:—"I am not able, though paying much attention to the subject, to hear of any one that has been an eye witness that a sea exists on that side of Europe." Nor did this singular isolation, so peculiarly characteristic of Europe, disappear even in the later ages of Roman rule. Dr. Arnold, in contrasting our knowledge of the globe with the ignorance of earlier ages, remarks: "The Roman colonies along the Rhine and the Danube looked out on the country beyond those rivers as we look up at the stars, and actually see with our eyes worlds of which we know nothing."

The Indian relics now specially referred to, when considered in connexion with the copper weapons, implements and ornaments of Southern grave-mounds, appear to throw a light on the past history of the American continent in its antehistoric ages, and to show it then as now, as clearly distinct in political as in physical characteristics from ancient or modern Europe. Europe never could be for any length of time the area for a nomadic population. In America, with its great unbroken levels, even the home-loving Anglo-Saxon becomes migratory, and seems to lose in a degree his old characteristic of local attachment. In Europe the diverse ethnological elements are still kept apart by its physical features. The Iberian of Ante-Christian centuries survives in the Pyrenees, and the Gaul and Briton of the first century find still their representatives on the coasts of Brittany, and in the mountains of Wales. But an aboriginal population, marked by many nearly homogeneous characteristics, appears to have occupied the entire area of the American continent; and now when its ancient tribes are being displaced by the colonists that Spain, England and Ireland, France, Italy and Germany, Poland and Hungary, pour unceasingly on its shores: the distinctions of Iberian, German, Celt and Saxon, which have survived there for well nigh two thousand years, appear to vanish almost with the generation that sets foot on the shores of the new world. When we consider how largely all European history has been affected by the peninsular character of Greece and Italy, and by the insular character of Britain, as well as

in its modern centuries by the isolation of Spain, France, Denmark, and the Scandinavian Peninsula, we cannot fail to perceive in this a key to some of the contrasting elements of fusion already noticeable among the people of European descent throughout the American continent. May we not further draw from this important inferences as to the causes of those homogeneous characteristics noticeable among the whole aboriginal tribes of the new world, to which an undue importance has been attached by American ethnologists, from their supposed bearing on the great question of human origin and descent from one or more centres of creation.

ON THE RELATION OF QUANTITY TO THE ÆSTHETIC SENTIMENT.

BY THE REV. DAVID INGLIS, M.A.

Read before the Canadian Institute, March 6th, 1858.

In compliance with the invitation of the Council for communications from the members at large, I venture to submit to the Canadian Institute a few remarks on the relation of Quantity to the Æsthetic Sentiment, drawing the illustrations mainly from the vegetable kingdom; chiefly with the view of inviting our consideration to a subject which has recently rewarded the study of scientific observers by results of great interest and value.

Numbers have a wondrous significance in every department of nature; and though the sensation of beauty may be without effort on our part, nevertheless the element of numbers enters largely into those arrangements, recurrences, and proportions which are so essential to all the forms that beauty loves. The eye is delighted with the foliage of one of our forest trees, clothed in the freshness of its early summer tints. A careless gazer may see no arrangement in the tree, but a shapeless mass of umbrageous beauty. A more careful observer discovers that the several parts are disposed and arranged by certain laws serving special ends, and that the forms, colors, and numbers are all designed and adjusted upon great and wise principles.

Such a discovery enhances our admiration, and leads us forward in the study of the wondrous works of God :

“ With growing strength and ever new delight.”

The number two is the most apparent cipher in the whole range of figures. All things go in pairs, and those two are ever one. The one is nothing without the other. You cannot separate them without destroying both. Thus we have day and night. But suppose that the earth did not turn upon its own axis, so that one hemisphere basked in the continual light of the sun, and the other lay in the gloom of an unbroken darkness. To the inhabitants of the first, no conception of day would be possible ; neither would that of night be possible to the dwellers on the shadowed side. So every where we have male and female, cold and heat, negative and positive, and numberless instances of this duality. In the structure of plants we find each to be a dual, composed of two essential and distinct parts—the stem and the leaf. Whatever apparently diversified forms may be found in the plant, they may be all reduced to these two. The sepal is a rudimentary leaf. The petal is a leaf reduced in size, thinned, and coloured. The stamen is a leaf whose petiole is represented by the filament ; while the two sides of its laminae are represented by the two lobes of the anther. In like manner each flower itself is a rudimentary branch, with its peduncle and bractcolæ. The plant, therefore, is a dual, with unity of plan running through the whole.

We have said that these two are ever one. It would have been more correct to have said that that these two are ever three ; for, after all, the universal quantity is a triad rather than either a unit or a dual. To the senses, the constitution of things is twofold ; but to the reason it is threefold. Between the two points already stated there is ever a third or middle point, without which we do not conceive accurately of either. Thus we have male and female, and that middle or third term, man, in which the two are one. So also we have the negative and the positive, and the relation between these opposites. We have the outside and the inside, and that one thing of which we use these relative terms. We have, also, stem and leaf, and the plant of which these are the essential parts.

Following *three* we have *five* as the next great typical number ; and next to this, and the last of the great and universal numbers, is *seven*. Carry our investigation where we will, these numbers follow each other in numerical progression. But our observations must for the present be confined to the vegetable kingdom.

In the acotyledons, or acrogenous classes of plants, *two* is the typical number. In lichens; ferns, and the like, two and its multiples prevail. Thus in the order *Equisetaceæ*, the branches, sheaths, and furrows are found in the numbers 2, 4, 8, &c.; and this is still more remarkable in the crowded teeth which fill the sheaths, and which are always found in multiples of two. So also in the order of mosses, we have teeth in the following numbers, 4, 8, 16, 32, and, in one instance (*polytrichum*), we have 64.

In the next class, the monocotyledons, as seeds, grasses, and other seed-bearing plants, we find *three* to be the prevailing number. That three and its multiples here prevail, is sufficiently illustrated by the use of such terms as *Tricandria*, *Trigynia*, *Hexandria*, &c., in describing the different orders of plants in this class.

In the diocotyledons, or highest order of plants, we have *five* as the typical number. Of this class the oak, with its acorn, may be taken as the great British type. Here may be observed five leaflets on a common stalk: the flower stem has five primary branches; these in turn have five secondary; and so repeatedly. The articulated leaves of this order are divided into five parts, and the stamens are in multiples of five.

Seven is found only in the class *Heptandria*, of which the horse-chestnut may be taken as the example. In the British Flora, there is only one plant belonging to this class—the *Trientalis Europea*, or chick-weed (winter-green.) But this number, so rarely found in the vegetable kingdom, is the great typical number in other departments of nature.

We find a numerical relation of a deeply interesting kind running through the various parts of the plant. This relation is most apparent when we examine the various parts of a complete flower. Thus in the flower of the monocotyledon, where three is the prevailing number; in it the outer row represents the calyx, with three sepals; the second row the corolla, with three petals; the third row represents the stamens, of which there are six—two rows of three each; and in the centre there are three pistils united in one. So also in the flower of the diocotyledon we have in the outer row five sepals; in the second, five petals; in the third, five stamens; and in the centre, five pistils.

If we compare the structure of the whole plant with that of the leaf, we find a striking correspondence both as to disposition and

numbers. In trees such as the birch, we have one main trunk sending out branches at equal distances; and each side branch, in its turn, becomes a central axis, sending out comparatively small branches. Examine the leaf, and we shall find one central vein sending out its veins on either side; and these, in like manner, sending out other smaller veins at equal distances. In trees such as the sycamore, we see more clearly the relation of numbers to this arrangement. The sycamore, at the height of eight or ten feet, sends out all at once a cluster of five branches; and in correspondence with this, its long leaf is divided into five mid-veins. The horse-chestnut sends forth, from the top of a bare trunk, seven branches, and the leaf is divided in exact correspondence with this. So in herbaceous plants; we find triplet stalks corresponding with triplet leaves.

In the arrangement of the leafy appendages of plants, there occurs a curious series of numbers: 1, 2, 3, 5, 8, 13, 21, 34, 55, &c. Here it will be observed that any two numbers of the series give the succeeding one. Of this arrangement, the cone of the fir-tree furnishes the most apparent illustration. In the cone we have a well-defined spiral arrangement, by which the scales are arranged round its axis. We take its most common form, in which two of these spirals are visible; though in reality there are four spirals—the governing one, by which the scales are arranged round the axis, and one other running in the same direction, and two others running in the opposite direction. The two sets of visible spirals intersecting each other form a series of figures, consisting of two equilateral triangles on the surface of the cone. These diamond-shaped figures have definite angles. Those above and below approximate to 120° ; those on the sides to 60° . These well-defined and beautifully proportioned rhomboidal figures on the surface, give to the cone its peculiar beauty and harmony of shape. *This arrangement also necessitates a series of figures spread over the surface of the cone: one of the rhomboidal protuberances occupies the centre, with four others corresponding—one at each angle: these give the figure known in gardening as the “quincunx.”*

In the spirals themselves we have a definite and special arrangement of numbers. They are, as we have seen, in two sets: one running from right to left, the other from left to right. The parts or numbers of each set, seen in the section of a cone—which Dr. McCosh has called threads—are arranged in numbers corresponding

with the progressive series already noticed: 1, 2, 3, 5, 8, &c. But the number of threads in one set of spirals, say that running from right to left, differs from that of the other running from left to right, yet the two stand in a remarkable relation, for the number in the second set is always one or other of the two contiguous ones in the above scale. If the number in the first be 5, then that in the other will be either 3 or 8. If the one be 13, the other will be 8 or 21, &c.

We have taken the cone of the fir as an illustration of this spiral and numerical arrangement, because this is one of the instances in which it is most apparent; but it has been conclusively shown that the same spiral arrangement regulates all the leafy appendages of the stem, and with the same results as to numbers.

These facts might be used with great effect to show the evidences of order and design, and of wisdom, and power in creation; but I propose to use them for the present for quite another purpose, though leading to the same conclusion of adoring views of God, who in lofty wisdom planned all things in the beginning, and with special care adapted all things to specified ends. We need not enter into the discussion of what beauty consists in; but appealing to the universal sensation of pleasure with which the eye reposes upon the outlines of beautiful forms, and the orders and variety of arrangements, I would briefly point out the special connection of the phenomena of beauty with the laws of quantity above stated. Whence arises that harmony of visual effect that strikes us in the wildest natural landscape as compared with the effect of an artificial plantation? Not from the harmony of colours, for this you may find in the artificial plantation as well as in the natural landscape. Not from the absence of regularity, for whatever is irregular throughout produces the feeling of deformity rather than of beauty. There is regularity in every form, yet not that regularity which impresses the mind simply with a sense of mechanism. Every where you have rectilinear figures, but these in connection with manifold curvilinear combinations, as in the case of the fir cone already noticed. In each form we have a regular law of numbers regulating all the appendages of the stem and influencing its waving outline. No where is there sameness. Every where is there regularity. From the leaves of the overhanging giant of the forest, down to the minute petals of the fringed daisy, every proportion and recurrence is specifically arranged, and admits of an arithmetical or mathematical expression.

While we observe all this in the forms of nature, it is not less interesting to turn the thought inward and mark the delight which the mind takes in numerical repetitions and recurrences—such delight as is felt in rhyme, and in music. These co-relations in poetry and music appeal to the same faculty of the mind which delights in the discovery of correspondences and proportions among the objects of nature. So that the man of judicious and deliberate research finds in the living garment with which God has clothed this wondrous world, a poem rich in the most beautiful analogies, a piece of music full of the most glorious harmonies.

“———The well directed sight
Brings, in each flower, a universe to light.”

The student who will study the structure of plants with a view to these numerical relations and adaptations, may add no new names to the list of Flora, but he will reap a rich harvest of profitable knowledge, and will be led more and more to magnify the Lord with “the duty of a devout and learned admiration.”

“———Thy desire, which tends to know
The works of God, thereby to glorify
The great w^{or}sh^{ip}per, leads to no excess
That reaches ^{the} same, but rather merits praise
The more it seems excess. * * * * *

For wonderful indeed are all his works,
Pleasant to know, and worthiest to be all
Had in remembrance, always with delight.”

ICE PHENOMENA, FROM OBSERVATIONS ON RICE LAKE.

BY J. H. DUMBLE, C. E.,
ENGINEER OF THE COBOURG AND PETERBOROUGH RAILWAY.

The phenomena attending ice are, I believe, but little understood or investigated in Canada. That water increases in bulk during the process of crystalization is well known. The mere facts, that ice floats on water, and that vessels of any description which contain water fracture while it is congealing, are proofs sufficiently practical. But that ice itself should be capable of expanding and increasing in bulk is not equally well known, although many practical proofs are afforded.

This property of expansion and contraction of ice aids in fracturing and reducing the floating and gigantic iceberg; and Dr. Kane tells us, that but for changes of ice at temperatures *far below the freezing point*, causing pressure, collapse, fracture and disruption, the short Arctic summer would fail to open the Arctic Seas. I may add, that the ignorance, or want of a proper appreciation, of the properties of ice, evinced in the construction of numerous wharves, piers, and bridges on the inland lakes and rivers of Canada and the northern States, has proved a source of infinite annoyance and of immense expense.

The Cobourg and Peterborough Railway bridge across Rice Lake supplies a remarkable instance, from observations of the effects of ice on which some valuable practical conclusions may be deduced. Timber being plentiful along the shores of this lake, a cheap and substantial form of pile and truss bridge was constructed.

This bridge on more southern waters would doubtless have been considered a most suitable structure, but owing to the violent and almost irresistible force of ice, while expanding, a considerable portion of this structure now presents the appearance of a complete wreck. Having, as Engineer of the Cobourg and Peterborough Railway, had two winters' experience of ice phenomena on Rice Lake, and having carefully noticed the peculiar circumstances attending the various movements of the ice, I submit my observations and remarks, hoping that from them a somewhat satisfactory and perhaps correct theory may be deduced.

In the first place, it is well to know, that the violent movement of the ice on Rice Lake is that of contraction and expansion, caused entirely by *change of temperature*. The lake generally "takes" with ice during the month of December at a pretty high water level, which level the dam across the outlet preserves until spring. Currents, therefore, cannot be said (as in the case of rivers) to influence the movements of the ice. Neither have we on Rice Lake those other various causes, such as differing temperatures of ice and sea water, currents, or wave action, which produce the disruptions of Arctic ice. It is observed on Rice Lake that the action of the mid-day sun will set the *glare ice* immediately in motion. Warm winds, snow storms, and rains, do likewise produce the same effect, when the ice is glare and free from water or snow. This motion is generally quite perceptible; it is not shrinkage, or contraction, but on the contrary is a

visible stretching and expanding of the field-ice, generally towards the shores of the lake and of islands. The movement of the ice is at times very gradual, and is accompanied by a slight crackling noise. Again the expansion is rapid and violent, the movement being by a succession of vigorous jerks accompanied by a hollow rumbling sound, seemingly from under the field-ice, while at intervals there occur sharp loud reports like that of cannon.

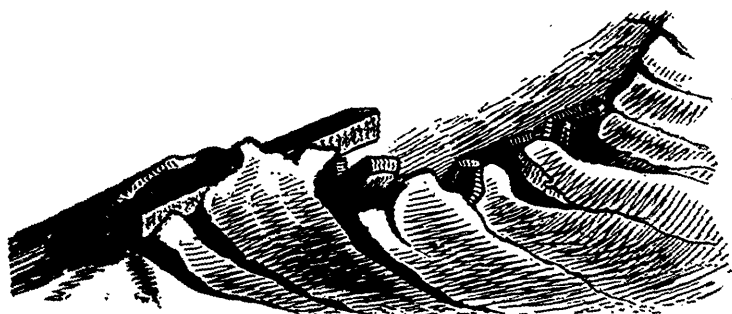
That ice does *expand* under such circumstances is very evident, as it may be seen creeping many feet on to the shores, without the appearance in the lake of any compensating fissures whatever. Ice may therefore be said to expand by a *high temperature*, that is, by a temperature higher than that which had just previously existed. The phenomena of ice contracting and expanding at the same temperature on different occasions is sometimes witnessed. For instance, should the thermometer indicate a temperature of minus 30° and then suddenly rise to zero, expansion would immediately be the result; again, should the temperature indicate plus 30° and suddenly fall to zero, contraction of the ice would speedily follow. The force and violence with which ice expands or shoves depends entirely on the *extent* of the *change* of temperature. The most violent shoves of ice occur previous to rain storms. A rise in temperature of 20° or upwards produces violent expansion. Various instances may be cited of the effects produced by ice when expanding; evidence of its power is very indelibly written on parts of the Railway Bridge before mentioned. Portions of this structure on piles have been, for long distances, bent and inclined even to an angle of 45° in a most uniform and extraordinary manner. Strong oak piles that would not bend have been cracked



and splintered, hundreds of heavy cap timbers of sound pine have been snapped across like reeds, and heavy iron rails have been curved and doubled up, by the almost irresistible pressure of the ice.

Instances of trees growing on the shores having been torn up by the roots are of frequent occurrence. Large boulders, weighing two tons or more, have been lifted several feet from the shore, and then pressed into the timbers forming the abutments of the bridge: as shown in the preceding illustration, sketched on the spot.

Channels cut for the purpose of moving timber frequently close by the expansion of the field ice, and the timbers are heaved out high and dry.



The greatest amount of expansion that I have witnessed at any one time in a horizontal direction was six feet. This may be considered a maximum shove.

When ice shoves on to the shores of lakes or islands it presents different forms of fracture, according to the nature of the resistance it meets with. Should the shore be low the ice merely runs up and fractures at the ripple mark. On the contrary, should the ice meet with resistance from a vertical shore or pier, a bursting up and piling of the fractured pieces would be the result.

Ice when contracting presents precisely the reverse of this fractured appearance. From my experience of ice I believe it is susceptible of contraction, but to a very limited extent. I have witnessed many sudden changes of temperature on Rice Lake, in some instances from plus 30° to minus 20°, indicating a fall of some 50°; and yet the contraction of the ice, as made visible by open fissures, has not exceeded three inches.

I have repeatedly heard of openings, that have occurred during former years, of several feet in width. I am inclined, however, to believe, that the distinction between a shove and an open crack, or fissure, was not sufficiently understood by my informants.

I have witnessed in several shoves that when the ice contracted, the fractured and elevated pieces, which previously came in contact with each other, would fall, and perhaps partly under the field ice. A space in the centre thus presented open water. This open water has probably been mistaken for a fissure caused by contraction.



I have heard of open fissures that have been seen eighteen inches in width, and this I think under peculiar circumstances, quite probable. That these fissures do sometimes occur, and that they never do occur unless the thermometer indicates a decided fall of temperature, is sufficient proof that ice contracts by a change to a temperature lower than that which had just previously existed. I may add, that contraction occurs generally at night, and is accompanied by sharp reports. A uniform temperature of the atmosphere does not cause either expansion or contraction of ice; it matters not whether the temperature be high or low, no movement of any kind takes place. A coating of snow of any depth over six inches effectually prevents any motion in ice, by protecting it from the influences of the atmosphere.

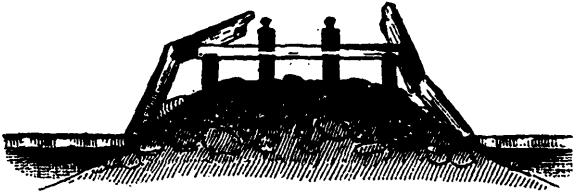
I find from repeated experiment that the upper stratum of ice partakes of the temperature of the atmosphere (up to 32°). The lower stratum maintains a constant temperature of some eight degrees below that of the underlying water. A fall of temperature, therefore, affects only the upper stratum, while the lower stratum remains unaffected. A separating and fracturing of the mass at its weakest point must of course be the result. Just the contrary effect is produced when the upper stratum is affected by a high temperature; shoving and overlapping is the consequence.

Ice, unlike most other solids, does not seem to possess the property of contraction to the same extent as it does the power of expansion. This will seem apparent from the following evidence:—When ice ex-

pands, and is forced perhaps six feet on to the shore, it is observed that should the temperature again fall, this ice, which had previously exceeded its limits does not recede to its former position, neither will the main field separate over a few inches from the fractured portions on the shore. On the contrary, should the temperature again suddenly rise a still further advance of perhaps the same distance is made on to the shore.

This repeated expansion may occur many times during a winter, and yet little evidence of any contraction will appear. I have known channels some six feet in width, opened for the purpose of isolating the Rice Lake bridge, to be closed eight times within a month by the expansion of the field ice.

An extraordinary instance of ice piling was witnessed on our new embankment. The ice shoved from both sides until the fractured pieces met in the centre of the track. The embankment is twenty-six feet in width at water level, and the rail is some six feet elevated; as shewn in the accompanying section.



The next phenomenon of ice, and that which seemed the most perplexing and difficult to account for, is the fact of ice shoving from different directions at different periods. In the first place it was noticed that it rarely or never shoved or fractured towards the centre of the lake; but on the contrary, the ice on the shores of the lake and of islands exhibited unmistakable signs of commotion.

It is but reasonable to suppose that any solid, equally dense throughout its dimensions, and susceptible of expansion, would, when equally acted upon by the active agent or moving cause, expand from its centre towards its circumference. We find such is the effect produced on any large field of ice of equal thickness and density, when acted upon uniformly by either the mid-day sun or warm winds. It is a fact, however, that it moves from other directions than from the centre of the lake. Shoves are sometimes witnessed from the east and sometimes from the west, to the north and to the south.

This phenomenon seemed as if it would baffle investigation, and it was only by careful observation of all the circumstances attending the formation and movements of the ice that I could deduce a theory to my satisfaction. It would perhaps be well to describe that portion of Rice Lake which came within my observation. The railway bridge crosses the lake at its widest part. An island, containing some three acres of land, is situated on the line of the bridge, about three-fourths of a mile from the south shore. The bridge is formed of pile bents, with the exception of that portion immediately to the north of Tic Island, which is a continuous truss for half a mile. To the east is a wide and unobstructed expanse of water; at the distance of perhaps four miles from the bridge, the lake is narrowed by two promontories to a mile in width. Less than a mile to the westward a succession of beautiful islands rise from the lake. The Otonabee River, a large sluggish stream, enters the lake opposite those islands from the north. We have then at this particular part of the lake some twelve square miles of water-way. When this large space is therefore covered with glare ice, and is swept by warm winds after a previous low temperature, the amount and force of its expansion is somewhat surprising.

An instance of expansion from the centre of this large field may be cited:—In December, 1857, the lake was covered with dense glare ice five inches in thickness. The temperature was extremely low (ranging from minus 10° to minus 30°) for some time after the ice formed, it suddenly rose to plus 30° previous to rain. The expansion that followed was of the most violent description. The truss bridge superstructure moved two feet six inches on to Tic Island; the pile bridge south of the island was forced four feet and a half on to the south shore. The bridge was slightly shoved to the north, but was mainly preserved by the parallel channels that happened to be open for the purpose of isolating it in that direction. The centre of the bridge was not affected in the slightest, it being the neutral point. The ice was piled on to Tic Island from the north, east and west, but on the south side it was torn away from the shore, exhibiting a fissure or opening some twenty inches in width.

Instances of the ice shoving on to the north and south shores of the lake, and also on to the shores of islands at the same time, are frequent. In fact, when the ice is equally dense and glare, and being fairly acted upon by a warm atmosphere, it must naturally expand from its centre to its circumference. But ice, owing to the peculiar circum-

stances under which it sometimes forms, is not found to be equally pure or dense, neither is it of uniform thickness. This ice irregularly acted upon by warm winds, or by the slanting rays of the sun at different altitudes, shoves or expands from various directions other than from the centre of the lake. During the early part of the last winter the ice shoves were entirely from the east, in the vicinity of the bridge. Upon an examination of the ice, I found that to the eastward glare and dense, the ice to the west of the bridge was not so pure but was seemingly thicker and more porous. This difference in its character was owing to snow having fallen during its formation; the bridge had retained the snow to the westward, and it became incorporated with the new ice. The large open expanse to the east was constantly swept by the wind. The glare ice became the most dense during cold weather, and of course the most susceptible of expansion by heat. Consequently the shoving was (until subsequent rains had changed the relative character of the ice) from the stronger and most susceptible ice towards the weaker and less expansive.

Ice on any large and irregular sheet of water studded with islands, like Rice Lake, must naturally be of unequal thickness and density. I have therefore no doubt whatever, that the phenomenon of ice expanding and shoving from various directions is caused by the *unequal thickness, density and glare of the ice*, and likewise by the *manner in which the heated atmosphere strikes it*.

The fact that channels opened in the lake (no matter whether transversely or longitudinally) always close up on the ice exhibiting the slightest tendency to expansion, is another proof that ice invariably expands and shoves to the line of such least resistance, and under peculiar circumstances from a general centre of the field.

On mentioning these circumstances to a friend from Kingston he asked: "If ice moves from the centre of the mass, why is it, that it does not do so between Kingston and Wolf Island?" and stated, that on the contrary a longitudinal shove and fracture are generally witnessed in the middle of the stream. I replied that the centre of the stream was generally the last to take, and being consequently the weaker ice, was sure to be crushed and fractured by the stronger ice on each side while expanding. I heard a seaman state, that he discovered the channel of a harbour (formed by the entrance of a river into the Black Sea) by the appearance of an irregular line of fracture in the ice.

Another instance of ice expanding towards the line of least resistance may be cited:—When Presque Isle Harbour is entirely frozen over, any expansion of the ice is apparant by its encroachment on the shore. But when the bay is but partially frozen over the expansion is towards the open water, and is not visible on the shores.

In conclusion, I would mention another circumstance that occurs during the expansion of ice. It is observed, that when a large extent of field ice expands towards the shore it does not shove into deep bays but fractures from point to point, in a zig-zag manner, across the chord at the mouth. The thrust of the main field must find less resistance across this chord than around the area of the bay.

Ice is a most delicate thermometer, and from the brief statement of facts connected with its phenomena the following general inferences may be derived :

1st. That ice is capable of expansion and contraction.

2nd. That ice (up to 32°) expands with a temperature *higher* than that which *had just previously* existed.

3rd. That ice contracts with a temperature lower than that which had just previously existed.

4th. That ice does not expand or contract with a uniform temperature.

5th. That ice is susceptible of expansion to a much greater extent than of contraction.

6th. That when ice is equally dense, thick, and glare, and equally acted on by a heated atmosphere, it expands from the centre towards the circumference.

7th. That ice expands towards the line of *least resistance*.

THE APPLICABILITY OF OUR EDUCATIONAL SYSTEM TO THE SOCIAL CONDITION OF LARGE CITIES.

BY THOMAS HENNING.

Read before the Canadian Institute, 27th March, 1858.

Education is a subject so fraught with interest and of such vital importance to the well-being of society, as to justify any inquiry likely

to promote its efficiency, and especially its extension to the lowest classes in the social scale. The aims and ends of education, though manifold and various, may be summed up in this expression, the "formation of character." Education is the "cultivation, training and discipline of every faculty of the intellect, and every affection and disposition of the moral and religious nature, for the attainment and fulfilment of the great purposes for which existence was conferred." If then, in the case of the individual, any faculty or power, intellectual or moral, be left undeveloped, in so far will he be incapacitated for rightly discharging the duties devolving upon him as a rational and intelligent being, and necessarily fail to attain the "purposes of his existence." An ignorant and uncultivated man forms, it has been very justly remarked, "a broken link in the chain of society, a jarring chord in the harmony of life." Every child, therefore, born into the world has a *right*, by the very laws of its existence, to such an education as will fit it for the due performance of its individual and relative duties, and no parent can deprive his child of such right without inflicting on him a serious injury, and doing a grievous wrong to society. "A parent has no more right," to use the forcible language of the Chief Superintendent of Education, "to leave his children intellectually blind, than he has to make them physically blind. He has no more right to leave them intellectually neglected than he has to maim them physically. The law will punish him in the one case, and it *should* punish him in the other. If a parent be so unnatural as not to provide for his children, the law will step in and protect them. So should it in like manner snatch those orphan children from the grasp of parents who would neglect their education. The Province has thus far a right to protect all its citizens, and if it has a right to protect life and liberty and property, it has a right to provide for the education and the efficient discharge of duty on the part of those not properly cared for by their parents." The soundness of the principle here enunciated, few, we imagine, would venture to impugn. Let us now see how Dr. Ryerson connects with this the principle of Free Schools. "The education of a people," he adds in the speech from which I have just quoted, "under a free government is essential to the very existence of that government, the wise administration of its laws, and the stability and efficiency of all its institutions. If that be so, a corresponding duty necessarily follows. If it be right that each child should have an education that will fit him for the efficient discharge

of all his duties, it is the duty of the State to provide that education. And according to the property which a man enjoys and the protection afforded to that property by the State, is he, whether he has children or not, bound to contribute to the education of the children of the State, upon the grounds of public policy, morality, and the laws which regulate property. No police system, however well organized, is equal to that of a thoroughly efficient general public school system. The application of these two principles involves the whole mystery of what is called Free Schools. It is palpable to every person who reflects upon it that this system involves principles of the highest humanity, as well as of the noblest patriotism." This, then, is the system of Education adopted in Upper Canada, a system based upon the principle "that the property of all shall be taxed by the majority for the education of all." Each municipality, it is true, may, according to the terms of the school law, either impose a rate-bill or declare the schools entirely free; still, we imagine, to test to the utmost the success of the system would require the general adoption of the free system as opposed to the imposition of rates. What then have been the results of the free system in those countries in which it has been tried for many years? How does it work in Canada? Does it accomplish both in extent and degree that which its advocates hoped and anticipated, or has it defects, inherent or accidental, which render it partially if not wholly a failure; and if so, what are these? Do they admit of removal, or are they such as to demand a radical change in the system? These are great and highly important questions, to which various answers have been given according to the prejudices and habits of the respondents, as well as their religious and political associations. My object, however, is simply to inquire as to how far the free system, under the present state of our municipal law, secures the attendance at school of those for whom it is specially designed; and whether, seeing the intimate connexion there is between ignorance and crime, it is not the duty of the State to declare both ignorance and vagrancy criminal, and to empower municipalities that tax all for the education of all to see that all are really educated.

In examining this point statistics must, in some measure, be our guide. What say they, then, respecting the state of education in large cities generally, what is their evidence specially as regards the City of Toronto? The following is a comparative statement of the schools, under specific headings, from 1844 to 1857 inclusive, prepared by Mr. Geo. A. Barber, the Local Superintendent of Schools:

Year.	City Population.	Average days attendance.	No. of Teachers.	Total Cost of maintaining Schools.	Children of School Age.
1844	18500	1194	12	4½ months 1877	4450
1845	19706	1108	12	1921	
1846	20565	1221	15	2011	
1847	No census.	1256	13	1871	
1848	23503	1431	13	Half-year 971	
1849	24126	1325	18	do 917	6149
1850	25766	1259	15	1998	6750
1851	30763	1366	16	2406	7773
1852	35000	1346	16	2558	7805
1853	40000	1402	20	3215	9000
1854	No census.	1459	21	4176	
1855	No census.	1570	31	5218	
1856	41760	1747	32	5642	8984
1857	45000	1863	36	6054	9000

From 1844 to 1847 the City was divided into School Sections, each having its own Trustees. In 1848, '49, '50 the Schools were under the direction of a Board nominated by the City Council, and in 1851 the elective principle came into operation. In 1848 and '49 the schools were free, because from a defect in the law it was doubtful whether a rate-bill could be enforced; in 1850 the rate-bill was in force, and in 1851 the free school system was established and has continued ever since. From 1844 to December 1851 there was no distinction of denominations in the schools, but from 1852 downwards separate schools have existed. In 1857 the whole number registered as in attendance, for any time in our common schools was 4,543, at the Roman Catholic Separate Schools 1,431, at the Upper Canada College 280, Toronto Grammar School 120, the Model Schools 420, and perhaps at the different private schools there may have been 200 additional, making a total in round numbers of 7,000 children, who enjoyed for a longer or shorter period the benefit of a school education in the City of Toronto. By the census of 1856, the number of young persons in the City between the ages of 5 and 16 is said to be 8,984 in that year. Allowing for the usual per centage of annual increase, I think we may fairly assume the school population of Toronto and those "due at school" to be at the present time 9,000. Taking this number and deducting the 7,000 presumed to be receiving education, we have a balance of no fewer than 2,000, a large proportion of whom are fast ripening for becoming inmates of our jails and penitentiaries.

Now although these figures may not be quite accurate, still it is certain that the number of children who are growing up in this city, and who take no advantage of the opportunities of acquiring a sound and useful education which are placed within their reach, is such as to justify earnest consideration and instant action. We have school houses externally beautiful, and fitted up internally with every convenience and appliance, we have a most respectable staff of teachers, and a system of education to which, it is true, objections have been raised, but in whose favor, we have the testimony of some of the most eminent men both in the United States and in Great Britain. In a debate which took place only a few weeks ago in the British House of Commons on the subject of national education, our Canadian system was referred to by the most distinguished men on both sides as one not only excellent in itself, but which it would be most desirable to copy in England. Why, then, it may be asked, do so many stand aloof from our schools; and why are so many growing up in ignorance and vagrancy, inflicting upon society most serious injury and heavy expenditure? To answer this question fully would lead me beyond the point to which at present I wish, as far as possible, to confine myself. I cannot but say, however, that while much is attributable to the indifference of parents for the welfare of their children, as well as to the want of countenance and moral support on the part of the more influential classes, much more injury is done by the misrepresentations of advocates of sectarian education, both Roman Catholic and Protestant.

I admit that the Common School system as it stands at present does not necessarily ensure the attendance of all those whose education is desirable; it does not do so in Toronto, as we see; it has not done so elsewhere. In European countries where the Free School system is in operation the compulsory principle is applied, as will be seen from the following extract from Dr. Kay's work on the "Social condition and Education of the people." He says:

"In Prussia, no child, without the permission both of the civil magistrate of the town or village of which its parents are inhabitants, and also of their religious minister, can be kept from school beyond the completion of its fifth year, or afterwards discontinue its attendance on the school classes for any length of time till he has passed his fifteenth year. If the parent neither provides at home for the education of his children, nor sends them to the school, the teacher is bound to inform the religious minister of the parent; the minister then remonstrates with him; and if he still neglects to send his children, the minister is bound by law to

report him to the village committee, which has power to punish him by a fine, of from one halfpenny to sixpence a day for neglecting the first and greatest duty of every parent. * * In order, however, to ensure regular attendance, and as an assistant to the parents themselves, each teacher is furnished by the local magistrate, every year, with a list of all the children of his district, who have attained the age at which they ought to attend his classes. The list is called over every morning and every afternoon, and all absentees are marked down, so that the school committees, magistrates, and inspectors may instantly discover if the attendance of any child has been irregular.

"In Baden the parish clergy, who keep registers, have to furnish the school authorities with a list of all children whose schooling begins at the next following Easter. To this is added a list of all the children in the place not born there, drawn up by the school authorities. These lists are handed to the school masters, and one fortnight after the school opens the schoolmaster has to return to the authorities the names of such children as attend the school, as well as those of the absent children. * * Children who have private instruction, or who attend higher institutions, require a certificate from the school authorities. * * * Every week the schoolmaster is required to give to the school authorities a list of such children as have been absent without leave, or who, having absented themselves, did not satisfactorily account for their so doing, together with the number of days' absence. * * * All masters of factories, who employ children under the age of fifteen, must render periodical lists of the children employed by them; giving the names, ages, places of residence, and names of the parents of such children. * * * Perhaps of all countries Switzerland offers the most instructive lesson to any one investigating educational systems and institutions. Throughout all the cantons, with the exception of Geneva, Vallais, and three small mountain cantons on the lake of Lucerne; where the population is too scanty and too scattered to allow of the erection of many schools, education is compulsory; that is, all parents are required by law to send their children to school from the ages of six to the age of fourteen. The schoolmasters in the several communes are furnished with lists of all the children in their districts, which are called over every morning on the assembling of school; the absentees are noted, and also the reasons, if any, for their absence; these lists are regularly examined by the inspectors, who fine the parents of the absentees for each day of absence. * * *

"It ought to be remembered that these laws are enforced under the most democratic forms of government. *The people themselves require attendance at the schools, so conscious are they of the necessity of education to the encouragement of temperance, prudence and order.*"

Contrasting the result of these stringent rules upon the state of society with that existing in English towns, Dr. Kay adds:

"One is astonished and delighted, in walking through the towns of the cantons I mentioned, to miss the heart-rending scenes to be met with in every English town; I mean the crowds of filthy, half-clothed children, who may be seen in the back streets of any of our towns, grovelling in the disgusting filth of the undrained pavements, listening to the lascivious songs of the tramping singers, witnessing

scenes calculated to demoralize adults, and certain to leave their impress on the susceptible minds of the young, quarreling, swearing, fighting, and in every way emulating the immorality of those who bred them. There is scarcely a town in England or Wales whose poorer streets from eight in the morning till ten at night are not full of these harrowing and disgusting scenes, which thus continually show us the real fountain head of our demoralized pauperism. In Switzerland nothing of the kind is to be seen. The children are as regularly employed in school, as their parents are in their daily occupations, and henceforward, instead of the towns continuing to be, as they are in England, and as they had hitherto been in Switzerland, the hot-beds and nurseries of irreligion, immorality, and sedition, they will only afford still more favorable opportunities than the country, of advancing the religious, moral, and social interests of the children of the poor."

In New England where the Free School system may be said to have originated, it was found necessary, in the case of large cities, to adopt what is named a "Truancy Act." This Act, which is in force, with the happiest results in Boston, Providence and other cities, presents the following features as described by Dr. Bishop who was lately Superintendent of Schools in Boston. He says :

"The territorial limits of the city are divided into three districts, and a 'Truant Officer,' so called, is appointed for each district. He is required to spend his whole time during school-hours in traversing streets, lanes, alleys and other places, in search of absentees from school. These are of several different classes. One class is composed of the children whose parents have recently moved into the city, and who being more or less indifferent to the education of their children, have neglected to find places for them at school. Whenever the truant officer finds any of these children idle in the streets of his district, he makes such inquiries of them as may be necessary to ascertain their condition. If he deems it expedient he accompanies them to their places of residence, and by conversing with their parents in kind and respectful terms, he generally succeeds in persuading them to send their children to school, without any show of his authority, which should always be kept out of sight until other means have failed, and then be exercised as a last resort.

Another class of absentees stay away from school for want of shoes, or such clothes as will enable them to make a decent appearance among the pupils at school. By patient efforts, on the part of the truant officer he can generally obtain from various sources such new or second-hand articles of wearing apparel as will keep this class of pupils respectably clad, and thus enable them to continue in school.

A third class of absentees is composed of children whose parents are so unfortunate, or idle, or vicious, as to require them to stay away from school for the purpose of gathering fragments of fuel and food for the family at home. The officer can do much in his district to diminish the number of this class of absentees, but in cases of extreme poverty the absence can not be prevented, for necessity knows no law.

The fourth and last class embraces the idle and dissolute runaways from school,

who not unfrequently absent themselves against the wishes and commands of their parents. Even such children the officer tries to win back to habits of attendance and good conduct, and is often successful. But when other means fail, he complains of the offender, who is arraigned according to law, and if found guilty is sentenced to some reformatory institution for a period varying from one to two years, where he will be instructed in the common school studies, and also taught to labor at some trade. In some cases the child is sentenced to the State Reform School during his minority, not so much to punish him as to save him from apparent ruin, and to give him an opportunity of growing up under good influence, and of becoming a good member of society."

A friend writes me to say that compulsory measures on the part of the Truant Officer are seldom required. The fact that such a power exists makes the reasonings of the Truant Officer so very *cogent* both with parents and pupils, that very rarely is anything more needed.

The number of non-attendants at the Schools in the City of New York has become so great as to arouse the citizens to see the necessity of some remedial measures. In the beginning of 1857, a special report on the subject was presented to the Board of Education, in which the chief recommendation was that existing organizations, so far as practicable should be used for lessening the "great mass of truant, vagrant, begging, and idle children." The report contains the following sentences which show what these organizations are :

Though your Committee do not believe that force is the best motive to be applied to the poor to promote education, still they would respectfully recommend a more stringent application of the Truant Law on the part of the police and magistrates of this City.

By this act, on complaint of *any citizen*, a child between the ages of seven and fourteen, found vagrant, may be taken before the police magistrate for examination; and the parent or guardian can be compelled to enter into an engagement to keep such child from vagrancy, and send him or her to school "at least four months in each year." The act provides also for the punishment of the parent if this engagement be broken. It further makes it the duty of all police officers who shall find truant and vagrant children to make complaint, as before described. If this law were at all thoroughly applied—if the existing organization were brought into coöperation with this Board—if a new series of Industrial Schools, together with visitors and appropriate ways and means, were opened—your Committee believe that a vast proportion of this vagrant class might be brought within and under the reach of educational influences, and immense expense and disaster saved to the City from the punishment and offences of such an ignorant population. They are aware that these recommendations, if adopted, will bring after them many new expenses to the Board and to the City; but they are convinced that nothing in the future will cost this City so much as *IGNORANCE*. The true economy

which should guide us in this matter is EDUCATION now, not PUNISHMENT afterwards."

That something additional was needed to cure the evil is abundantly evident from the strong language used by Mr. Randall, the City Superintendent, in his report presented to the Board at the commencement of the present year.

After denying that the Public School system is responsible for the crimes of those who refuse to take advantage of it, Mr. Randall continues :

"Equally confidently and unhesitatingly is the allegation denied that the Public School system either of the State or City is responsible as well for what it has failed to accomplish in the education of the entire population, to whom its doors were freely opened, as for what it has actually done. Neither the officers nor agents of these schools and systems have been invested with any authority to bring within their supervision those who did not voluntarily choose to place themselves under their guidance and control. Their doors were and have been invitingly open and free to every child in the community, rich or poor, high or low, virtuous or vicious. They have undertaken the responsibility of bestowing upon each child, fully availing himself of the facilities thus afforded, a sound, practical, Christian education, and to this high responsibility they should be rigidly held. But they have not undertaken, nor had they the power to undertake, the compulsory education of any child—nor can they, with any pretension to justice, be held responsible for the vices or the guilt of those who have never, or only for brief and intermitted periods of time, been placed under their instruction. There is, however, a fearful and solemn responsibility resting upon those who possess both the power and the means for securing the universal education of the future members of the community, and who have hitherto neglected and still continue to neglect to make such provision effectual. With the experience of ages before them, all pointing in the same direction, and all combining to demonstrate the intimate connection between ignorance and crime—with the moral certainty staring them in the face, that the idle and the dissolute, the darkened and the benighted intellects of to-day will become the paupers or the criminals, the robbers, the incendiaries, the burglars or the murderers of to-morrow. With the full knowledge that the streets and avenues of our great cities and towns are swarming with the rapidly ripening elements of wretchedness, and vice, and crime, and with the undoubted and clearly deducible power, even as a measure of self-defence and in the exercise of the most obvious means of salutary prevention, to arrest the further progress of this desolating plague, and to convert into a fertile source of blessing by a comprehensive and well-devised system of universal education. The legislators of the Commonwealth yet shrink from the discharge of their imperative duty in this respect, and vainly and ineffectually hope to accomplish the work of reform by penal enactments and vindictive punishments? These are the men, and not the officers or agents of our public schools, who may legitimately be held responsible, not alone for the consequence and results of what they have done, but for what, having the power

and means to do, they have left undone in the intellectual and moral training of the youth of the State."

Even in monarchical England, where any supposed infringement of the liberty of the subject is regarded with so jealous an eye, and where changes in customs and laws are introduced with such wariness and scrutinized with such closeness, they are beginning to perceive that something more must be done to educate the masses than has hitherto been attempted. Indeed this very subject of compulsory attendance at school has lately formed a prominent topic of discussion both in the press and at public meetings; and distinguished men, such as the Dean of Carlisle and others, have come to the conclusion that a system which should make the sending of children to school until a certain age compulsory upon the parents, was the only remedy for existing evils. In the late debate on Education in the British Parliament, nearly all the speakers felt the difficulty in which they were placed by the statistics which had been produced, and were compelled to acknowledge that, although the "stubborn independence of Englishmen" would not readily brook compulsion, still something must be done. It was finally agreed that a Commission should be granted to inquire into the present state of education in England, and to consider what measures are required for the extension of sound instruction to all classes of the people.

In Scotland an intermediate method has been lately proposed. "It is a matter of experience and observation," writes the Editor of the *Scottish Guardian*, "that multiply schools till they are as common as public houses; and, without some means either of drawing or driving them, you will not carry down your education to the youth of the lowest stratum of society."

"How, then," the writer continues, "are the youth of the neglected poor to be brought under educational influences? Are the people of this country prepared to submit to the *driving* system of Prussia, where the policeman works to the hands of the schoolmaster. We think not. Exceptions there may and must be amongst the dangerous classes—such exceptions there are already in the compulsory education of the Reformatories; but we cannot imagine that as a general principle it is either desirable or possible to fill our common schools by direct compulsion. But there is an intermediate method to which we have frequently referred—that of rendering education a passport to employment. Let the employers of youthful labor be

prohibited from taking any young person into their workshops and factories without a schoolmaster's certificate of several years' attendance at school. This expedient seems the only way of cutting the Gordian knot. The experiment is surely worth trying. Is it too much to expect of the true friends of the education of the people, whatever be their opinions as to a national system, that they should agree in urgently recommending such a plan as this to the Government to begin with?"

This principle was recognized in the draft of an Education Bill introduced into the House of Lords by Lord Kinnaird and others; and very recently an Education Bill, introduced by the Attorney General of Australia, Mr. Michie, was carried by a majority of 38 to 11, by which the father of a child above seven years of age, of sound mind, unable to read or write, and not attending any school, is liable to be fined double the amount of the school-fees, ample provision being at the same time made for the gratuitous schooling of children whose parents are unable to provide instruction at their own expense.

Reformatories seem just now to be the panacea for all the ills of ignorance and vice in Britain. But surely in this case, as in others, "Prevention is better than cure." It is the most practical plan, the most efficient, the cheapest and the most beneficent. Reformatories are excellent as auxiliaries, but what can they effect alone in the large cities of Great Britain and of the United States where ignorance and crime amongst the masses are so general? Until recently it was acknowledged that in the case of England and Wales alone there were a million of children, of school age, receiving no school education of any kind. Such a condition of things accorded with the statement of the Prison Inspectors, who in their report for 1853 say that of 98,484 prisoners, 93,766 could neither read nor write, or could only do so very imperfectly—were, in fact, absolutely uneducated; while only 4,158 could read and write well, and 167 had received a superior education.

In a most instructive work lately published in London and written by Alexander Thomson, Esq., of Banchory, it is shown that with all their efforts to arrest the progress of juvenile crime, there is a fresh annual supply of 20,000 or 25,000 young criminals coming forward to keep up the number of the criminal population, which is estimated from the recorded convictions at a total for Great Britain of 104,988. "Let the reader," so writes the Editor of the *Glasgow Guardian*,

already quoted, "try to realise the idea of a vast army of criminals, amounting in round numbers to one hundred and five thousand, living in the midst of us, and reinforced by youthful recruits at the rate of five-and-twenty thousand a-year; and contrast this with the meagre and inadequate means employed to restrain and diminish such a formidable array of vice and social degradation.

"The cost of maintaining our army of thieves is startling. Twenty-five pounds a-year being taken as the lowest sum upon which a frugal and industrious couple, with one or two children, can subsist,—and double that sum, or fifty pounds a year, being assumed as the lowest amount of the income of a thief, who is the reverse of frugal,—it follows that the thieves of Great Britain levy black mail upon the public to the extent of £5,250,000 a-year; being equal to a tax of four shillings a-year on every man, woman, and child in the kingdom. But this estimate is probably far below the average, individual cases being noted in the prison reports, of thieves earning from £300 to £500 per annum for a succession of years.

"This estimate takes no account of the cost of maintaining criminals in gaol. But the money expense is the least of the evil. It has been stated on good authority that every thief corrupts at least ten boys, and thus multiplies his own malignant influence tenfold. So true is it that 'one sinner destroys much good.'"

And yet this same writer sneers at the *driving* system of Prussia, as he calls it, and "cannot imagine that as a general *principle* it is desirable to fill the Common Schools by direct compulsion," although at the same time he acknowledges that the absence of all intellectual and moral training is to be regarded as the principal source of juvenile delinquency! The popular tendency towards remedial rather than preventive measures is illustrated by the following characteristic anecdote, related by Mr. John Robertson, in an excellent paper read before the Manchester Statistical Society, last year, on certain legalized forms of temptation to crime:—"This reminds me," says Mr. Robertson, "of what used to be told of a town in Lincolnshire, notorious for ague. The better class of people, who lived in the higher town, and enjoyed good health themselves, were ever ready to supply Peruvian bark and ague-drops to sufferers from the fever, but they never thought of draining the neighboring marsh. Now, an engineer happened to visit the place, and, hearing of the ague, pointed out to

the inhabitants how easy it would be to get rid of the miasmata by means of a drain. The project was well received; but the owners of the property would not agree; there were difficulties in the way; the drain would be an innovation; it would be expensive; and so the marsh was allowed to exhale its poison as before. But, as some amends to those suffering from ague, the people of the high town redoubled their benevolence in the shape of bark and ague-drops. They refused to drain the marsh, but they were willing to cure the marsh fever."

As it was in Lincolnshire, so is it, I fear in Canada, and in this City of Toronto. Although we are too young yet to equal the Mother Country in our criminal statistics, still we make a very respectable attempt to do so. From the statistics of the Toronto gaol alone during the year 1856, as compiled by the Governor from the Gaol Register, the whole number of prisoners committed to the Gaol of the United Counties of York and Peel (including the city) was 1967. Of these, 401 males and 246 females could neither read nor write; 253 males and 200 females could read only; 570 males and 198 females could only read and write imperfectly; 68 males could read and write well; and only one male had a superior education.

In 1857 the following is the result of a similar Gaol census:

The total number of prisoners committed during 1857 was 1906; of these 293 males and 203 females could neither read nor write; 278 males and 264 females could only read; 727 males and 123 females could read and write imperfectly; 18 males could read and write well, and there were none who had received a superior education. From these statistics it appears that more than ninety-five per cent. of the 1967 prisoners committed to the Toronto Gaol during the year 1856, had grown up without the advantages of a good common school education; and 99 per cent. of those committed during 1857; facts which show that had a legal provision been made, such as would have secured to *all* these prisoners a good common school education, the number of prisoners committed to the Toronto Gaol during the last two years would not have exceeded one hundred, instead of swelling to 1967 and 1906 respectively; their crimes would have been prevented, and the time, trouble, and expenses attending their detection and punishment would have been saved. By returns obtained from Mr. Allen, it appears that the number of juvenile delinquents under fifteen years of age, who have been committed to

jail during the past five years, is 226, viz. : 191 boys and 35 girls. Mr. Gurnett, the Police Magistrate, writes me to say, that this number comprises scarcely two thirds of the whole who were brought to the Police Court on charges which could have been sustained against them, the residue being discharged—many because of the unwillingness of complainants to prosecute them on account of their youth, and many others being discharged, with admonition by the Court, rather than subject them to the contaminating influence of associating with hardened criminals in the jail, from whom, in the present condition of that establishment, they could not be separated. Mr. Gurnett adds that the total number of such juvenile offenders may have been about 340 or 350. Most of them were the offspring of the lowest and most vicious part of our city population, from whom both by example and precept, they have learned nothing but vice and crime. The greater proportion of them could neither read nor write, and of those who were examined on the subject, few, even of the oldest of them had any knowledge of the obligation or even meaning of an oath. Most of them were charged with petty thefts or pilfering, and in too many cases it was evident that they had been stimulated to commit the offences by their parents or other persons with whom they resided. Why then do we continue to imitate the people spoken of by Mr. Robertson, and provide at a very heavy expenditure “bark and ague drops,” when we ought to be “draining the marsh?” This is a subject which has been brought before the public several times during the last few years, and it is one which is destined to occupy a still larger share of public attention in the future. Until it is provided by law that every child of school age shall attend some school a certain portion of his time, the full benefits of the Free School system will not be reaped by the public. The Chief Superintendent of schools has long felt this, and submitted to government some three years ago a draft of a bill investing municipalities with power to see that “each child should receive somewhere a certain period of instruction,” and in the *Journal of Education* for January, 1857, Dr. Ryerson writes :

Schools are, of course, not responsible for the crimes and conduct of those who never attend them; nor are school laws responsible for defects in criminal laws or police or municipal regulations. The Municipality that nobly provides for the education of all its youth, should undoubtedly have the power of preventing its youth from growing up uneducated.

We trust the current year will witness the taking of this last step towards securing to all the youth of the land, the full benefit of their Divine and human birth-right—an education such as will fit each of them for his duties as a christian citizen."

Again the Judges on the Bench have made this the subject of special addresses. In the same month Mr. Justice Hagarty used the following language :

"The only class of people that property is practically interested in educating, is not compelled to accept, and exercises its right of rejecting the boon. But it seems a very plain proposition that, co-extensive with the legal obligation to teach should be the legal obligation to be taught. If it be said that it would be an interference with the rational liberty to enforce attendance at school, the answer seems very reasonable. It would be an interference, but to no greater extent than the compulsory contributions by assessment for school rates. In a well regulated city, all nuisances are removeable by law. Every citizen has to surrender a certain portion of his freedom of action for the general good. So long as compulsory assessment for school purposes prevails, it could not be unreasonable to compel every head of a family to satisfy the school inspectors that his children were regular in attendance on some course of instruction, private or public, as he should think proper—allowing all freedom of choice in selecting the peculiar mode or place, but insisting on satisfactory evidence that education was not neglected."

This we conceive is correct reasoning. "The community has the right, and it is its duty to require that the liberal and munificent outlay which it invests in the education of its citizens shall not be virtually counteracted or rendered unavailing to the accomplishment of the purposes for which it is designed, by the culpable and criminal neglect of a large portion of its members to avail themselves of the facilities thus placed at their disposal. It has a right and it is its duty to insist that for every dollar contributed towards the education of the people, at least an equal amount shall be deducted from the annual assessment for the maintenance and punishment of criminals, and the support of vagabonds and paupers; and this result it can secure only by gathering into the institutions of learning provided for that purpose, *all* those of a suitable age for whose mental and moral culture no other adequate provision has been made." Let us then begin in time to save our country from the danger as well as the disgrace which must result from allowing the children, especially of our large towns to remain uneducated, and thus descend to the depths of social and moral degradation. To wait until the evil is done and then try to remedy it by reformatories and ragged schools

and similar medicaments is but trying to cure the marsh fever by "bark and ague drops" without curing the marsh itself by a process of thorough and universal draining.

REVIEWS.

Historical and Statistical information respecting the History and prospects of the Indian Tribes of the United States; Collected and prepared under the direction of the Bureau of Indian Affairs. Vols I. and II. Philadelphia, 1851.

The subject of the languages of the aboriginal tribes of the North American continent is one, the importance of which to the comparative philologist, the ethnologist and the philanthropist, can scarcely be over-rated. To the first it opens up a wide field of inquiry, the borders of which have only just begun to be cultivated; to the second it furnishes a clue which cannot but assist him in his interesting researches, and by the last in the person of the Christian Missionary it cannot be neglected without his being justly taxable with unfaithfulness to the all-important work that the great head of the church has assigned to him. Every well-wisher, therefore, to the cause of science or that of Christian civilization must hail with pleasure every work that tends to throw light on a subject of such great interest, but which so few are at all competent to handle; and for this reason we were disposed to regard favourably the work, the title of which we have placed at the head of this article, though we could not but regret that the information it proposed to give on the subject of the habits and languages of the Indian tribes was buried under the load of six enormous volumes which even those that are rich enough to place on their shelves, cannot always spare the time requisite for such laborious literary excavation.

To ensure the success of a person who would enrich science with lore drawn from the hitherto unwrought mine of the North American languages, it is absolutely necessary that he possess two qualifications: first a competent knowledge of the class of languages into the philology of which he professes to enter; and, secondly, a sufficient acquaint-

tance with the grammar and literature of civilized and learned languages to enable him to mark the analogies and differences that exist between them and the less known tongues whose genius and character he would desire to make the property alike of the comparative philologist and the missionary.

In this respect the languages of the western continent have hitherto been unfortunate; while men of the highest mental calibre, a Henry Martyn, a Sir William Jones, a Claudius Buchanan, a Lee and a Morisson, have applied their fine intellects and varied attainments to the elucidation of the languages of the east which they had previously thoroughly mastered, no one has yet arisen who can be said to occupy the place with reference to the languages of the western, that those eminent and highly gifted men did towards those of the eastern continent. It is true that many eminent men both in America and in Europe have directed their attention to the North American languages, but they have been groping in the dark, they have been like skillful miners who had gone down into a rich but new mine without the accustomed light to direct them; they pass along extensive galleries on every side of which the richest jewels protrude, but they discern them not. They painfully take with them to the surface what they suppose to contain the riches that they were in quest of, but which when exposed to the light of day are found to contain nothing valuable. There are others again who during a long intercourse with the aboriginal tribes have made themselves thoroughly acquainted with their language, but, through deficiency of general education and entire unacquaintance with philological science are unable to make their knowledge available for the guidance and information of others. But we have yet to find the man who combines those two qualifications and when we do, we may expect much more light to be thrown on the genius and peculiarities of the western languages than has yet been done.

Our republican brethren will at once reply that the vacant post has already been filled by their countryman Mr. H. R. Schoolcraft. This position has been claimed for him by the American press; we have seen it more than once asserted in popular periodicals published in the United States, that Mr. Schoolcraft understands the languages of the American continent better than any other living white man. It has been claimed by that gentleman himself, for he says at page 354 of volume 2, speaking of himself, "He may plead on his behalf the

force of circumstances, which during a period of upwards of thirty years have placed him in the extreme solitude of the forest in contact with the aborigines, under auspices extremely favorable to the acquisition of their language, and to the collection and examination of facts and materials, * * * and the situation he has filled has opened sources of information of which the assertion may be ventured, it is believed, without presumption, that he has wanted neither opportunities, disposition, nor assiduity to avail himself of;" again, at page 355 he says "I have deemed this much necessary to satisfy public curiosity and to justify grammatical positions, which if they are sometimes stated with much confidence, are the result of full convictions, mature inquiry, and ample opportunities."

How far the claims thus set up to be henceforth regarded as an authority in all that concerns the North American languages is sustained by the character of what he has brought forward as the result of his inquiries into this interesting subject, it is now our business to examine.

We freely confess that the first of those ponderous and expensive volumes did not lead us to expect much from the compiler in the way of elucidation of the grammatical or etymological structure of the Indian Languages. We believed that the glaring errors into which he has there fallen in giving what he supposed to be the meanings of the several Indian Songs that he had laid before his readers, arose from the unfaithfulness or incompetence of the interpreter whom he had employed for the purpose; but we never could have imagined that the compiler laid claim to any thing like an intimate acquaintance with the languages, of the meaning as well as the pronunciation of whose vocables he has there shown such ignorance.

It would lead us too far away from the main object of this paper to give many examples of this misrepresentation of the meaning of Indian songs which struck us so forcibly in looking over the first volume, but we cannot resist the temptation to take one or two of them at random. Page 384, Vol. I. "No 4 depicts the symbolical union of a meda with a bird. He affects to have all space at his command and to be gifted with powers of supernatural locomotion.

Ah-wa-nan

Ba-bah-mis-saud

Ween-jeeh

Uh-nish-an-aw-ba"

} Should have been
written, to make
any sense at all;

Ah-wa-nan

Wan-je

Ba-bah-mis-sad

Un-ish-ah-nah-ba,

This song Mr. Schoolcraft renders, "Who makes the anishenahba my-fellow walk about." Now there is no word in it having the meaning "my fellow," and none to signify "walk" nor translated in that way does it in the slightest degree elucidate the symbol (a winged human figure) to which he refers. The proper translation of the words is "Who is he on account of whom a human being flies?"

Again at page 401, Vol. I. we have the following :

" 4. To the great spirit
In ah wah owh mon e do
In i wah owh mon e do
I au ah jim ind
Gee zhik oong a bid"

which Mr. Schoolcraft renders thus: "Look thou at the spirit; it is he that is spoken of who stays our lives who abides in the sky," but of which the correct translation is "Lo this God; Lo this God is he of whom it is told that he is in the sky," there being no word that in the slightest degree approaches to the meaning of "who stays our lives," the second line which Mr. Schoolcraft so translates being, as even the merely English speaking reader can satisfy himself, a repetition of the first.

These examples, which are only slight specimens of what we could adduce from almost every page of the first volume in which Indian phraseology and its interpretation are professedly given, will serve to show that we were fully warranted in coming to the perusal of Mr. Schoolcraft's second volume with no very sanguine expectations as to the result of his researches into the genius of a class of languages with which it was already plain to us he had so little personal acquaintance.

On the treatise in the second volume we would in the first place remark that we find in it the same misrepresentation of the meaning of words as marks the author's attempts at interpretation in the first volume. Thus we have *a-dit-tag* plural *a-dit-ta-gin* interpreted as fruit, fruits, when they really signify "that thing which is ripe—those things which are ripe;" thus giving a false idea of the genius of the language which contains no generic word for fruit, but only specific words for the different kinds of fruit *ex. gr.* an apple, a plum, just as it contains no word for "time," but only for the natural divisions of it, a day, a month, a year. Again at page 369 *ish-pa-de-nah* is translated a "hill," though it is a verb in the indicative present, 3rd pers. sing., signifying

“it is elevated ground,” and consequent on this blunder the still greater one of giving as its plural a word that does not exist in the language: there is no word to express “hill” as distinguished from “mountain,” the diminutive form of this latter word being used for that purpose.

Mr. Schoolcraft is decidedly wrong in saying that the numeral “*pazh-ik* (one) represents the English indefinite article; it is never so used, but, with very few exceptions, wherever it occurs, it is in its proper numeral sense. In the phrase that he adduces as an example “*pa-zhik muk-wun ooge-wah-buh-maun*,” it means that he saw *one* bear, not two or many. The Indian for “he saw a bear” without the idea of number would be simply “*oo-ge-wah-buh-maun muk-wun* :” indeed Mr. Schoolcraft himself unwittingly furnishes us with an example which disproves his own rule, for a little after (page 372), he give us, for “he or she loves a man” a sentence precisely similar to “he killed a bear” “*oo-sah ge-aun en-ne-ne-wun*” showing that in his former sentence *pa-zhik* is not an indefinite article but a numeral adjective. The nearest approach that *pa-zhik* ever makes to the signification of an indefinite article is to be found in the very few instances in which it occurs in the sense of the Greek enclitic $\tau\iota\varsigma$ —a certain one.

We look upon Mr. Schoolcraft’s observations on the possessive of substantives as very unphilosophical and very incorrect, inasmuch as they ignore a very interesting and important feature of the language, namely, that it makes modification of the sense of words by a double agglutination of particles—a prefix and an affix—both of which are absolutely necessary to the additional idea and one of which without the other would add nothing to the meaning of the original word, thus “*pe-zhe-ke*” is a bison, “*ne-pe-zhe-keem*” my bison, but *ne-pe-zhe-kee* would have no meaning, neither would *pe-zhe-keem*, both the prefix and affix being absolutely necessary in order that the word should come before us in its possessive form. But one unacquainted with the language would gather from Mr. Schoolcraft’s observations that it is the affix alone that imparts the possessive meaning; he might as well attempt to divide the *h* from the *s* in the English possessive *his*” as to think of giving to an Ojibwa noun a possessive meaning without the prefix as well as the affix.

His remark on the third person singular possessive form is equally open to objection, “*mun*” being in that case just as much part of the possessive as is the terminal *n* of the first and second persons, and

not as he represents it to be, the sign of the objective, which is evident from the fact that the form is the same where "his bison" is the subject instead of the object of the verb. Another case in which the same principle of double agglutination is exemplified is the mode of expressing a negative by the prefix "*kah-ween*" and the affix "*se*," thus *wah-be* he sees, *kah-ween wah-be* would not impart a negative form to the verb; it would mean "no, he sees" but *kah-ween wah-be-se* "he does not see," being somewhat analogous to the French *ne pas*.

Again at page 373, Mr. Schoolcraft, through his ignorance of the Algonquin idiom has lost an opportunity of bringing to the notice of his readers a very interesting peculiarity of the language. "His father's dog" he renders in Indian *oo-sun oo-dy-un*, which would not be his father's dog, but "his father, his dog," the way to express his father's dog being, *oo-sun oo-dy-e-ne*. This brings out a striking peculiarity of which Mr. Schoolcraft must have been altogether ignorant when he made such an Indian sentence as that which we have just quoted from his treatise; it is this, when a noun in the objective case, or with the third person singular possessive particles, has another noun in the possessive case attached to it, the noun so attached changes its possessive affix into "*e-ne*" thus in the sentence quoted we have *oo-sun* of the possessive form, but to it belongs another noun in the possessive form "his dog" which must be rendered *oo-dy-e-ne*. The use of this second possessive form will be made plain by the following example: "He slew his brother and his wife" leaves it uncertain whether it was his own or his brother's wife that he slew; not so in the Algonquin languages,—*oo-ge-ne-saun we-kah-ne-sun kuh-ya we-wun* would mean "he slew his brother and his own wife," *oo-ge-ne-saun we-kah-ne-sun kuh-ya we-we-ne* would mean "he slew his brother and his (*i. e.* his brother's) wife. Jesus loved Martha and her brother:—*Jesus oo-ge-sah-ge-aun Martha-un kuh-ya oo-dah-wa-mah-ne not oo-dah-wa-maun* which would signify Jesus own sister (used of the relation of a male, *oo-dah-wa-maun* signifies his sister, of that of a female, her brother). We think that an error that involves the ignoring of so interesting a peculiarity is unpardonable in a person making such pretensions as we have seen Mr. Schoolcraft does.

While we are on the subject of this second possessive it is as well to remark that it affects the verb also. That is to say, when a noun having the third person singular possessive particles is the subject,

the verb changes its form to correspond with it, *ex. gr.* while the sentence "a man saw a bear" would be rendered *Enéne oo-ge-wah-buh-maun muk-wun* the sentence "His father saw a bear" would be in Indian "*oo-sun oo-ge-wah-buh-mah-ne muk-wun*" not *oo-ge-wah-buh-maun*. None but those who have occasion to address Indians on subjects that require great precision of expression can form any idea of the advantages that this peculiarity gives, or what confusion is produced by ignorance or neglect of it.

Mr. Schoolcraft's grammatical analysis is as much at fault as his translations from Indian to English, and *vice versa*, of which we will give a few examples out of very many that might be adduced did space permit.

At page 384 of his second volume, he says of certain nouns "By prefixing '*Tah*' to these words, and changing the inflexion of the animate nouns to *e-we*, and that of the inanimate to *e-wun*, they are rendered future thus, *Tah-Pontiacwe Tah-mittigewun*." The principle after which he seems in this passage to be groping, but which he has evidently failed to discover is this, all nouns are capable of being transformed into verbs by the addition of "*we*" for animate forms, "*wun*" for inanimate with an euphonic or agglutinating vowel, varying in different words when the noun to be thus verbalized ends in a consonant thus, *en-e-ne* a man *e-ne-ne-we* he is a man, *oo-da-nah* a town *oo da-nah-wun* it is a town, or there is a town *mah-éen-gun* a wolf, *mah-éen-gun-e-we* he is a wolf, *me-tig* a tree, animate) *me-tig-oo-we* it is a tree; and being thus verbalized the word becomes capable of all the inflexions of a verb of which the future indicative 3rd person singular made by the prefix *Tah*, is of course one. These verbalizing affixes are in reality fragments of the verb *ah-we* animate, and *ah-wun* inanimate "he is" "it is" in an identifying sense; thus it makes but little difference to the sense whether we say "*en-e-ne ah-we*" it is a man *oo-da-nah ah-wun*, it or there is a city, or *en-e-ne-we oo-da-nah-wun* but in the use of the former the inflecting particles continue with the original verb, in the latter case they belong to the verbalized noun, thus we say *tah-e-ne-ne-we* but *en-e-ne tah-ah-we* he will be a man, *tah-oo-da-nah-wun* but *ooda-nah tah-ah-wun*, it or there will be a city.

Mr. Schoolcraft is as much astray in his rules for converting verbs into nouns as we have already shown him to be with regard to those for turning nouns into verbs. At page 390 he says, "their names for the various utensils of civilized life are based on the word "*jee-gun*" one

of those primitives which, although never disjunctively used, denotes in its modified forms the various senses implied by our words instrument, contrivance, machine:” of which we may safely say that such a primitive word exists nowhere nor never did, except in the writer’s imagination, the forms that he gives being derived from verbs in *je-ga*, *keesh-ke-booje-ga* he divides crosswise *taush-ke-boo-je-ga* he cuts down the middle or lengthwise from which by changing the verbal termination “*ga*” into the nominal “*gun*” the class of words that he gives are all formed, *keesh-ke-boo-je-gun* a cross-cut saw, *taush-ke-boo-je-gun* a saw to cut lengthwise, hence a saw-mill. The correctness of this analysis will be at once seen by examining such words as *wee-de-ga-mah-gun* (Mr. Schoolcraft says that the termination “*gun*” is always a contraction for *je-gun*) a companion, a wife *ke-ke-noo-ah-mah-gun* a person under instruction, a disciple; where the termination, “*gun*” could not possibly be a contraction for *jee-gun*, instrument, machine, even did such a primitive exist in the language.

Two more instances of the errors into which Mr. Schoolcraft’s want of knowledge of the language of whose interpretation and genius he claims to be considered the exponent, leads him we will select from his chapter on substantives, and then pass to that on adjectives. At page 372 he gives the following Indian sentence “*Waub-oo-jeeg oo-ge-me-gah-naun naud-ah-wa-se-wun*” which he translates “*Wauboojeeg fought his enemies.*” Even had the word *naud-ah-wa-see* signified “*enemy*” *naud-ah-wa-se-wun* would not express “*his enemies,*” as it wants the possessive prefix which is never dispensed with in Indian as the possessive pronoun is frequently in Greek and Latin, but *naud-ah-wa-see* does not signify “*enemy*” but “*Sioux Indian,*” and therefore the sentence quoted is good Ojibwa, meaning however, “*Wauboojeeg fought the Sioux.*” The error is just as if a school-boy should translate “*Cæsar vicit Gallos*” by “*Cæsar conquered his enemies.*” Again at page 376 he represents the word *and-ah-yaun* which he pretty correctly interprets by the English word “*my home*” (it should rather have been “*at my home*”) as a substantive; whereas it is the subjunctive and participial form of the verb “*dah*” he dwells, and signifies “*where I dwell,*” and this at once accounts for the want of the possessive pronominal prefix, as there is no idea of possession about the word and the word *an-dah-yaun-in* that he gives as the plural really signifies “*whenever I dwell,*” “*wherever I dwell!*”

From Mr. Schoolcraft’s chapter on adjectives, we would be led to

conclude that the Algonquin languages are very rich in that part of speech which, were it the case, would furnish a reply to his own hypothesis of the affinity of these languages with those of the Semitic group which are known to be particularly defective in adjectives. But the very contrary is the fact; few languages we believe exist, in which there is a greater deficiency of purely adjective forms; those of which Mr. Schoolcraft gives so copious a list being all verbs, *mah-nah-dud*, *mah-nah-de-ze*, signifying not "bad," but "it is bad," "he is bad." *muh-kuh-da-wah*, *muh-kuh-da-we-ze*, not "black," but it is black, he is black, which words are capable of being put through all moods and tenses, just as other verbs; and when we need to express the simple adjective, we cannot get nearer to it than by using what for want of a more appropriate designation may be called a participle, *mah-yah-nah-duk*, "which is bad;" *mah-yah-nah-de-zid*, who is bad; *ma-kuh-da-waug*, which is black; *ma-kuh-de-we-zid*, who is black; *on-e-she-shin*, not "good," but "it is good," the participle of which, *wa-ne-she-shing*, stands in Indian translations for our word good as applied to inanimate nouns. This error vitiates the whole of Mr. Schoolcraft's chapter on adjectives; but, besides this, he has fallen into many errors in his details; he has restricted the adjectives *muj-je*, bad; *me-noo*, good, which are two of the very few true adjectives of the language, to animate nouns, than which restriction nothing can be more unfounded: these and all other adjectives being applicable without change of form to both animate and inanimate nouns. Even were we not able to draw on our own knowledge for instances innumerable to the contrary of Mr. Schoolcraft's restriction, we find sufficient for our purpose in what he has himself written, for he gives us the expressions *muj-je-be-mah-de-ze-win* and *me-noo-be-mah-de-ze-win* for bad conduct, good conduct; also, a little further on, *muj-je-kezh-e-gud* *me-no-ke-zhe-gud*, a bad day, a good day. The truth is that the few adjectives that belong to the language are, without exception, undeclinable, *i. e.*, not possessing distinct animate and inanimate, singular and plural forms. A mode of supplying the deficiency of adjectives that is largely practiced by the Indians seems to have escaped the notice of Mr. Schoolcraft, and, what is still stranger, of Bishop Baraga in his grammar,—which, though extremely deficient in clearness and arrangement, is generally very full and correct,—and that omission is the more to be regretted, as it affords the comparative philologist one of those few links that serve to bind the languages of the new to those of the old world: we

mean the mode in which the numerous class of adjectives represented by such words as wooden, golden, earthen, are formed, namely, by the agglutination of the substantives wood, gold, earth, &c., to the noun whose quality is to be designated. Thus, *me-tig-oo-che-maun*, a wooden canoe; *me-tig*, being wood and *che-maun*, canoe; *oo-zah-wah-shoo-ne-yah we-wuh-quaun*, a golden crown; *wah-be-gun-e oo-nah-gun*, an earthen vessel, which is closely analogous to the Semitic expressions vessels of silver, and still more so to the English silver vessels, gold pens, &c.

Mr. Schoolcraft's attempts at etymological analysis are not unfrequently bordering on the ludicrous; we will instance one at page 397. Speaking of such words as *mis-quah-be-kud*, it is red rock or metal; *mis-quah-bik-e-ze*, he is red metal; he has the following observations; "The word 'is' (included in brackets) in the translations, is not deemed to be wholly gratuitous; there is, strictly speaking, an idea of existence given to these compounds by the particle 'au' in *au-bik*, which seems to be indirectly a derivative from that great and fundamental root of the language, *i-au*." In this passage Mr. Schoolcraft's inconsistency with himself is easily made plain, even to a reader totally unacquainted with the language. At page 389 he had correctly given *au-bik* as the generic radix signifying any solid, stony, or metallic mass; then, at the beginning of page 397, he had again correctly given *misk-wau-bik* as signifying simply red rock; but, if his analysis on which we are now commenting were correct, *misk-wau-bik* would signify it is red rock, as it contains the syllable *au* as well as *misk-waub-ik-kud*, in which case the affix "*ud*" would be useless and unmeaning; but in truth it is this affix "*ud*" for the inanimate, *iz-ze* for the animate, that is alone the verbalizing particle, and the connexion between the *au* of the radix *wau-bik* and the verb substantive *i-au* exists only in Mr. Schoolcraft's imagination. Before quitting the subject of adjectives, we would beg to take exception to Mr. Schoolcraft's remarks on such words as *pa-pa-zhek*, as found in the compound word *pa-pa-zheg-oo-gun-zhe*, a horse, on which he has the following remarks, page 389: "In naming the horse *pa-pa-zhe-koo-gah-zhi*; i. e., the animal with solid hoofs, they have seized on the feature which most strikingly distinguished the horse from the cleft-footed animals. *Pai-zhik* is one, and is also used as the indefinite article. The word *pa-pa-zhik* is also used in an adjective sense, figuratively, indicating united, solid, undivided." Now, the word *pa-pa-zhig* does not mean

solid, undivided, but is the distributive form of the numeral *pa-zhik*; and so *pa-pa-zhe-goo-gun-zhe* signifies not "the animal with a solid hoof," but "the animal with one hoof to each foot," in contradistinction to cloven-footed animals, as the deer, the bison, which have two hoofs to each foot. Mr. Schoolcraft does not appear to have been aware that the Ojibwa is furnished with a set of distributives formed from the cardinals by prefixing a reduplication; for example, *pa-zhik*, one; *pa-pa-zhik*, one each; *neezh*, two; *na-neezh*, two apiece, &c., corresponding exactly with the Latin "singuli, bini," &c., in which respect it has the advantage of the Greek, where a circumlocution is used to express the distributive idea.

We will not dwell long on the chapter of pronouns; but, having made one or two observations, will hurry on to that on verbs; and the first error of Mr. Schoolcraft, under that head, that we would point out to his and our readers, is another case of false analysis, so many of which are to be found in the whole treatise. We refer to his remarks on the first word of the Lord's prayer, as it occurs in the translation of the Liturgy of the Church of England now used in the Episcopal missions to the Algonquin tribes both in British North America and in the United States. At page 406 he says: "The term *Wa-yoo-se-me-goo-yun*, signifying father of all, or universal father, seemed precisely the word wanted; but it was throwing the object in so general a relation that philosophy alone appeared satisfied with it." The word does not signify "Father of all," nor is there the slightest shade of the idea of universality in it, as will be seen from the following analysis: *oos* is the radix of the word signifying father; *oo-yoo-se*, he has a father, which becomes passive by the addition of *mah*, *oo-yoo-se-mah*, he is held in the relation of father, of which the participial form of the second person plural is *wa-yoo-se-megoo-yun*, "thou whom we have for a father," or "thou who art held as a father:" for it is one of the deficiencies of the language that these two ideas are expressed by the same form, or to speak more exactly, that two different parts of the verb in the course of inflexion bring out the same combination of sounds. Thus "you are loved," and "we love you," are expressed by the same word, a deficiency which, however, is no reproach to the language, seeing that it has it in common with others, and those the vernaculars of highly polished and civilized races; thus we have in Attic Greek $\lambda\upsilon\eta$, 3d sing. subj. pres. active; $\lambda\upsilon\eta$, the indic. pres. 2d sing. passive, and $\lambda\upsilon\eta$, the subj.

pres. 2d sing. passive, from which coincidence of sound, however, no inconvenience is ever felt, seeing that the context of the word at once determines in what sense it is used. Thus explained, it is evident that the word *Wa-yoo-se-me-goo-yun*, thou who art our father, is exactly the word required to express the "Our Father" of the Lord's prayer. *Noosa*, which Mr. Schoolcraft seems to prefer, being manifestly inappropriate to the form and subversive of the very spirit of that prayer, it never meaning any thing but "my father," not "our father."

In a treatise containing so much that is erroneous both in principle and detail, it is difficult to select subjects for comment, seeing that in a paper confined within such narrow limits as the present, so much must be left untouched; but we will select another instance from the chapter on pronouns as illustrative of the very unphilosophical principles of etymology adopted by Mr. Schoolcraft; at page 408 he derives the verb *ah-we*, first person singular *auw* (is, am, in an identifying sense) from "yow," the radix of *we-yow*, "his body," and then translates "*nin-dauw*," I am a man; *ah-we*, "he is a man;" whereas nothing can be more erroneous than such etymology nor anything more incorrect than the interpretation that he grounds on it. To derive *auw*, am; *ah-we*, is, from "yow," body, is just as if the Greek and Latin verbs *εμι* and *sum* were asserted to be derived from the Greek *σωμα*, a body, a derivation too far-fetched for even the most fanciful of the old lexicographers. We would adduce many other instances in which mere similarity of sound is the only basis on which Mr. Schoolcraft builds abstruse, and, to the uninitiated, learned-looking etymological dissertations. On the assumption of the supposed connexion between *yow*, body, and *nin-dauw*, I am, he interprets *nin-dauw*, I am a man; *ah-we*, he is a man, which is a total misrepresentation, the signification of these words being simply "I am," "He is" (not in the sense of existence; which would be *nin-dah-yahzh-yah*, but of identification); for a proof of which, appreciable by those who do not understand the language, we have not to go beyond Mr. Schoolcraft's own book, at page 469 of the second volume of which, at the end of the Algonquin vocabularies, we find a translation of the mysterious and awful formula in which the Divine Being defines his own existence, "I am that I am," all of which vocabularies give *nin-dauw* as the word for "I am," which would be singularly inapp-

priate if *nin-dauw* signified "I am a man," or even if it ever so remotely contained the idea of body.

In the beginning of the chapter on verbs, we have an elaborate dissertation in which the untenable theory of the originally monosyllabic character of the Algonquin languages is maintained, the author says, page 424, "It is evident that such particles as *ak*, *be*, *ge* were invested with generic meanings before they assumed the concrete forms of *a-ke*, earth; *ne-be*, water; *ge-zis*, sky." We would ask, Evident from what? and what were the ancient generic meanings of those particles? how does the author know that such was the case? and, supposing his monosyllabic theory admitted, how does he know that *ke*, *ne*, *zis* were not the particles invested with generic meanings? for on none of those very natural points of inquiry has he given his readers any information. We have at page 426 an instance of the absurdities into which an unfounded theory will lead a person practically unacquainted with the subject on which he is philosophizing. One would have supposed that the word "*Boz*," embark, was sufficiently short to have been admitted by Mr. Schoolcraft to the dignity of a primitive radix, but not even so thin a hair as this can escape him, he must split it up till not the most microscopic philology can discover its component parts, its "disjecta membra," in the wide field of the Algonquin vocabulary. On this word he has the following very characteristic passage: "This is the simplest form in which the word occurs colloquially, but it will at once be perceived to be a compound: *Ozh* seems to be the root of every species of contrivance designed to float on the water, which has been made with hands; the latter idea is incorporated in the word and appears to be derived from *oo-zhâ-ah* to make up (v ep) *oo-zhe-toon* (v anti ep). *Ozh* appears to be the root for the name of a vessel." Now, in the first place, we would ask on what principle it is evident that this word is a compound? certainly not from Mr. Schoolcraft's own theory of monosyllabic roots for *boz* is nearly as short a monosyllable as could be." How does *ozh* appear to be the root of every species of contrivance designed to float on water? certainly not from the vocabularies that he has given at the end of his treatise, (which though by no means correct, yet bear marks of having been contributed by persons knowing much more of the language than he does,) for there we find two words, and only two, denoting contrivances designed to float on water, namely: *nah-be-quawn*—a ship, *na-bug-e-chem-aun*—a boat, into neither of which does the

syllable *oozh* enter ; again we would ask if the sound *ōz* in *bōz* belongs to the imaginary root *ozh*, floating thing, how in the name of common sense can it have anything to do with *oo-zhe-ah*, he is made (not to make as Mr. Schoolcraft has it)? But, suppose we allow *oz* to pass muster, where is the other part of the compound? the author does not enlighten us as to whence comes the etymological molecule *b*. But the fact is, that the component parts of the word *bōz* have no existence except in Mr. Schoolcraft's very fertile imagination, the word being a root word of the very simplest kind, signifying to enter into any machine, *nautical* or *otherwise*, that is about being put in motion as a canoe, a sleigh, a carriage.

Having already prolonged these remarks to a greater extent than we had intended we will leave Mr. Schoolcraft for the present, having first corrected him in reference to a point involving one of the principles of the Indian verb : we mean his assertion that the subjunctive mood is formed by prefixing the word *kish-pin* to the several forms but not in any wise altering them : (page 431 and again page 433.) "The other tenses of the indicative mood all admit of the same prefixed term *kish-pin*, if." The very contrary of these statements is the case ; the subjunctive is never formed by the mere prefixing of *kish-pin*, but requires a very extensive change indeed in the modifying suffixes, and *kish-pin* prefixed to the indicative forms of the verb is utterly inadmissible. For confirmation of what we say on this point we appeal to the paradigms which Mr. Schoolcraft has given in the body of his treatise (evidently furnished by another hand, though much spoiled in passing through the press) ; 1st. the paradigm of *atta* "to be" impersonal, page 441, we have indicative, *at-ta*, it is, subjunctive *kish-pin at-tag* ; here we see that the *kish-pin* is not prefixed to the unchanged indicative ; again the verb *I-eau*, to be, personal indicative, 436-438 ; *nin-dah yah*, I am, subjunctive *i-au-yaun*, if I be. The rule is that in the indicative the pronoun is expressed by a prefix as *ne-waub* I see, in the subjunctive by a suffix as *wah-be-yaun* : the conjunction *kish-pin* never being incorporated in the word but always placed with regard to it in the same position, as "if" in English the *εav* of Greek and the *si* of Latin, such a form as *kish-pin ne-saug-e-aug*, *kish-pin ov-sah-ge-aud* (page 433) would be sure to produce a smile on the faces of an Indian audience at the expense of him who should use them.

In a note at the end of his chapter on verbs, Mr. Schoolcraft very

justly animadvert on the reason given by Mr. Baraga in his grammar for the dubitative form of the Indian verb, by which, what an Indian thoroughly believes to be true is sometimes expressed in a form (*doog* for the indicative, *an wan* for the subjunctive) expressive of some degree of uncertainty. This Mr. Baraga traces to the Indians' habitual want of truth in their intercourse with one another. We think it quite capable of the very opposite interpretation, namely, that an Indian is so much afraid of stating what he does not know to be the case, that he has invented a form of speech which enables him to keep considerably within the line that divides truth from falsehood.

It seems to have escaped the notice of both Mr. Schoolcraft and Mr. Baraga that a similar usage holds in Attic Greek where the dubitative particle *av* with the optative mood is used where no doubt is intended to be implied (*ὄυκ ἂν φεύγοις*, you will not escape), and we are not aware that even the Roman satirists ever ascribed this usage to the proverbial untruthfulness of the Greeks. In fact the Algonquin dubitative form is merely the formula *credendi*, or mode of expressing belief as distinguished from personal knowledge.

In conclusion, we have to express our regret that a work coming out under such auspices as that, the two first volumes of which have drawn forth the above remarks, should be so incorrect both in principle and detail, especially as we are aware that from the circumstance of its having received the imprimatur of the United States Government, it is looked on as an authority in all that refers to Indian literature and language. Longfellow, for example, has much injured the effect of his otherwise beautiful poem *Hiawatha* by the many errors into which he has fallen in the Indian words that he has worked into it, chiefly, it would appear, from having taken Mr. Schoolcraft as his guide.

F. A. O'M.

The Sandwich Islands Monthly Magazine. January to May, 1856.

A. Fornander, Honolulu.

The New Era, and Argus. Honolulu, 1857.

The Victoria Gazette. Vancouver's Island, 1858.

The progressive diffusion of the language, the social habits, and the elements of freedom of the Anglo-Saxon race, justly awakens fresh wonder and admiration with every new manifestation; and the peri-

odicals we have named at the head of this article are highly characteristic indices of recent advances. "The love of religious conquest," says a recent American writer, in treating of *The prospects of the English language*—"The love alike of literary, commercial, and military conquest, which the Anglo-Saxon race have shown, and are now showing, all over the globe, will each diffuse the language. The British empire, extending over one hundred and fifty-six millions, listens to that language as to a voice of power. The population of the United States, doubling every twenty-five years, already amounts to more than twenty millions. The French population of Canada, the Spanish population of Mexico, will give place to the Anglo-Saxon race, or rather, as in past time, be absorbed in it. We may believe that, fixed in the standards of the national literature [of the United States,] the language of the Constitution will be familiar to the hundreds of millions in North America as their vernacular tongue; and that Shakspeare and Milton will be read ages hence on the banks of the Connecticut and the Potomac, on the shores of the Columbia and the Francisco." That such anticipations of the future destiny of the English language are not extravagant, seems to find corroboration even in such ephemeral yet significant literature as that now under review.

The printing-press, that great engine of modern social reformation and revolution, no longer waits for the consolidation of settled communities and the luxurious leisure of accumulated wealth, to invite its presence. It marches with the van-guard of the Anglo-Saxon nomades, and materially contributes to the rapidity with which they hew a home out of the wild forest, and change the wilderness into a centre of civilization.

The *Victoria Gazette*, the most recent of the above named periodicals, is the first paper published on Vancouver's Island, the fruit of that sudden migration which the recent gold discoveries have attracted to the North-western regions around Fraser's River. This paper is issued twice a-week; and from its second number, dated June 30th of the present year, we extract the following amusing editorial sketch of the "Printing House Square" of this, the newest world of civilization:—

"The present number of the *Victoria Gazette* is prepared for publication in a room more remarkable for its extent than convenience. Its walls abound in crevices, through which the wind bears with an impartial equality the seeds of catarrh and bronchial affections to the editors, proprietors, and typographers. Its

floor is of a shaky character, and each passer imparts a tremulousness to its surface which occasions the present writing to assume a character that Champollion, were he one of our compositors, would find it difficult to decipher. Cavities, large and small, lie in wait for individuals passing into and about the establishment, which have already resulted in serious shin damage to the major part of its occupants. The 'editor's desk' is a bundle of printing paper, skillfully poised upon a leather trunk, vibrating with each movement of the writer's hand, and compelling him to double up his person in the act of preparing 'copy' in a manner more curious than graceful. The 'Editor's Easy Chair' is a Chinese trunk, whose top would be on a level with the desk, but for the brilliant idea of increasing the height of the latter by the paper expedient alluded to. The striking thoughts which pervade the brain of the individual favored with these facilities would find a much readier expression at the point of his pen, but for the drawback of being compelled to retail copies of this journal, receive items of news, and correct misdirected intruders on the point of their destination, simultaneously with inditing those remarkable conceptions. Two huge fire-places adorn our sanctum. These ornaments, having been built with a view to convey all the heat as well as the smoke up the chimney, are as little dangerous in the matter of risk of a conflagration as they are but slightly conducive to comfort in modifying the blasts of Boreas which dispute occupancy with the present sojourners in the establishment we are describing. We had designed supplying these fuel-eaters with a pile of lumber belonging to the Hudson's Bay Company, stored in the premises, but the printers having occupied it in lieu of a table, we have been compelled to postpone indulgence in that (to us) economical expedient. It is possible, also, that the corporation in question might entertain some objections to the proposed use of their property, which objections, although we consider them absurd in view of our necessities, we are bound to respect. The pleasant sounds of wood-sawing, nail-hammering, &c., add to the facilities for editorial labor of which we are now in existing enjoyment, and an occasional procession of Indians cheers and invigorates the writer by stopping and surrounding his locality of labor, and gazing upon his deeds with the expression of intelligence common to the physiognomy of the intellectual race of which they are the representatives."

Compared with the scene of labor of this north-western disciple of Faustus, the Sandwich Islands are ancient seats of civilization; and there accordingly we find, not only the "New Era" and "Argus" the broad-sheet representatives of social and political freedom, but also "The Sandwich Islands' Monthly Magazine," specially devoted to literature, and not altogether neglectful of science. Nor are such evidences of progress limited exclusively to the Islanders of English descent, including those directly from the United States. A paragraph more recent than any of the pages of the Honolulu Monthly which we have, as yet, had an opportunity of perusing, somewhat

oddly combines the evidences of progressive civilization in the following items:—

“The Minister of the Interior of the Sandwich Islands has officially recommended that the English language, which is already that of the court and of trade, shall be adopted as the national language.—Another Sandwich *trait* worth noticing is, the fact of a splendid lace robe for the Prince Royal (Prince of Hawaii) having been procured from Ireland.”

We are indebted to our friend, Mr. Joseph Barnard Davis, the learned author of the “*Crania Britannica*,” for the first six numbers of the Honolulu Magazine, as a publication well calculated to gratify those who watch with interest the transformations which external influences effect on rude aboriginal races, and the light thrown on the past history of the human race by watching the phenomena attendant on the meeting of currents so essentially distinct and diverse as those now brought into contact on the remote islands of Polynesia.

The singular phases of thought and of social action thus brought about, alike in the mingling and the conflict of races, cannot fail to arrest attention. Here, for example, is a fragment of the Honolulu editorial address at starting, which presents, in various respects, a striking contrast to that of the *Gazette* of the Fraser River gold regions. Especially noticeable is the very different feeling, manifested, in the one case, of regard for the native population, accompanied as it is with the declaration of “respectful loyalty” towards the native king,—compared with the scarcely disguised contempt with which the other looks down upon the degraded and doomed Indians, and seems to anticipate their extirpation along with the forest which he is already converting into *piles of lumber*.

“In giving our opinion,” says the Polynesian editor, “on the Men and Measures of the Government of these Islands, we shall bring to the task a profound desire to set forth only the truth, divested as much as possible of all bias or preconceived political ideas; but while avoiding personalities, viewing public men as public property, we shall not scruple to expose their shortcomings should they arise, or fail to point out to the best of our ability the true course and policy to be pursued.

To the King recently called to the Throne of these fair Islands, we profess respectful loyalty, admiration for his character, so far as it has yet developed itself, and shall not be found wanting in helping on the good work he has so much at heart, the moral and intellectual elevation of the people over whom he rules. And without the slightest adulation we may say truthfully, that few young men who had had the benefit and advantage of an European education could have entered on his difficult task with better or more decided success.

And now we address ourselves to the task so faintly shadowed forth, and if we

could dip into the future and see "*the vision of the world*," and the effects yet to be wrought out by the various agencies within and around us, what would be the spectacle presented by these Isles of our adoption. Should we see our villages, rising into towns of importance—our towns into large and wealthy cities—our harbors filled with the ships of every nation—our native and foreign population holding equal ground and pursuing together with equal success the paths of happiness, virtue, wealth and intellectual culture—or, should we see the foreigner usurping every position of advantage, and the poor native, his mind uninstructed, his body diseased, his lands sold to meet some temporary want, or to minister to petty vanity, and rapidly disappearing from the soil his fathers cultivated.

We will not dwell now on these speculations, for while writing thus briefly our few introductory words, the delicious Trade Wind is gently stirring our paper—and while all without is glowing in the fervid noon of the Tropics—shade becomes a very paradise—and stretching far away to the horizon, heaves and gently throbs the vast Pacific—the idle waves scarce breaking the usual long white lines on the Coral Reefs—while the feathery leaves of the Cocoa Nut tree are moving gently and gracefully over us. All round us are the Orange, Lime, Pomegranate, Bread Fruit, Banana, Date and Tamarind Trees, with wealth of gorgeous flowers at our feet, while with quiet and gentle steps the natives are gliding stealthily or squatting low to pass round the pipe, and inhaling their two or three whiffs of the fragrant weed."

The contents of the *Sandwich Islands' Magazine* are of an amusingly miscellaneous character. Interesting and instructive ethnological and geological papers lie alongside of such contributions as a "Sonnet to Miss Emma R—," "Eulogy to Queen Pomare," the "Story of a Waltz," "Ode on the Marriage of Kamehameha IV.," &c. Then again we have such practical sheets as "Custom-house Statistics for 1855," "Monthly Summary of Shipping Intelligence," and even a column of "Business Cards," wherein our attention is invited, among lists of Ship Chandlers, Commission Merchants, &c., to the "Honolulu Daguerrean Gallery, King Street, opposite the Globe Hotel," or again, to "the Daguerrean Artist located on Rose Lane, opposite the Bethel, Honolulu." The reviewer next plays his part, and we peruse a well written article under the heading: "*Transactions of the Royal Hawaiian Agricultural Society at its Fifth Annual Meeting, June, 1855. Vol. II. Honolulu: Printed for the Society;*" or, under such headings as "*Report of the Minister of Finance,*" or the "*Differential Duties, and their working in Hawaii,*" we find ourselves gliding into the troubled waters of Polynesian politics. The Minister of the Interior thus recommends an appropriation "for the purchase or building of a steamboat suitable for our trade, if the Hawaiian Steam Navigation Company fail to fulfil the conditions of their charter" :—

“A regular communication with every part of the islands is essential to induce the people to be prepared with their products for market. A boat suited to the trade, and managed with economy, would undoubtedly be a good investment, and I have no doubt that she would be paid for by her earnings in a reasonable time. The general advantages of a frequent communication with all the ports of the group would, I have no doubt, increase very largely our agricultural productions, and render our markets far more attractive. An impulse must be given to labor, and I know of no mode so sure to do it as furnishing a ready means of sale for its products. Much that we raise is perishable, and no communication will answer the purpose so fully as that afforded by steamboats. It is impossible to predict the increased production of fruits, vegetables, &c., which would be induced by a certain and prompt communication with the market. That it will be very great no one can entertain a doubt. Divided, as the kingdom is, into several islands, a steam communication is far more essential than if it were united. I have no doubt that the Government can purchase a boat on its own faith and credit in part, so that a small advance in money would not embarrass the Treasury. Let the boat be insured, and its nett income be made a sinking fund from which to pay the debt, and, I doubt not, it will prove a good investment, and confer general benefits on the island of very great value.”

Or listen to our able Honolulu editor on the great educational question as it presents itself to the Hawaiian:—

“In reviewing the merits or demerits of the Minister’s budget, we do not intend to touch upon the ephemeral questions which receive from, and impart to, the discussion of politics its chameleon hue; but one item involves principles of justice as well as economy.

“Under the heading of ‘Department of Public Instruction,’ we find \$40,000 appropriated for the support of Common Schools (in the Hawaiian language) and \$8,000 for the support of the English schools for natives. In view of such a distribution of the school fund, we would ask the President of the Board of Education, on whom the introduction of the English language among the common people, through special schools for that purpose, has devolved, upon what plan or principle he intends to succeed in this laudable undertaking? How far does all the instruction, of which a Hawaiian school is capable, elevate an intelligent native mind? We will answer, just to that point where ‘a little learning becomes a dangerous thing,’ and then it leaves him without a chance of further progress. If the President were sincere in his eulogiums on the introduction of the English language, he would have divided the school fund so as to give at least one English school to every district, or more to some of the larger, even if one or more of the Hawaiian schools in each district would have been shut up for that purpose. And less than \$25,000 would not secure competent teachers. The pittance of \$8,000, now asked for, is trifling with the good disposition of the teachers already in the field and discouraging to other applicants.”

The “*Report of the Minister of Foreign Relations!*” next comes

under review, and the reader is almost tempted to smile at the gravity with which the Honolulu critic infers from it :

“That peace and amity reign between this country and ‘the rest of mankind;’ at least, there are no questions pending likely to assume the important features of a *causus belli*. Our hopes in the continuance of this friendly feeling in the great powers who assisted at our political investiture, is farther strengthened by the fact that they are at last making a naval station of our port for more or less of their Pacific squadrons. Had such a measure been adopted simultaneous with the recognition of our independence, its moral influence would have been incalculable, not only on our foreign relations but also on our domestic progress.

The so long expected treaty with France is apparently not yet completed, seeing that the Minister says not a word about it. It was fondly believed that the legislature of last year had removed the only obstacle to a consummation devoutly wished for, and we have yet to learn that any new misunderstanding has arisen to delay it. But then, diplomacy is a *mare mortuum*, on which the spirit of progress has as yet made no impression. When men or governments approach each other with honesty of purpose and candor of expression, the result cannot long be doubtful; where these postulata are wanting, no result can be satisfactory or lasting.”

And thereupon the writer proceeds to address and to warn the Ministers of His Majesty King Kamehameha’s Cabinet in relation to the future interests and destinies of the Hawaiian nation, and its young sovereign, and thus concludes :—

“But though empires fall and nations pass away, yet humanity remains; and as true as the laws which govern it, so sure is there a splendid destiny in store for the isles of the Pacific. Their cycle is just beginning; in several directions the dawn is breaking on their former night, and shall Hawaii ignore her position and her duty in the premises, her share in the result?

“We could wish then that our Ministers would take a loftier, a larger view of the future possible, as well as the present, position and influence of our country, and realize that in more than one sense are we “the heart of the Pacific.” It is true that our pulses beat as yet but feebly, but all that we do lack is time and the political sagacity which have conducted other countries to eminence and prosperity. Our statesmen are surrounded with all the materials which go to the making of a beautiful as well as solid mansion; do they know how to remove their roughness and cement them together? Do they see ‘the distant beacons,’ and are they steering for them, or do they hang by the moorings of an effete and obsolete past? With the absolute fact before them that “knowledge is power,” will they confine that power to an idiom already unable to represent it? With an instinctive consciousness that either the nation or its language must perish, can they hesitate in the choice? With a foreign element daily increasing and daily assuming a more isolated position, because containing all the learning and wealth, which are the only roads to distinction, will they not rather strain every nerve to throw down the barrier which prevents this power from fertilizing the country; will they not

enable the nation to share this power, and, through the intellectual bond of a common language, secure the sympathy of the good and disarm the malevolence of the designing? Shall there be malevolence or antagonism in the next generation? Will laymen solve the problem which priests in vain essayed?"

The great question, therefore, of the Hawaiian Cabinet and kingdom in 1856 was the reception of the English language as the element of intellectual and social unity with the nation. That question, as we have shown, has since been settled, and the interesting group of islands, comparatively speaking so recently brought within our knowledge, already constitutes an important centre for the further diffusion of the language in which Shakespear and Milton still live for all by whom it is known. Remembering what the British Isles once were, it would be folly to smile at the anticipated destinies of those Isles of the Pacific; but we cannot overlook the part played in all this by "the daily increasing foreign element;" to which the Honolulu reviewer refers; and are reminded that when the Celtic Briton first learned the arts of civilization, and shared in the culture and refinement of Roman intellectual progress, our Angle and Saxon ancestors were unknown foreigners, and the English tongue was not yet in being. In the triumph of the Anglo-Saxon in the Isles of the Pacific, as among the wilds of America, it is to be feared that the native race is destined to the same fate as the native language; unless some unheeded island-group supplies for the Polynesian race the same refuge which the mountain fastnesses of Scotland and Wales have done for the Celtic Briton, where, sheltered from the fatal influences of our triumphant progress, they may preserve for other generations the living record of that Archipelago of the Pacific, the discovery of which, in the eighteenth century, stirred the fancy and stimulated the enthusiasm of Europe, with feelings akin to those to which the revelations of Columbus gave rise in the close of the fifteenth century.

D. W.

SCIENTIFIC AND LITERARY NOTES.

PHYSIOLOGY AND NATURAL HISTORY.

CLASSIFICATION OF MAMMALIA, &c.

We transcribe the tabular view of Owen's latest arrangement of Mammalia, from the fifth number of the Journal of the Proceedings of the Linnæan Society, that such of our readers as have it not already before them may be enabled to

compare the views of this great comparative Anatomist with the systems in general use. The groups below the rank of Orders are inserted merely as illustrations of those orders, not as equivalent subdivisions, or as the most natural subdivisions of those orders, into which it has not been the aim of the author on this occasion to enter :

CLASS.	SUB-CLASS.	ORDERS.	
MAMMALIA	Archencephala	Bimana <i>Homc.</i>	
	Gyrencephala	Unguiculata .	Quadrumana. { <i>Catarrhina.</i> <i>Platyrrhina.</i> <i>Strepsirrhina.</i>
			Carnivora ... { <i>Digitigrada.</i> <i>Plantigrada.</i> <i>Pinnigrada.</i>
			Artiodactyla. { <i>Omnivora.</i> <i>Ruminantia.</i> <i>Solidungula.</i>
		Ungulata....	Perissodactyla { <i>Multungula.</i> <i>Elephas.</i> <i>Dinotherium.</i>
			Proboscidea.. { <i>Toxodon.</i> <i>Nesodon.</i>
			Toxodontia .. { <i>Manatus.</i> <i>Halicore.</i>
	Mutilata.....	Sirenia..... { <i>Delphinidae.</i> <i>Balenidae.</i>	
		Cetacea { <i>Bradypodidae.</i> <i>Dasypodidae.</i> <i>Edentura.</i>	
		Bruta..... { <i>Frugivora.</i> <i>Insectivora.</i>	
	Lisencephala.....	Cheiroptera . { <i>Talpidae.</i> <i>Erinacidae.</i> <i>Soricidae.</i>	
	Lyencephala.....	Insectivora .. { <i>Non-claviculata.</i> <i>Claviculata.</i>	
		Rodentia { <i>Rhizophaga.</i> <i>Poëphaga.</i> <i>Gorpophaga.</i> <i>Entomophaga.</i>	
		Marsupialia.. { <i>Echidna.</i> <i>Ornithorhynchus.</i>	
		Monotremata. {	

Through the Linnæan Society also Mr. Sclater has communicated his views on the Geographical distribution of the Class Aves, in a paper of great interest (Journal of the proceedings of the Linnæan Society, Nos. 7 and 8) He first divides the Earth's surface into primary kingdoms or provinces. Of these he recognizes six—two in the new and four in the old world—one in each belonging to the Arctic and temperate regions; the other four to the warmer portion. In the North American Province, containing 6½ million square miles, he finds 650 species. In the South American Province, with 5½ million square miles, 2,250 species. In the Northern portion of the old world, extending from the West of Europe to Japan, and including the basin of the Mediterranean, bounded on the South by Mount Atlas, with 14 million square miles, he finds 650 species. In the Western

Tropical region, including the chief part of Africa, with Madagascar and Arabia, 12 million square miles, give 1250 species. The old world, middle, tropical or Indian Province, has, to four million square miles, 1500 species, and the Australian Province, to three million square miles, has 1000 species. Mr. Selater does not at present enter upon the subdivision of these great provinces, but in respect to each of them he gives the proportions of the eight orders of Birds, and notes the most characteristic forms. We give his table of families peculiar to the new and to the old world:—

Familie Neogeane sive Novi Orbis.

<i>Todidæ,</i>	<i>Tyrannidæ,</i>
<i>Momotidæ,</i>	<i>Cotingidæ,</i>
<i>Bucconidæ,</i>	<i>Rhamphastidæ,</i>
<i>Galbulidæ,</i>	<i>Opisthocomidæ,</i>
<i>Trochilidæ,</i>	<i>Cracidæ,</i>
<i>Icteridæ,</i>	<i>Tinamidæ,</i>
<i>Caerebidæ,</i>	<i>Meleagrinae,</i>
<i>Formicariidæ,</i>	<i>Odontophorinae.</i>
<i>Dendrocolaptidæ,</i>	

Familie Palaeogeane sive Orbis Veteris.

<i>Coraciidæ,</i>	<i>Promeropidæ,</i>
<i>Eurylaemidæ,</i>	<i>Muscicapidæ,</i>
<i>Meropidæ,</i>	<i>Musophagidæ,</i>
<i>Upupidæ,</i>	<i>Coliidæ,</i>
<i>Bucerotidæ,</i>	<i>Megapodidæ,</i>
<i>Sturnidæ.</i>	<i>Pteroclidæ,</i>
<i>Paradisæidæ,</i>	<i>Phasianidæ,</i>
<i>Meliphagidæ,</i>	<i>Perdicinae.</i>

The same numbers of this valuable journal contain an interesting report on the Botany of the North Australian Expedition, under the command of A. C. Gregory, Esq., by Dr. Ferdinand Müller, Botanist to the Expedition. We may state that 2000 species belonging to 800 genera, and 160 Natural Orders, were observed. Of these, 800 species are new to the Australian Flora, and 500 probably new to Botanical Science. The writer estimates the whole vegetable productions of Australia at 10,000 species. The notes on the useful plants observed are highly interesting, and the choice of a Naturalist to enjoy the advantage of investigating for the first time the Botany of an extensive and important region seems to have been judicious.

Among recent contributions to Physiology and Natural Science, Mr. Nunneley's paper on the structure of the retina, in the Journal of Microscopical Science, should not be overlooked, as it seems to add considerably to the knowledge previously possessed, and to give the results of long series of careful observations of a very difficult kind.

Natural Science has lost another distinguished cultivator in Mr. Dawson

Turner, whose great work on the Fuci is a lasting memorial of his skill and knowledge. He died at a very advanced age.

The twenty-fourth annual report of the Royal Cornwall Polytechnic Society contains several good contributions to Natural Science, especially a paper on the cetacea of the Cornish Coast by Mr. Couch, so well known as an Ichthyologist, but from a short paper by the same Naturalist on the wheat midge we judge that this destructive insect is much less known and understood than with us.

Mr. T. Rymer Jones, F.R.S., &c., has produced a volume entitled the *Aquarian Naturalist*: a manual for the sea-side. It is very highly spoken of as excelling other works of its class, several of which have no small merit, and being illustrated by Tuffen West, and published by VanVoorst, we may be assured that it appears before the public with every advantage.

W. H.

CANADIAN NATURAL HISTORY.

The following remarks have been communicated to the Editor, from the pen of one well qualified from his knowledge of the subjects to which he refers to speak with authority, and the suggestions he throws out cannot fail to be recognized as meriting the attention of those to whom they are addressed. We commend them alike to the consideration of the officers of the Geological Survey, and to the Members of the Canadian Institute who interest themselves in the branches of native science here referred to:—

Why is there not a Zoologist and Botanist attached to the Canadian Geological Survey? is a question that has often occurred to me. And it has recurred with greater force in reading in the May number of the *Annals of Natural History*, the critique on the "General Report upon the Zoology of the several Pacific Railway Routes. Part 1st. Mammalia."

The critic gives just praise to the American Government, for the Zoological Appendices to the Reports of the various Surveys and Explorations ordered by the Government of the United States, and especially to the work under notice, which he says, "Promises to bring still greater additions to our knowledge of North American Zoology than any of the previous publications."

It appears that the specimens collected by the various expeditions for surveying the routes towards the Pacific were deposited in the Smithsonian Institution, under the care of its officers, that Professor Baird has undertaken and executed the first volume on Mammalia, that Mr. Capin is to take the Birds, and gentlemen learned in the other classes, those to which they have paid the most attention.

So much for the United States; but what has been done by our Canadian Geological Survey for the advancement of the Zoology and Botany of the Province? Absolutely nothing; though their parties have traversed from the heights of Gaspé to far beyond the Northern limits of Lake Huron.

This year they have published a report of their progress for four years, accompanied by a valuable atlas of Charts, which show with what an amount of zeal and

talent the officers of the Survey have worked in their special departments. But while is looking over these Maps, we are struck with astonishment at the amount of labour bestowed on the Map of Geological detail; still there is a feeling of regret, that while such a vast area has been explored so little has been done for the sister sciences. Not that I reflect at all on the Members of the Survey, they have had enough to do in their own departments, but it is a subject for regret that the living organisms have been so entirely overlooked. Surely the expense of a Naturalist with a separate canoe which he would require, would not have added so very considerably to the cost of the Survey, and we should have had now such materials for the elucidation of the Flora and Fauna of the country as can seldom be obtained. Probably these would not differ much from those of the Northern states of the Union, but now that the local distribution of species is becoming of so much importance for the determination of their Geographical distribution such knowledge would be most valuable. In confirmation of this I quote from the article referred to before :

“ The time is now passed when the mere indication of the continent whence an animal has been obtained could satisfy our curiosity. And those Naturalists who have had an opportunity of ascertaining closely the particular circumstances under which the animals they describe are placed in their natural home, are guilty of a gross disregard to the interests of science when they neglect to relate them. Our knowledge of the distribution of animals would be far more extensive and precise than it now is, but for this neglect. *Every new fact relating to the Geographical distribution of the well known species, is as important to science as the discovery of a new species.*”

Were the Canadian Institute to bring this before the Government, they possibly would be induced to lend some assistance to the carrying out of such an object— although the benefit might not be so apparent as in the search after minerals. And possibly among those gentlemen who have turned their attention to these branches of science, some one might be found sufficiently capable, who would not require a very high salary; or, who urged by his zoological ardour might be induced to offer his services, for the payment of the necessary expenses, and the privilege of retaining for himself his duplicates, on depositing a specimen of each species collected, wherever the Government may direct.

MISCELLANEOUS

THE ATLANTIC TELEGRAPH.

Among the triumphs of Science in the 19th century, we can scarcely anticipate another which shall cast into the shade the successful laying of the great electric cable along the ocean bed of the Atlantic. There appears something of the calm and unostentatious dignity becoming so great an enterprise, in the unheralded announcement of success. Previous failures had prepared all minds for defeat-

An unpropitious season confirmed such unfavorable anticipations; so that when, on the 5th of August, the Niagara and the Gorgon sent forth, through all Telegraphic lines of the American Continent, the startling news that they had reached Trinity Bay with their portion of the cable intact, and that on the same memorable 5th of August the Agamemnon communicated, by its means, her completion of her moiety of the work, and the safe arrival of the other end of the cable in Valentia Bay: the general feeling was one of doubt and incredibility.

Time, however, has confirmed beyond all question, the certainty of the great event; and rejoicings of a character scarcely paralleled in modern history have testified to the feelings which it has awakened. The hardy seamen who carried the cable to land, knelt together, and united their voices in prayerful recognition of a Divine and overruling Providence, without whose aid their labor must have been in vain; and the English Board of Directors of the Telegraph Company,—abandoning the wonted matter-of-fact coolness of a joint stock directory,—despatched to the American Board this message, as novel in its form as in its news: EUROPE AND AMERICA ARE UNITED BY TELEGRAPH. GLOBE TO GOD IN THE HIGHEST, ON EARTH PEACE, GOOD WILL TOWARDS MEN.

Since the completion of the work was announced, a sufficient number of messages have flashed along the bed of the ocean to prove that the line is capable of being worked with effective accuracy. Some delay must necessarily take place before the communication can be thrown open to the public; but a little impatience is not unnaturally shown at the unavoidable delay; nor does rumor fail, as usual, to put its own construction on the silence. It has even been necessary to give official contradiction to the report that the cable had broken. The possibility either of laying the cable, or of transmitting the electrical current through its vast length of wire, can no longer be discussed; for both have been accomplished. But we must be prepared for unexpected phenomena, such as may baffle all previous telegraphic experience. Twice during the progress of laying the cable, from some hitherto unexplained cause, signals failed to pass between the Niagara and the Agamemnon; viz: for an hour, from 7.30, P. M., on July 29th, and again on August 2nd, from 12.38, A. M., to 5.40, A. M., or for fully five hours. During the whole of the latter period, the gravest apprehensions must have beset the minds of the operators that their labor was once more in vain.

The magneto-electrical current originally proposed to be employed,—and from which we are not aware of any intention to deviate,—is derived from a powerful combination of inducing coils and soft iron magnets. Doubtless when the scientific truths involved in the whole detailed history of this unparalleled triumph of science and persevering enterprise are fully revealed, many facts of singular interest and value will be brought to light.

Civic processions, feasts, and orations, have testified, alike in Britain and America, to the universal sympathy in the joy of those who have accomplished the great feat. Already it has been abundantly, if not adequately celebrated in verse as well as in prose. Among the poetic effusions to which it has given rise, we insert the following, from the pen of a correspondent, whose lines compare favorably with most of the published verse on the same prolific theme:—

Words o'er the Ocean!—Words!
 Words on the Lightning's wing!
 For a conjuring cord our Planet girds—
 The arc of a mystic ring.

Thro' old Neptune's wide domain,
 With a Time-out-rivalling rate,
 It beareth the thoughts of the busy brain—
 A noiseless—a glorious freight!

Secret, 'neath tidal wave
 It treadeth the trackless main;—
 The Spirit Medium stretching afar,—
 The grand Electric Chain!

'Tis done!—at length 'tis done!
 No vain Utopian scheme,
 God-like mind hath a triumph won
 Beyond all that the mind could dream.

The Song of the Scraph-Host
 On Judea's plains hath been
 Wafted from coast to utmost coast
 By England's righteous Queen.

Hail to thee—bridal clasp!
 Emblem for evermore,
 Of the troth 'twixt Britain's rock-bound Isle
 And Columbia's wooded shore!

J. P. H., St. Mary's, Aug. 14, 1858.

It is a fact, not unworthy of note, in the laying of the Atlantic Cable, that its final success, after repeated failures, may be ascribed mainly, if not altogether, to the abandonment of the elaborate machinery designed for regulating the rate at which the cable should be submerged, and literally "giving it its chance." It is also interesting to learn now that the existence of the "Telegraph Plateau," which the Atlantic soundings were supposed to have revealed, proves to be more than doubtful. The reported soundings of Lieutenant Berryman of the United States Navy, when carefully examined, and employed to gauge the outline of the Atlantic bottom, reveal no such uniform submarine plain, free from all undulations, as the projectors of the transatlantic telegraph were induced to found on the report of these soundings. Again the soundings made by Lieutenant Dayman, R. N., differ very considerably from those of Lieutenant Berryman, U.S.N.; and it now seems very questionable if either observations can be regarded as more than a very vague and partial approximation to the average depth. Relying, however, on the supposed proofs of a submarine ledge, or great "Telegraph Plateau," extending from the coast of Newfoundland to Ireland, the laying of the Telegraphic Cable has been attempted; and beneath the waves of the Atlantic, the mysterious electric current has already borne its winged messages, swift as thought, from the Old World to the New.

ARCTIC SCENERY.

In noticing in last number (ante p. 367) a disgraceful piece of literary fraud recently perpetrated under the auspices of a Philadelphia publishing house, we were not aware of the full extent of the imposture, and confounded it with the genuine work issued by Messrs. Childs and Peterson, of Philadelphia.

"The spurious "Kane Arctic Expedition" of Messrs. Loyd & Co. of Philadelphia, professes, as we now learn, to have been written by Sontag, one of Kane's officers, whose features the "*enterprising*" publishers endeavored very effectually to adapt to his assigned character, by converting the portrait of a highwayman, from the *National Police Gazette*, into his accredited likeness. The work appears to be characterized throughout by the most shameless effrontery ever embodied in the mercenary frauds of literary forgery. We only notice it now to prevent the confusion of Messrs. Childs and Peterson's genuine work, with that issued by Messrs. Loyd & Co.

ROMAN INSCRIPTIONS IN BRITAIN.

In the paper by the Rev. Dr. McCaul, entitled "Notes on Latin Inscriptions found in Britain," the author suggested a conjectural reading in the letters of the inscription on an altar found at Bath, in 1754, which, if correct, made a very important change in the rendering of the whole inscription. (ante p. 229.) From the following extract from a letter to the author, in reply to his communication of the paper, addressed to him by the Rev. H. M. Scartb, an eminent English antiquary and successful investigator of Anglo-Roman remains, particularly in Somersetshire, it will be seen that the ingenious conjecture has been fully confirmed.

"I this morning received the Canadian Journal (for May, 1858), and having read from *Notes on Latin inscriptions found in Britain*, proceeded to the Literary Institution to verify your conjecture respecting the altar mentioned at page 228."

[The altar, to which reference is made, was found in Upper Stall Street, Bath, in the year 1754, and is at present preserved in the Literary Institution of that City. It is probably about 15 or 16 centuries old.]

"I found your conjecture *perfectly correct*. What had escaped the acumen of Mr. Hunter and other antiquaries, who have from time to time examined the stone, has at the distance of some thousand miles, and in the new world, been read aright by one who has never seen it; so valuable is learned and accurate criticism in the hands of a scholar. It is really

LOVCETIO
MARTI ET
NEMETONA
V. S. L. M.

The L has been read as an I, but it is perfectly plain, when examined closely. There can be no doubt about it."

D. W.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST, -JUNE, 1883. Latitude—43 deg. 39.4 min. North. Longitude—79 deg. 21 min. West. Elevation above Lake Ontario, 108 feet.

Table with columns: Barom. at temp. of 32°, Temp. of the Air, Excess of mean above average, Tens. of Vapour, Humidity of Air, Direction of Wind, Result. Direction, Velocity of Wind, Rain in inches, Snow in inches. Rows represent days from 1 to 30.

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JUNE.

Heavy Dew recorded on 13 mornings during the month.
 Solar Halo and Parhelia on 8th, from 7 to 8 a. m., and 27th at 9 a. m., very perfect.
 Rainbow on the 4th, from 6 to 7 p. m., double and very perfect.
 Dense Fog on the 4th at 6 a. m.
 A considerable quantity of pollen fell with the rain during the thunderstorm on the morning of the 27th.

The Resultant Direction and Velocity of the Wind for the month of June, from 1848 to 1858, inclusive, were, respectively, West, 0.46 miles.

COMPARATIVE TABLE FOR JUNE.

Year	TEMPERATURE.				RAIN.		SNOW.		WIND.	
	Min. Aver	Max. from Aver	Min. obsd.	Range	No. of days	Inch's	No. of days	Inch's	Resultant Direction	Mean Force or Velocity.
1840	59.8	78.5	37.1	41.4	11	4.860	...	...	...	0.36 lbs.
1841	65.6	82.8	45.7	47.1	19	1.560	...	...	...	0.31
1842	55.6	73.9	28.0	45.9	15	6.755	...	...	...	0.27
1843	59.4	81.3	28.5	52.8	12	4.595	...	...	...	0.19
1844	59.9	82.8	33.1	49.7	9	3.535	...	...	...	0.27
1845	61.0	83.6	40.9	42.7	11	8.715	...	...	...	0.32
1846	63.3	83.3	41.5	41.8	14	1.920	...	...	...	0.30
1847	58.4	78.3	36.7	41.8	10	2.625	...	...	...	0.30
1848	62.9	81.5	38.3	54.2	8	1.810	...	...	N 61° W	1.90 to 51 mls.
1849	63.2	84.9	45.2	39.7	7	2.020	...	...	S 71° E	0.49 to 3.32
1850	64.3	83.2	49.0	34.2	10	3.945	...	...	S 60° W	0.38 to 5.4
1851	59.2	79.2	41.2	38.0	11	2.695	...	...	S 20° W	1.20 to 4.42
1852	60.8	80.1	43.6	42.5	10	3.160	...	...	S 76° W	1.49 to 0.9
1853	65.5	86.3	43.3	43.0	9	1.550	...	...	N 14° W	0.27 to 3.67
1854	64.1	87.7	47.4	41.3	17	4.670	...	...	N 21° E	0.80 to 4.12
1855	59.9	80.7	40.6	50.1	13	3.200	...	...	N 69° W	1.33 to 5.70
1856	62.1	82.6	48.3	34.3	21	5.060	...	...	S 21° W	0.90 to 5.30
1857	60.9	81.1	40.9	37.6	13	2.943	...	...	N 21° E	1.15 to 6.60
1858	66.2	80.3	48.7	31.2	12	2.943	...	...	S 20° E	0.25 to 5.53
M	61.43	83.69	40.95	42.74	11.5	3.151	...	...	...	4.80 Mls.

Highest Barometer..... 29.891 at 8 a. m., on 8th } Monthly range = 0.744
 Lowest Barometer..... 29.147 at 2 p. m., on 10th }
 Maximum Temperature..... 90° 2 on p. m., of 25th } Monthly range = 47° 7
 Minimum Temperature..... 42° 5 on a. m., of 14th }
 Mean maximum Temperature..... 73° 94 } Mean daily range = 17° 54
 Mean minimum Temperature..... 56° 41 }
 Greatest daily range..... 26° 4 from a. m. to p. m. of 2nd.
 Least daily range..... 4° 8 from a. m. to p. m. of 9th.
 Warmest day..... 26th... Mean temperature..... 79.98 } Difference = 26° 90.
 Coldest day..... 12th... Mean temperature..... 53° 08 }
 Radiation. { Solar..... 103° 0 on p. m. of 26th } Monthly range = 65° 0
 { Terrestrial..... 38° 0 on a. m. of 15th. }
 Aurora observed on 4 nights, viz., on 3rd, 7th, 10th and 23rd.
 Possible to see Aurora on 20 nights; impossible on 10 nights.
 Snowing on days,—depth inches; duration of fall hours.
 Raining on 12 days,—depth 2.943 inches; duration of fall 46.8 hours.
 Mean of cloudiness = 0.48.
 Most cloudy hour observed, 2 p. m., mean = 0.57; least cloudy hour observed 6 a. m., mean, = 0.40.

Stems of the components of the Atmospheric Current, expressed in miles.
 North. 1287.17
 South. 1455.91
 East. 1143.26
 West. 1082.01

Resultant direction S. 20° E.; Resulant Velocity 0.25 miles per hour.
 Mean velocity..... 5.53 miles per hour.
 Maximum velocity..... 24.5 miles from 11 a. m. to noon, on 7th.
 Most windy day..... 7th.... Mean velocity 11.19 miles per hour.
 Least windy day..... 16th.... Mean velocity 2.23 ditto.
 Most windy hour... 3 to 4 p. m..... Mean velocity 9.16 ditto. } Difference { 6.30 miles.
 Least windy hour... 4 to 5 a. m..... Mean velocity 2.86 ditto. }

Thunderstorms occurred on the 4th from 3 to 4.30 p. m.; 7th, 5.30 to 6.30 p. m.; 9th, 10 p. m. to midnight; 10th, 8 to 4 p. m.; 12th, 10 p. m. to midnight; 16th, 2 to 4 p. m., and 27th, 3 to 4 a. m.
 Distant Thunder heard on 2nd at noon; 20th, 3 p. m.; 21st, noon; 24th, 5 p. m.; and 26th, 2 to 4 p. m.
 Sheet Lightning observed on 3rd at midnight; 7th, 10 p. m. to midnight; 15th, 9 p. m. to midnight; and 25th, at 10 p. m.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—JULY, 1888.
Latitude—43 deg. 39.4 min. North. Longitude—83 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Date	Barom. at temp. of 32°.			Temp. of the Air.			Mean Temp. of the Air.			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Velocity of Wind.			Re-sultant Direc-tion.	Re- sultant Direction.	Rain in Inches.	Snow in Inches.			
	6 A.M.			10 P.M.			2 P.M.			6 A.M.			10 P.M.			2 P.M.			6 A.M.							10 P.M.		
	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.	6 A.M.	10 P.M.	2 P.M.					6 A.M.	10 P.M.	2 P.M.
1	29.693	29.667	29.666	63.5	61.3	62.10	2.87	291	350	317	326	68	68	68	E N E	N E E	E N E	8.8	6.0	3.4	7.87	7.94	Inap.	...				
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31			
July	6250.29	5975.82	5989.28	6052.63	63.32	63.65	63.65	23.87	481	470	470	481	77	77	77	62	74	70	4.02	8.64	3.76	5.783	6.72	Inap.	...			

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1858.

Highest Barometer 29.915 at 8 a.m. on 6th } Monthly range =
 Lowest Barometer 29.290 at 4 p.m. on 8rd } 0.625 inches.
 Mean temperature 83° on p.m. of 8th } Monthly range =
 Minimum temperature 69.0 on a.m. of 6th } 33° 0
 Maximum temperature 75° 44 } Mean daily range = 16° 45
 Mean maximum temperature 59° 98 }
 Mean minimum temperature 24° 9 from a.m. to p.m. on 6th.
 Greatest daily range 2.1 from a.m. to p.m. on 11th.
 Least daily range 2.1 from a.m. to p.m. on 11th.
 Warmest day . . . 8th ... Mean Temperature . . . 75° 78 } Difference = 17° 63.
 Coldest day . . . 15th ... Mean Temperature . . . 58° 25 }
 Maximum { Solar 103° 2 on p.m. of 8th } Monthly range =
 Radiation { Terrestrial 42.5 on a.m. of 28th } 60° 7
 Aurora observed on 5 nights, viz.: 4th, 5th, 6th, 12th and 15th; possible to see
 Aurora on 19 nights; impossible on 12 nights.
 Snowing on 0 days; depth, 0.0 inches; duration of fall 0.0 hours.
 Raining on 13 days; depth, 3.072 inches; duration of fall, 31.4 hours.
 Mean of cloudiness = 0.50; most cloudy hour observed, 2 p.m., mean = 0.57; least
 cloudy hour observed, 10 p.m., mean = 0.43.

Sums of the components of the Atmospheric Current, expressed in Miles.
 North. 1034.03
 South. 1380.10
 West. 1163.29
 Resultant direction, N 15° E; Resultant Velocity, 1.13 miles per hour.
 Mean velocity of the wind 5.76 miles per hour, from 11 a.m. to noon on 27th.
 Maximum velocity 29.5 miles per hour, 11.10 miles per hour.
 Most windy day 27th—Mean velocity, 1.65 do
 Least windy day 29th—Mean velocity, 0.77 do } Difference
 Most windy hour, 2 to 3 p.m.—Mean velocity, 8.77 do }
 Least windy hour, 9 to 10 p.m.—Mean velocity, 3.52 do } 5.25 miles.

Thunderstorms occurred on the 6th from 2 to 4:30 p.m.; 10th, from 11:40 a.m. to
 0:30 p.m.; 21st, from 2 to 3 p.m.
 Distant Thunder heard on the 14th, from 3 to 4 p.m.; 16th, from 3:30 to 4 p.m.;
 Sheet and Forked Lightning observed on the 2nd, from 7 p.m. 13rd, from 5 p.m.;
 10th, from 10 p.m.

Heavy Dew recorded on 11 mornings during the month.
 3rd. Pollen fell with the rain registered this morning.
 21st. Large hailstones fell with the rain during the thunderstorm from 2 to 3 p.m.
 25th. Brock's Monument on Queenston Heights distinctly visible to the naked
 eye at 2 p.m.
 The Resultant Direction and Velocity of the Wind for July, from 1848 to 1858
 inclusive, were respectively N 65° W, and 0.17 miles.

COMPARATIVE TABLE FOR JULY.

YEAR	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Difference from Average.	Maximum Observed.	Minimum Observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Mean Velocity.
1840	65.8	-1.3	79.4	48.2	31.2	6	5.270	...	...	...	0.27 lbs
1841	65.0	-2.1	86.3	43.2	43.1	10	8.150	...	...	...	0.33 "
1842	64.7	-2.4	90.5	42.0	48.5	4	3.050	...	...	...	0.44 "
1843	64.5	-2.6	86.1	40.5	45.6	8	4.604	...	...	...	0.19 "
1844	66.0	-1.1	86.1	40.5	45.6	12	2.816	...	...	...	0.29 "
1845	66.2	-0.9	94.6	44.9	49.1	7	2.195	...	...	...	0.19 "
1846	68.0	+0.9	94.0	44.9	49.1	9	3.895	...	...	...	0.19 "
1847	69.0	+1.6	87.5	45.8	43.7	3	3.355	...	...	...	0.18 "
1848	69.4	+1.3	82.7	46.7	36.0	10	1.890	...	...	N 14 W	4.94 ms
1849	68.5	+1.3	89.1	51.0	38.1	4	3.415	...	...	S 5 W	0.75 "
1850	68.9	+1.8	84.9	52.8	32.1	12	5.270	...	...	N 61 E	0.59 "
1851	68.0	-2.1	82.7	52.1	30.6	12	3.025	...	...	N 60 W	0.88 "
1852	66.8	-0.3	90.1	49.5	40.6	8	4.025	...	...	N 43 W	0.93 "
1853	65.6	-1.5	85.4	49.4	36.0	10	0.315	...	...	S 76 E	0.31 "
1854	72.6	+5.4	83.6	53.0	40.6	9	4.805	...	...	S 58 W	0.34 "
1855	67.9	+0.8	86.4	53.1	35.3	13	3.245	...	...	S 19 W	0.73 "
1856	69.9	+2.8	92.0	51.4	40.6	8	1.120	...	...	N 79 W	1.57 "
1857	67.8	+0.7	85.4	52.4	33.0	15	3.475	...	...	S 68 E	0.81 "
1858	67.9	+0.8	83.4	55.9	27.5	13	3.072	...	...	N 15 E	1.13 "
Mean	67.07	...	87.48	46.19	39.29	4	3.636	...	...	...	4.66 "

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—JUNE, 1858.
(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., L. L. D.

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

Day	Barom. corrected and reduced to 32° Fahr.		Temp. of the Air.		Tension of Vapor.		Humidity of Air.		Direction of Wind.		Velocity in miles per hour.			Mean direction of Wind.	Inches Rain.	Inches Snow.	A cloudy sky is represented by 10; A cloudless sky by 0.		WEATHER, &c.
	6 A.M.	3 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.				2 P.M.	10 P.M.	
1	29.907	29.781	29.840	55.1	80.9	65.6	400	464	386	SW	SW	8.12	1.62	3.22	Clear.	Clear.	St. 2.		
2	29.833	29.882	29.878	60.6	78.0	63.6	391	418	416	SW	SW	0.20	4.47	4.65	C. Str. 2.	C. Str. 2.	Do. 2.		
3	29.802	29.861	29.851	64.0	76.7	61.0	288	413	390	SE	S	4.46	4.26	0.61	Clear.	Clear.	C. St. 8.		
4	29.827	29.814	29.808	63.2	88.1	63.5	221	584	543	SE	SE	16.06	14.90	13.52	C. Str. 10.	Nimb. 10.	Thun.		
5	29.813	29.878	29.861	60.7	72.0	62.8	367	340	391	W	W	0.46	0.09	3.22	Clear.	Clear.	Clear.		
6	29.797	29.831	29.816	64.6	63.6	61.0	355	543	511	SE	SE	3.66	6.17	11.11	C. Str. 10.	Nimb. 10.	Thun.		
7	29.777	29.857	29.878	60.2	81.0	72.1	511	663	631	W	W	3.99	8.81	6.98	Do. 8.	C. Str. 6.	C. St. 7.		
8	29.842	29.816	29.816	59.7	70.9	68.0	323	423	372	W	W	0.00	0.46	1.02	Clear.	Clear.	Str. 2.		
9	29.868	29.804	29.874	59.7	64.9	66.1	391	407	370	W	W	0.71	3.81	2.22	C. St. 10.	Nimb. 10.	Do. 10.		
10	29.799	29.446	29.446	62.1	62.1	61.1	445	498	446	SE	SE	6.70	8.85	7.60	Nimb. 10.	Nimb. 10.	Do. 10.		
11	29.893	29.874	29.851	60.0	62.1	61.1	410	347	270	W	W	6.96	4.05	0.12	C. Str. 6.	C. Str. 6.	Clear.		
12	29.948	29.861	29.812	50.8	68.1	67.2	210	346	407	W	W	0.72	3.80	1.92	Cum. 4.	Do. 8.	C. St. 9.		
13	29.694	29.647	29.624	54.0	67.1	65.0	308	436	420	SE	SE	2.86	4.83	0.83	C. St. 10.	Nimb. 10.	Do. 8.		
14	29.897	29.670	29.797	55.0	65.4	64.1	411	463	450	SE	SE	0.00	1.05	0.17	C. Str. 6.	Cir. Str. 6.	Clear.		
15	29.780	29.700	29.711	60.5	78.1	60.9	456	588	466	SE	SE	0.26	0.09	0.17	Clear.	Do.	Str. 4.		
16	29.753	29.714	29.691	55.9	76.1	63.7	420	541	569	SE	SE	0.12	2.95	5.27	Do.	Cir. Str. 9.	Do. 9.		
17	29.907	29.799	29.825	61.0	83.0	72.2	473	662	666	SW	SW	5.31	6.70	7.00	C. St. 6.	Clear.	C. St. 10.		
18	29.816	29.603	29.632	70.0	69.0	65.2	551	608	483	SE	SE	3.61	2.62	0.70	C. St. 8.	C. St. 10.	Do. 4.		
19	29.822	29.765	29.800	60.0	62.0	60.9	374	496	473	SE	SE	0.00	1.53	1.96	Clear.	Do. 4.	C. St. 4.		
20	29.744	29.889	29.716	62.1	81.9	70.2	491	664	557	SE	SE	0.88	0.02	0.16	Do.	Cir. Str. 4.	Cir. Str. 4.		
21	29.888	29.797	29.716	65.9	83.1	66.2	444	570	666	SE	SE	0.58	0.40	0.00	Cum. Str. 2.	C. Str. 6.	Do. 8.		
22	29.823	29.644	29.628	76.8	85.4	68.1	478	610	516	SE	SE	0.00	0.00	0.00	Do.	Cir. Str. 4.	Cir. Str. 4.		
23	29.985	29.824	29.778	58.2	57.0	57.2	446	836	807	SE	SE	0.51	0.30	1.02	C. C. St. 9.	C. C. St. 9.	Cir. Str. 6.		
24	29.825	29.717	29.696	74.7	83.8	80.1	552	942	804	SE	SE	0.56	4.42	4.18	Cir. Str. 6.	Do. 6.	Nimb. 10.		
25	29.710	29.882	29.696	74.0	96.2	71.9	680	1053	745	SE	SE	0.23	2.47	3.06	C. C. St. 6.	Do. 6.	Nimb. 10.		
26	29.714	29.778	29.814	73.0	97.2	79.2	693	1256	612	SE	SE	0.16	0.22	0.73	C. C. St. 2.	Clear.	Cir. Str. 2.		
27	29.815	29.806	29.800	70.5	89.0	78.5	579	809	735	SE	SE	0.32	0.65	0.02	C. C. St. 8.	C. C. St. 8.	Do. 4.		
28	29.890	29.821	29.843	74.0	84.4	83.0	568	474	393	SE	SE	0.10	8.05	8.73	Do. 3.	Clear.	Clear.		
29	29.881	29.811	29.845	59.5	83.0	62.3	462	597	523	SE	SE	0.86	0.00	4.20	C. C. St. 8.	C. C. St. 8.	Cir. Str. 4.		
30	29.777	29.792	29.834	54.0	75.1	60.3	282	628	466	W	W	1.42	4.67	4.22	Clear.	Clear.	Clear.		

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—JULY, 1868.
(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., L.L.D.

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

Day	Barom. corrected and reduced to 32°		Temp. of the Air.			Tension of Vapor.			Humidity of Air.			Direction of Wind.		Velocity in miles per hour.			Mean direction of Wind.	Rain in Inches.	Snow in Inches.	WEATHER, &c.		
	6 A.M.	2 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.				10 P.M.	6 A.M.	2 P.M.
1	29.872	29.717	20.823	50.0	59.2	258	470	352	71	52	70	WbK	S	SWbW	4.32	4.00	6.96	Clear.	Clear.	Clear.	St. 3.	Clear.
2	7.47	679	853	54.5	84.4	308	545	530	74	47	64	SSE	E	E	3.30	0.51	0.32	Do.	Do.	Do.	Ni. 10.	Ni. 10.
3	566	858	413	68.2	87.0	543	928	826	79	72	95	SSE	E	E	0.27	3.37	5.10	Clear.	Cir. Str. 10.	Cir. Str. 8.	Do.	Do.
4	555	630	881	73.7	75.6	59.0	853	873	416	51	79	NbE	E	W	1.76	3.36	9.12	Do.	Do.	Do.	Do.	Do.
5	30.052	30.014	29.945	62.8	64.4	353	688	467	71	74	83	NbE	E	W	8.88	1.43	1.70	Do.	Do.	Do.	Do.	Do.
6	29.811	29.655	792	71.4	91.0	615	1004	745	88	72	82	SbW	SbW	S	0.32	2.01	4.25	Do.	Do.	Do.	Do.	Do.
7	758	735	800	72.1	68.0	568	476	452	74	75	94	SWbS	S	S	2.48	8.80	6.06	Do.	Do.	Do.	Do.	Do.
8	814	831	862	58.2	69.9	440	493	433	91	87	97	NbE	NbE	NbE	7.12	1.40	16.08	Do.	Do.	Do.	Do.	Do.
9	832	812	865	59.0	76.8	70.9	463	805	726	97	80	NbE	NbE	NbE	17.83	0.37	9.02	Do.	Do.	Do.	Do.	Do.
10	841	864	942	60.4	66.7	59.1	487	460	439	94	76	NbE	S	S	4.40	0.70	1.16	Do.	Do.	Do.	Do.	Do.
11	877	772	827	54.0	56.2	390	429	430	93	97	98	NbE	NbE	NbE	9.43	0.06	5.70	Do.	Do.	Do.	Do.	Do.
12	684	720	821	59.1	68.2	500	577	517	90	85	80	NbE	NbE	NbE	13.30	6.60	7.92	Do.	Do.	Do.	Do.	Do.
13	884	884	881	65.9	67.2	510	731	563	85	81	86	NbE	S	S	2.68	5.22	5.02	Do.	Do.	Do.	Do.	Do.
14	949	836	927	60.2	87.7	69.4	570	836	460	89	65	SW	S	SW	0.28	1.98	0.23	Do.	Do.	Do.	Do.	Do.
15	861	779	785	69.4	80.6	599	843	658	84	83	90	SSE	SSE	SSE	0.53	1.40	0.22	Do.	Do.	Do.	Do.	Do.
16	916	779	856	68.1	86.5	612	850	536	90	68	77	S	S	S	0.63	4.20	4.77	Do.	Do.	Do.	Do.	Do.
17	816	765	898	68.1	86.5	612	850	536	90	68	77	S	S	S	0.63	4.20	4.77	Do.	Do.	Do.	Do.	Do.
18	906	822	882	68.6	80.0	61.3	557	442	77	77	83	NbW	NbW	NbW	2.77	1.60	1.05	Do.	Do.	Do.	Do.	Do.
19	911	914	896	63.0	64.5	577	547	563	91	52	84	NbW	NbW	NbW	0.60	0.02	0.60	Do.	Do.	Do.	Do.	Do.
20	821	858	716	81.2	84.6	498	746	583	91	64	94	NbE	S	S	0.00	0.00	1.62	Do.	Do.	Do.	Do.	Do.
21	610	435	500	64.9	63.0	63.0	583	587	549	94	63	NbE	S	S	0.22	2.16	3.02	Do.	Do.	Do.	Do.	Do.
22	466	514	637	61.0	61.4	57.6	511	497	407	97	85	NbE	NbE	NbE	0.11	6.51	12.61	Do.	Do.	Do.	Do.	Do.
23	665	653	899	67.8	67.0	55.1	362	406	402	87	77	NbE	NbE	NbE	4.51	2.08	13.02	Do.	Do.	Do.	Do.	Do.
24	835	883	878	51.3	67.8	59.0	341	489	446	89	75	SW	SW	SW	0.11	0.76	6.60	Do.	Do.	Do.	Do.	Do.
25	971	964	959	51.9	71.6	61.1	354	603	505	93	66	NbE	NbE	NbE	0.02	1.81	6.15	Do.	Do.	Do.	Do.	Do.
26	927	714	643	55.8	84.2	67.0	420	269	682	94	83	NbE	NbE	NbE	3.05	2.61	0.01	Do.	Do.	Do.	Do.	Do.
27	535	510	661	70.0	77.9	67.0	658	527	489	90	57	SSE	SSE	SSE	0.00	0.08	16.12	Do.	Do.	Do.	Do.	Do.
28	814	862	864	59.3	73.4	67.1	416	506	503	85	62	SW	SW	SW	16.81	15.82	4.05	Do.	Do.	Do.	Do.	Do.
29	917	781	777	53.4	63.9	57.6	375	510	443	93	88	SW	SW	SW	0.12	0.25	0.56	Do.	Do.	Do.	Do.	Do.
30	648	682	658	51.1	76.8	62.4	354	614	523	96	88	NbE	NbE	NbE	0.28	0.37	0.22	Do.	Do.	Do.	Do.	Do.
31	587	687	712	60.7	79.1	63.5	505	635	569	94	76	SSE	SSE	SSE	0.00	1.05	0.08	Do.	Do.	Do.	Do.	Do.

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

Barometer	{	Highest, the 3rd day	30.002
		Lowest, the 10th day	29.342
		Monthly Mean	29.771
		Monthly Range	0.660
Thermometer ...	{	Highest, the 26th day	97°4
		Lowest, the 12th day	41°4
		Monthly Mean	67°21
		Monthly Range	53°0
Mean of Humidity .....		.756	
Greatest Intensity of the Sun's Rays		108°4	
Lowest point of Terrestrial Radiation		43°2	
Amount of Evaporation in inches		3.69	
Rain fell on 13 days, amounting to 8.056 inches; it was raining 49 hours, and was accompanied by thunder on 4 days. (From 5 to 6 p.m. on the 10th day there fell 0.933 inches-)			
The most prevalent wind was S. E.			
The least prevalent wind was N.			
The most windy day was the 5th; mean miles per hour, 12.74.			
The least windy day was the 22nd; mean miles per hour, 0.00.			
Aurora Borealis visible on one night.			
The electrical state of the atmosphere has indicated high tension.			
Ozone was in moderate quantity.			
Fireflies first seen on the 18th day.			

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

Barometer	{	Highest, the 18th day	30.082
		Lowest, the 3rd day	29.388
		Monthly Mean	29.759
		Monthly Range	0.674
Thermometer ...	{	Highest, the 7th day	99°3
		Lowest, the 1st day	41°3
		Monthly Mean	66°50
		Monthly Range	58°0
Greatest intensity of the Sun's Rays		108°1	
Lowest point of Terrestrial Radiation		40.6	
Amount of Evaporation (in inches)		3.14	
Mean of Humidity .....		.818	
Rain fell on 13 days amounting to 12.214 inches; it was raining 72 hours 44 minutes, and was accompanied by thunder on 4 days. (The Rivers in this vicinity rose nearly 2 feet on the 13th day, owing to the heavy and continued rain.)			
The most prevalent wind was N. E. by E.			
The least prevalent wind N.			
The most windy day the 28th; mean miles per hour 12.22.			
Least windy day the 19th; mean miles per hour 0.20.			
The electrical state of the Atmosphere has indicated rather high tension.			
Ozone was present in large quantity.			

