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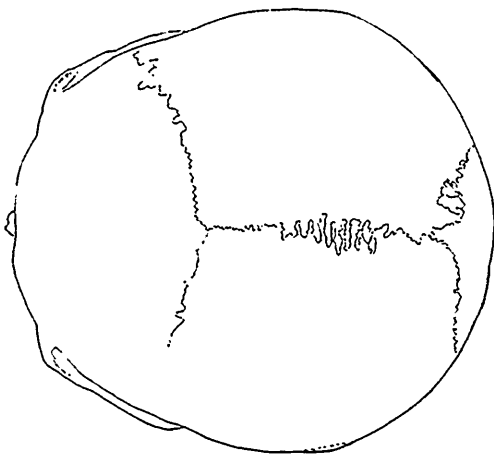
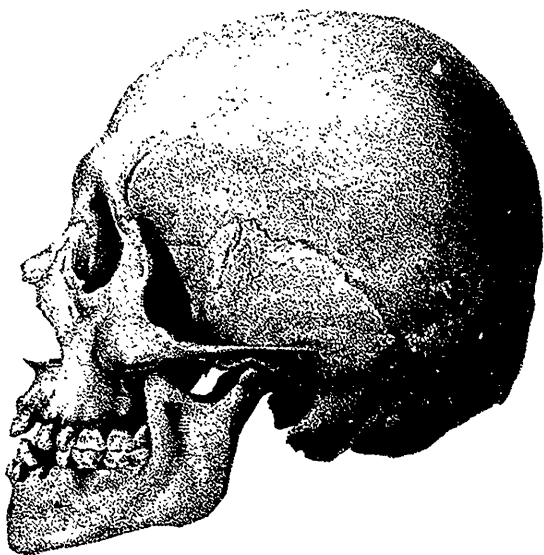
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ETHNICAL FORMS AND UNDESIGNED ARTIFICIAL DISTORTIONS OF THE HUMAN CRANIUM.

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THE differences between man and all other animals appear to be so clearly defined, that the Naturalist was long induced to overlook those which distinguish different races of men, and to regard any diversities of structure or relative proportions in the human form as mere variations from one common or ideal type. Nevertheless the craniologist, at the very commencement of his investigations, is led to recognise certain essential varieties of form; though still tempted, like Blumenbach, to refer all these to some "Caucasian" or other assumed highest type. Before, however, the ethnologist directed his attention to such researches, the artist had sought this type in the beautiful realisations of Greek sculpture; and by such means he determined the long-accepted statuary-scale of the human head and figure. The influence of this artistic ideal on the later speculations of the ethnologist should not be overlooked. It guided Camper in assigning the laws of his facial angle; controlled Blumenbach in his determination of the cranial peculiarities

of leading races of men ; and even influenced Prichard in his definition of the symmetrical or oval form of skull which he ascribed to his first division. Against the ideal canons of an antique statuary scale, however, some of the greatest modern masters protested ; foremost of whom was Leonardo da Vinci, of whom Bossi remarks : " He thought but little of any general measure of the species. The true proportion admitted by him, and acknowledged to be of difficult investigation, is solely the proportion of an individual in regard to himself, which, according to true imitation, should be different in all the individuals of a species, as is the case in nature." In the features of the face there are the endless varieties of portraiture, controlled by family and national affinities, and so also in the varying proportions of the skull there appears to be an approximation in each race towards a special form. The craniologist accordingly finds in nature his short and truncated ; his long and tapering, or " boat-shaped ;" his high or pyramidal ; his broad, flattened, and oval : as well as intermediate forms. But besides those, to each of which a distinctive name has been assigned, attention is being anew directed to a totally distinct class, in which not only the absence of symmetry is suggestive of abnormal structure ; but wherein certain special forms are recognised as the result of artificial causes, operating accidentally or by design. Some of these artificial forms have an additional significance from the fact that they are peculiar to man, and originate in causes which distinguish him from all inferior orders of animated nature. This is specially the case with one of the classes of artificial conformation, already traced, in a former number of this Journal, to influences resulting from the mode of nurture in infancy. As the same opinion has been recently reproduced in an English scientific journal as a novel discovery,* a recapitulation of the original idea, with additional illustrations, may not be out of place here.

In the month of March, 1855, an Indian cemetery was accidentally opened at Barrie, on Lake Simcoe, from which upwards of two hundred skulls are said to have been exhumed, along with bones and Indian relics. Among the Crania preserved in the collection of the Canadian Institute is one of those Indian skulls, selected, no doubt, owing to its unusual form, which could scarcely fail to attract atten-

* *Nat. Hist. Review*, July, 1862. J. B. Davis, M.R.C.S. Eng., &c., *On Distortions in the Crania of the Ancient Britons*.

tion. It was found in the country of the ancient Hurons; and though the idea was, that it lay among other relics of a battle-field,—to which its unusual shape would give countenance, as the indication of some foreign intruder,—yet it is possible that it had been deposited in one of the Ossuaries into which it was the custom of the Huron Indians to gather their scaffolded dead, after they had been exposed for a certain time to decay.

The skull in question is large and massive, and differs essentially from the Huron type of Cranium in its short longitudinal diameter, vertical occiput, and flattening of the whole parieto-occipital region to so marked a degree, that when laid on the occiput it rests as firmly as on the base.

I have already shown, in a former paper,* that the Hurons were characterized by the more elongated, or dolichocephalic form of head. In this respect indeed their crania are prominently distinguished, exhibiting a greater divergence from Dr. Morton's assumed type, than any other of the American Aborigines, if we except the Esquimaux. The Barrie skull, on the contrary, approximates in a considerable degree to the celebrated mound-skull of the Scioto Valley, which Dr. Morton specially selected as "perhaps the most admirably formed head of the American race hitherto discovered. It possesses," he added, "the national characteristics in perfection, as seen in the elevated vertex, flattened occiput, great interparietal diameter, ponderous bony structure, salient nose, large jaws, and broad face. It is the perfect type of Indian conformation, to which the skulls of all the tribes from Cape Horn to Canada more or less approximate."

I formerly showed, from the results of a series of careful measurements of Canadian crania, that the latter remark is not born out by a minute determination of the Algonquin, Iroquois, or Huron cranial type; and more extensive observations have since strongly confirmed me in that conclusion. The mean derived from the measurement of thirty-seven skulls procured from Indian graves within the Huron district, including those of twenty-nine males and eight females, is here placed in comparison with the measurements of the Scioto-Mound and Barrie skulls; and, as will be perceived, presents a striking contrast:—

* Supposed prevalence of one Cranial type throughout the American Aborigines. *Canadian Journal*, Vol. II., p. 406.

	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
Scioto Mound Skull..	6.50	6.00	4.50	6.20	16.00	4.50	13.80	19.80
Barrie Skull	6.60	6.40	5.20	5.30	16.00	4.60	14.40	20.70
Huron Mean	7.40	5.43	4.35	5.43	14.66	4.23	14.65	20.48

If no artificial element was supposed to affect any of those forms, the Barrie skull would naturally be classed with the former in any such comparison; and even with a full recognition of the artificial influences, for the illustration of which the Barrie skull (Plate I.) is now selected, it forms quite an exceptional instance among crania exhumed within the Huron country. Its markedly brachycephalic character, however, is chiefly determined by its parieto-occipital flattening, with the accompanying parietal expansion; and although the same may be affirmed to some extent of the typical Mound-skull, yet it is only in certain respects that the two agree in form or measurements. The important difference in the vertical diameters constitutes an essential distinction between them, the Barrie skull being below the Huron mean, while the Mound-skull is considerably above it. Dr. Morton was familiar with the effects produced by the widely extended practise among the American Aborigines of cranial deformation, and did not overlook its probable influence on certain familiar forms of head, which he assumed to be universally prevalent throughout the Western Hemisphere. Accordingly, while selecting the Scioto Mound-skull as most perfectly illustrating the typical American head, he remarks on its peculiar parieto-occipital conformation:—"Similar forms are common in the Peruvian tombs, and have the occiput, as in this instance, so flattened and vertical, as to give the idea of artificial compression; yet this is only an exaggeration of the natural form, caused by the pressure of the cradle-board in common use among the American nation."

But the vertical flattened occiput, thus referred to as of common occurrence in Peruvian crania, and described as, in its extremest development, only an exaggeration of the American typical form, is by no means peculiar to the New World; and a comparison of the American examples now referred to, with others derived from ancient British cemeteries, may help to throw new and interesting light on

some of the customs of Europe's prehistoric tribes. The subject thus referred to was first brought by me, under the notice of ethnologists, in a paper on the supposed American cranial type, read before the American Association for the Advancement of Science, at its Montreal meeting in August, 1857,* and submitted to the notice of the Ethnological section of the British Association, at the Dublin meeting in the same year.† In this I selected the Barrie skull as exhibiting in a remarkable manner the peculiarities of the vertical occiput; and after quoting the above remarks of Dr. Morton on the corresponding feature, as it occurs both in the Scioto Mound-skull, and in many Peruvian crania, the paper thus proceeds:—

I think it extremely probable that further investigation will tend to the conclusion that the vertical or flattened occiput, instead of being a typical characteristic, pertains entirely to the class of artificial modifications of the natural cranium familiar to the American ethnologist alike in the disclosures of ancient graves, and in the customs of widely separated living tribes. In this I am further confirmed by the remark of Dr. Morton in reference to the Peruvian crania:—"These heads are remarkable, not only for their smallness, but also for their irregularity; for in the whole series in my possession there is but one that can be called symmetrical. This irregularity chiefly consists in the greater projection of the occiput to one side than the other, showing in some instances a surprising degree of deformity. As this condition is as often observed on one side as the other, it is not to be attributed to the intentional application of mechanical force; on the contrary, it is to a certain degree common to the whole American race, and is sometimes, no doubt, increased by the manner in which the child is placed in the cradle."‡ To this Dr. Morton subsequently added in describing an unsymmetrical Mexican skull: "I had almost omitted the remark, that this irregularity of form is common in, and peculiar to, *American crania*."§ The latter remark, however, is too wide a generalization. I have repeatedly noted the like unsymmetrical characteristics in the brachycephalic crania of the Scottish barrows; and it has occurred to my mind, on more than one occasion, whether such may not furnish an indication of some partial compression, dependent, it may be, on the mode of nurture in infancy, having tended, in their case also, if not to produce, to exaggerate the short longitudinal diameter, which constitutes one of their most remarkable characteristics.

From this it will be seen that, so early as 1857, I had given expression to an idea formed previously to my leaving Scotland in 1853, relative to undesigned artificial changes wrought on crania recovered from Scottish barrows, and which I conceived to be traceable to the

* *Canadian Journal*, Vol. II., p. 406.

† *Edinburgh Philosoph. Journal*, N. S., Vol. VII., p. 1.

‡ *Crania Americana*, p. 115.

§ *Types of Mankind*, p. 144.

mode of nurture in infancy. That event mainly prevented the publication of the views I had formed on this subject, earlier as well as in a more ample form, from the consequent interruption of researches then in progress, relative to the physical conformation of early British races. The delay, however, has furnished me with novel illustrations on this and other points relating to physical ethnology, derived from corresponding phenomena in the crania of the New World.

So remarkable a change has taken place during the interval, that it is now difficult to realize such a condition of things as prevailed when Sir Richard Colt Hoare, one of the most intelligent and zealous of British antiquaries, explored the sepulchral mounds of Wiltshire, and recovered from them a host of illustrations of primitive arts and customs, but systematically rejected evidence of the physical characteristics of the artists by whose skill such objects had been wrought. Nothing could more strikingly illustrate this than the contrast presented between the "*Ancient Wiltshire*," otherwise so rich in its stores of archaeological information; and the "*Ten Years' Diggings in Celtic and Saxon Grave Hills*," which records the results of researches closely analogous to those of Sir R. C. Hoare, carried on by the late Mr. Thomas Bateman, in coöperation with two zealous fellow-labourers, in Derby, Stafford, and York-shires, from 1848 to 1858. The Wiltshire Antiquary, with commendable reverence, restored the bones to the ravished sepulchre, from whence it never occurred to him that they would be again recovered, as furnishing evidence of greater significance to the scientific student than the pottery and implements which he preserved. Under the influence of the change in the appreciation of such evidence, his Derbyshire follower claims a special value for information derived by him from the systematic opening of upwards of four hundred tumuli, because it embodies the results of his exhumation of such a collection of ancient crania as no future writer is likely to have access to.

The result of my own examination of such ancient Scottish crania as were accessible at the period when my researches were interrupted, along with imperfect references to other explorations and disclosures, was to impress me with the conviction that the evidence pointed to the existence of more than one early race, and that traces seemed to be recognizable, suggestive of one characterised by great

length and narrowness of head, a remarkable prolongation of the occiput, and poor frontal development. To this another appeared to have succeeded with a short or brachycephalic head, prominent parietal development, and truncate occiput. Accordingly when the questions involved in such researches and speculations were brought under the notice of ethnologists in a paper read by me before the British Association in 1850, I there remarked: "Not the least interesting of the indications which this course of investigation seems to establish in relation to the primitive races of Scotland, are the evidences of the existence of primitive British races prior to the Celtæ; and also the probability of these races having succeeded each other in a different order from the primitive colonists of the north of Europe. Meanwhile, however, these data, and the conclusions derived from them, are produced chiefly with a view to induce more extended research. A much greater accumulation of evidence is requisite to establish any absolute or certain conclusions; and this can only be obtained by a general interest in the inquiry leading to the observation of such, where the researches of the archæologist, or the chance operations of the agriculturist afford the desired means."* To suggest the possibility of primitive races of men, not of Celtic origin, having been the earlier occupants of Scotland appeared, in 1850, a sufficiently daring extravagance. But the *Antiquités Celtiques et Antédiluviennes* of M. Boucher de Perthes, had just issued from the French press; and already, after so brief an interval, we read in familiar phraseology of the prehistoric man of the Pfahlbauten of Switzerland and France, or of the Crannoges of Ireland and Scotland, and the Kjekkenmøddings of Denmark; and are no longer startled even to hear of the Flint-Folk of the preglacial period, the contemporaries of the *Elephas primigenius* and the *Rhinoceros tichorinus*. In 1851, before this wonderful revolution in opinion had been brought about, my ideas on the prehistoric races of Scotland, and inferentially of Britain, were set forth in greater detail;† but still necessarily accompanied with expressions of regret at the inadequate data available for investigations on a subject then altogether novel. Scottish antiquaries—sympathising in the views which guided Sir R. C. Hoare in returning to the barrow the skull and bones of its occupant, while carefully

* *Inquiry into the Evidence of Primitive Races in Scotland prior to the Celtæ.* Report Brit. Assoc. 1850, p. 144.

† *Archæology and Prehistoric Annals of Scotland.*

preserving the implements and personal ornaments originally deposited beside them,—had for the most part transferred to the Phrenological Museum the few earlier crania recovered from Scottish barrows. To these phrenological zeal had made some additions; and my own researches enabled me to increase the number. But after setting forth the measurements and most noticeable characteristics of thirty-nine skulls, including some from medieval cemeteries, I was careful to express the conviction that such limited data could, at most, only suffice for the basis of suggestive hypotheses.

The facilities derived from repeated study of the remarkable collection of Crania of the Academy of Sciences of Philadelphia, as well as those in other American museums, have since familiarized me with the varied forms of which the human head is susceptible, under the influence of artificial compression; and while the examination and measurement of some hundred specimens of American crania have satisfied me of the existence of dolichocephalic and brachycephalic heads as tribal or national characteristics of the New World; I have also been no less struck with the exaggerated brachycephalic form, accompanied with the parieto-occipital flattening, or the vertical occiput, the effects, as it appears to me, of undesigned artificial deformation, resulting from the process of nursing still practised among certain Indian tribes. Of this peculiar brachycephalic form the Barrie skull, figured on plate I., is a highly characteristic illustration. Found in an Indian cemetery, on a continent where the craniologist is familiar with examples of the human head flattened and contorted into the extremest abnormal shapes; and where the influence of the Indian cradle-board in producing or increasing the flattened occiput had long since been pointed out by Dr. Morton: the peculiar contour of the Barrie skull excited no more notice than pertained to the recognition of one well-known variety of American cranial forms. But when almost precisely the same form is found in British graves, it is suggestive of ancient customs hitherto undreamt of, on which the familiar source of corresponding American examples is calculated to throw a novel light.

About the year 1852, some labourers engaged in levelling a sepulchral mound in the Parish of Codford, South Wiltshire,—the scene of Sir R. C. Hoare's valuable explorations,—recovered from it a skull which has been preserved by Mr. J. Y. Ackerman, and described in the "*Crania Britannica*." This is the skull represented on plate

II., selected here from those of its class in the *Crania Britannica* for the purpose of comparison with the Barrie Indian skull. As seen in profile the vertical occiput is still more remarkable, and materially contributes to determine the peculiar characteristics which attracted the attention of Mr. J. Barnard Davis, by whom it is described. He remarks of it: "Its most interesting peculiarities are its small size, and its decidedly brachy-cephalic conformation. This latter character, which commonly appertains to the ancient British cranium, and even to that form which we regard as typical, is seldom met with in so marked a manner." He then describes the fore-part of the head, with its oblique forehead, pointed chin, and quadrangular orbits, producing the aspect of a face "eminently British," and thus proceeds: "The zygomatic arches are short, a character which appertains to the entire calvarium, but is most concentrated in the parietals, to which the abruptly ascending portion of the occipital lends its influence. The widest part of the calvarium is about an inch behind, and as much above the auditory foramen, and when we view it in front we perceive it gradually to expand from the outer angular process of the frontal to the point now indicated. The dome of the brain-case is remarkably equable, and is uninterrupted by any irregularity. The vault of the palate is small and short, but lofty. We believe we have thus described every noteworthy characteristic that can assist the eye in realizing the original from the study of the figures now presented." Mr. Davis accordingly proceeds to point out the exceptional character of the Codford cranium, owing to its decidedly brachycephalic form, but without indicating the special peculiarity of the flattened occiput, or referring any of its features to artificial causes. On the contrary, he concludes with the remark: "It shows the latitude of form, or variety, among any given set of features; but still far from allowing of the withdrawal of the skull from the race to which it belongs, and without by any means wholly overshadowing the ethnical characters appertaining to that race."* These opinions Mr. Davis appears to have retained down to the year 1857, when I suggested the probable artificial source of the flattened occiput; and, indeed, to have abandoned any recognition of exceptional features in the Codford Cranium: as in a paper communicated by him to the Academy of Natural Sciences of Philadelphia that same year, this skull is specially selected as one of three representatives

* *Crania Britannica*. Decade II. Pl. 14.

of "the typical form of cranium of the ancient Briton," in contrast to others which he calls "aberrant forms."*

None of all the skulls figured in profile in the first four decades of the *Crania Britannica*, exhibits the parieto-occipital flattening, with its exaggerated brachycephalic accompaniments, so markedly as this one recovered from the Codford Barrow, and shown here on Plate II. Nevertheless it is obvious that it had not occurred to the learned craniologist, when describing, as he says, every noteworthy characteristic, to ascribe any of the features of this peculiar type of cranium to artificial causes, though he has now adopted the opinion that some of the British crania may owe in part their brachycephalic proportions, with the accompanying unsymmetrical development and vertical occiput, to some partial compression dependent on the mode of nurture in infancy. The first example of this peculiar occipital conformation which attracted my attention, as possibly traceable to other than mere ethnical specialities, or natural variations from a normal typical form, occurred in a skull recovered from a cist opened at Juniper Green, in the vicinity of Edinburgh, on the 17th of May, 1851. Soon after the publication of the *Prehistoric Annals of Scotland*, when my attention was specially directed to this subject, I learned of the accidental discovery of a stone cist in a garden on the Lanark road, a few miles to the north-west of Edinburgh, and immediately proceeded to the spot. The cist occupied a slightly elevated site, distant only a few yards from the road; and as this had been long under cultivation as a garden, if any mound originally marked the spot, it had disappeared, and no external indication distinguished it as a place of sepulture. A shallow cist formed of uneven slabs of sandstone enclosed a space measuring 3 feet 11 inches in length, by 2 feet 1 inch in breadth at head, and 1 foot 11 inches at foot. The joints fitted to each other with sufficient regularity to admit of their being closed by a few stone chips inserted at the junction, after which they appeared to have been carefully cemented with wet loam or clay. The slab which covered the whole projected over the sides, so as effectually to protect the sepulchral chamber from any infiltration of earth. It lay in a sandy soil, within little more than two feet of the surface; but it had probably been covered until a comparatively recent period by a greater depth of soil, as its site was a little higher than the sur-

* Proceedings of Acad. Nat. Sciences, Philadelphia. 1857, p. 42.



rounding surface, and possibly thus marked the traces of the nearly levelled tumulus. Slight as this elevation was, it had proved sufficient to prevent the lodgment of water, and hence the cist was found perfectly free from damp. Within this a male skeleton lay on its left side. The arms appeared to have been folded over the breast, and the knees drawn up so as to touch the elbows. The head had been supported by a flat waterworn stone for its pillow; but from this it had fallen to the bottom of the cist, on its becoming detached by the decomposition of the fleshly ligatures; and, as is common in crania discovered under similar circumstances, it had completely decayed at the part in contact with the ground. A portion of the left side is thus wanting; but with this exception the skull was not only nearly perfect when found, but the bones are solid and heavy; and the whole skeleton appeared to me so well preserved as to have admitted of articulation. From the view of the skull engraved in the *Crania Britannica*, it appears to have been somewhat mutilated since I last examined it. Alongside of the head of the deceased, above the right shoulder, a neat earthen vase had been placed, probably with food or drink. It contained only a little sand and black dust when recovered, uninjured, from the spot where it had been deposited by affectionate hands long centuries before, and is now preserved along with the skull in the Scottish Museum.

Notwithstanding the hundreds of barrows that have been opened, it is rare indeed to witness an example of the skeleton *in situ*, so entirely undisturbed as this was. Even where the cist has only been invaded by a partial infiltration of earth or sand; its removal necessitates the displacement of the bones; and when the skeleton has to be exhumed, as is more frequently the case, from the incovering soil, any attempt to represent its actual position must depend to a great extent on the imagination of the artist. Some of such representations, indeed, partake not a little of fancy sketches. Hence the example here described is peculiarly valuable on account of its faithfully revealing to the eye the undisturbed remains of the ancient North Briton, as they had lain since the fleshly tissues decayed and left the naked skeleton to its long repose. I have accordingly reproduced, on Plate III. a drawing of the Juniper Green cist, from a sketch taken at the time, before a single bone had been displaced. It exhibits the interior of the cist as it appeared on the removal of the covering slab, and suffices to show how far any posthu-

mous compression could affect the form of the skull. The latter is represented in profile, in the *Crania Britannica* (Dec. II. pl. 15.) The sutures are partially effaced by ossification, and other characteristics mark it as that of a man probably upwards of fifty years of age. The teeth also present the familiar characteristic of this ancient class of crania, being worn completely flat, both in the upper and lower jaw, like those of a ruminating animal; indicating the nature of the food as hard grains, nuts, or other substances requiring laborious mastication, different from the mere animal food of a purely hunter state of savage life; though the same phenomenon is witnessed in a more marked degree among the Walla-walla Indians of the Columbia River. They occupy a barren waste, frequently exposed to drifting sand, and subsist almost entirely on salmon dried in the sun. During the process of desiccation the salmon becomes so impregnated with sand, that it is rare to meet with a Walla-walla much beyond maturity whose teeth are not worn down to the gums by the attrition of his gritty food. Again, among the Peruvians, a similar result is produced, though to a less extent, from their habit of chewing the leaf of the coca mixed with *Uute*, a compound made of the wild potatoe, with calcined shells and ashes of alkaline plants.

The Juniper Green Skull, as shown in the full-sized view in the *Crania Britannica*, presents in profile, as well as partially in the vertical view, that square and compact form peculiarly characteristic of the brachycephalic crania of British barrows. But it also discloses, in its flattened occiput, a feature which had escaped my notice in any previous example of primitive Scottish crania; and along with this an unusual parietal breadth increasing towards the occiput, in a manner which I subsequently learned to recognise as an accompaniment of the post-parietal flattening. Only those who have themselves engaged in such researches can fully appreciate the vividness of impressions produced by whatever is characteristic or peculiar in the skull or other relics, handled for the first time as the evidence of the race or age of the freshly opened barrow or cairn, compared with the examination of the same from the shelves of a cabinet. The Juniper Green skull was carried home in my hand, a distance of some miles, and its flattened vertical occiput specially attracted attention, and gave rise to conversation on the way, with my friend Mr. Robert Chambers, who had accompanied me on this excursion.

With the temptation of a novel discovery, I was at first disposed to recognise the traces of art in this abbreviated form of skull, not only as exaggerating the natural characteristics, but as a possible source of their production. But a comparison with examples of the true dolichocephalic form, to which I had already assigned priority in point of time, sufficed to dispel that illusion. At a subsequent meeting of the Society of Antiquaries of Scotland, I accompanied the presentation of the cranium and urn with an account of the circumstances of their discovery, and some remarks on the novel features noticeable in the skull. Unfortunately the printing of the Society's proceedings, which had been suspended for some time, was not resumed till the following season; and no record of this communication was preserved, beyond the title.

The same remarkable parieto-occipital flattening is apparent in another Scottish cranium found, under somewhat similar circumstances, in a cist at Lesmurdie, Banffshire, also engraved in the *Crania Britannica* (Dec. III. 16); and still more so in the one already described, and figured on Plate II., recovered from a Wiltshire barrow. But I was more interested in detecting some slight traces of this artificial parieto-occipital flattening, in a remarkable skull found at Grangemouth, on the Forth, in 1843, at a depth of twenty feet, in a bed of shell and marl. This interesting relic has been engraved on a small scale for a work now in the press;* and, as there shown, is an imperfect calvarium, the basilar and temporal, as well as the facial bones, being absent. But sufficient remains to illustrate its characteristic form, and to show that in its general character it approximates to the brachycephalic crania of British tumuli. It is as symmetrical as the majority of modern heads. A slight depression occurs at the coronal suture; the parietal protuberances are prominent, and the superciliary ridges are well developed. The following measurements of this skull will show that it is of large size, though with a small relative vertical diameter:

Longitudinal diameter	7.43
Parietal diameter	5.65
Frontal diameter.....	4.47
Vertical diameter	4.75
Occipito-frontal arch	15.25
Do. from occ. front. protuberance to root of nose	13.25
Horizontal circumference	21.13

* *Prehistoric Man: Researches into the Origin of Civilisation in the Old and the New World.* Macmillan & Co.

Attracted as my attention was, to the marked contrast between the protruding occiput of the elongated dolichocephalic, or kumbecephalic skull, recognisable among some Scottish primitive crania that came under my observation, and the abrupt, truncated occiput of the opposite type, I was the more prepared to suspect the exaggeration of the latter peculiar conformation by artificial means; and this has been confirmed as I have become familiar with the characteristic peculiarities of American artificially distorted crania, by recognising in them the constant occurrence of the same unsymmetrical irregularities as are frequent in British brachycephalic crania. The Lesmurdie skull in the Scottish Museum, already referred to, is marked by great inequality in relative lateral development, especially where an unusual post-parietal expansion gives to it its most peculiar character; and the unequal parietal development, or bulging out on the one side, of the Juniper Green skull, is all the more deserving of attention from the precise knowledge we possess of the posthumous influences to which it had been subject. The concomitants of the Lesmurdie skull were little less striking in this respect. It was recovered from a cist formed of slabs of mica-slate. Though constructed with care, and neatly paved with a flooring of water-worn stones embedded in loam, the crevices of the cist had not been so effectually closed as to prevent the micaceous sand and earth from being carried in, so as to fill about three-fourths of the narrow chamber. This accumulation sloped away with diminishing depth towards the northern end, where the skull lay on its left side, so that the earth only partially imbedded it, leaving the right side uncovered. A neatly ornamented urn, as in the Juniper Green cist, stood behind the skull, with its rim protruding above the sand, from which it was recovered in a perfect state. These facts, along with those already detailed in reference to the circumstances under which the Juniper Green skull was found, are important, from the proof they furnish that to whatever cause the unsymmetrical irregularity may be traced, it cannot be ascribed to posthumous compression. The slight accumulation of infiltrated sand in the Lesmurdie cist did not cover the skull; while that at Juniper Green was free even from such trifling adventitious elements. There the skeleton lay within its narrow sepulchral chamber so entirely protected from any external influences, that we fancied we could detect some slight traces of its linen covering, especially on the larger leg bones.

Such examples of markedly unsymmetrical skulls, thus recovered under circumstances which preclude the idea of their irregular conformation being traceable to posthumous sources of change, have an important bearing on the general question of typical and abnormal cranial forms. Mr. J. Barnard Davis appears indeed to have entertained an opposite view. In describing the Juniper Green skull he remarks: "There is a depression from about the posterior third of the sagittal suture to the tip of the occipital bone; and a want of symmetry in the posterior superior region of the parietals, that on the right side being less prominent than that on the left, — *not improbably a posthumous deformation.*"* So also in his description of the Lesmurdie skull. After defining its peculiar platycephalic form with unusual lateral development in the post-parietal region, Mr. Davis adds: "There is also a want of symmetry in the two sides of this post-parietal swelling. The right side is not equally tumid with the left. Not improbably this irregularity of form, in which this skull agrees closely with that from the Juniper Green cist, *may arise from posthumous distortion.*"† In those remarks the learned craniologist may be presumed to have overlooked circumstances strongly impressed on my own mind, from witnessing the exhumation of the Juniper Green skull, and observing its unsymmetrical conformation and flattened occiput on lifting it from the cist, where it had lain for centuries, unsubjected to the slightest pressure. To whatever cause such irregularity or distortion may be ascribed, its origin must be traced in such examples to some action operating during life. Of the occurrence of posthumous cranial distortion there can be no question. In the remarkable example of an abnormal skull in Dr. Thurnam's collection, recovered from the Anglo-Saxon cemetery at Stowe, in Buckinghamshire, there are indications, especially in the gaping sutures on the base, that it has been subjected to an extraordinary amount of oblique compression, producing changes wholly incompatible with the exercise of important vital functions.‡ The same is no less obvious in the skull recovered from an Indian grave on the site of the ancient Hochelaga, at Montreal, and described by me in a previous number of this Journal.§ The posthumous origin of the distortion is placed beyond doubt in both

* *Crania Britannica*, Dec. II. 15. (3)

† *Ibid.*, Dec. II. 16. (5)

‡ *Archæol. Journal*, viii. p. 96. *Cran. Brit.* Dec. I. p. 38.

§ *Canadian Journal*, Vol. VI., p. 414.

examples, by the lower jaws having remained unaffected by the pressure that wrought so great a change on the calvaria, thereby supplying an accurate gauge of the amount of distortion, on replacing the condyles in apposition with the glenoid cavities. In the same paper, on "Some modifying elements affecting the ethnic significance of peculiar forms of the human skull," attention is also drawn to the exaggeration of the dolichocephalic type of head, in an Indian skull from an ancient cemetery on the Georgian Bay, now preserved in the Museum of the University of Toronto.

But the sources of unsymmetrical cranial deformation must be traced to other causes besides those of artificial appliances purposely employed in infancy, and of posthumous compression changing the form after death. The normal human head may be assumed to present a perfect correspondence in its two hemispheres; but very slight investigation will suffice to convince the observer that few living examples satisfy the requirements of such a theoretical standard. Not only is inequality in the two sides of frequent occurrence, but a perfectly symmetrical head is the exception rather than the rule. The plastic condition of the cranial bones in infancy, which admits of all the strange malformations of ancient Macrocephali and modern Flat-heads, also renders the infant head liable to many undesigned changes. From minute personal examination I have satisfied myself of the repeated occurrence of inequality in the two sides of the head, arising from the mother being able to suckle her child only at one breast, so that the head was subjected to a slight but constantly renewed pressure on one side. This I have specially noted as developed to a very marked extent in a boy of five years old, the child of a Scottish woman, wife of a farmer in Upper Canada. He was a very sickly infant, and was consequently subjected to an unusually protracted nursing. Perhaps also, as his teeth early decayed, and he was upwards of two years old before he could walk, his bones may have been more than usually pliant. He is now a healthy boy: but his head is so flattened on the one side, and disproportionately convex on the other, as readily to attract notice. I have found, moreover, that examples of such malformation are familiar to hat manufacturers. Some of the shapes they have furnished to me are odd and fantastical; and such as could not fail to excite as general notice as other personal deformities, did not the hair suffice more or less effectually to conceal them. My attention was originally directed to this famil-

iar test by a remark of the late Dr. Kombst, that he had never been able to obtain an English-made hat that would fit his head. He added that he believed such was the general experience of Germans, owing to the greater length of the English head. I subsequently found the shapes of a Yorkshire hatter to be shorter than some furnished me from Dublin; and I believe that such comparisons of the shapes most in demand in different parts of the British Islands, and on the Continent, will supply important craniological results. Dr. Nott has employed the same means in his "Comparative Anatomy of Races," but only as a test of relative horizontal circumference.*

But unsymmetrical, truncated, or elongated heads may be so common as apparently to furnish distinctive ethnical forms, and yet, after all, each may be traceable to artificial causes, arising from an adherence to certain customs and usages in the nursery. It is in this direction, I conceive, that the importance of the truths resulting from the recognition of artificial causes affecting the forms of British brachycephalic or other crania chiefly lies. The contents of early British cists and barrows prove that the race with whom they originated was a rude people, ignorant for the most part of the very knowledge of metals, or at best in the earliest rudimentary stage of metallurgic arts. They were in fact in as uncivilized a condition as the rudest forest Indians of America. To prove, therefore, that like the Red Indian squaw, the allophylian British mother formed the cradle for her babe of a flat board, to which she bound it for safety, and facility of nursing, in the vicissitudes of her nomade life,—though interesting, like every other recovered glimpse of a long-forgotten past,—is not in itself a discovery of much significance. But it reminds us how essentially man, even in the most degraded state of wandering savage life, differs from all other animals. The germs of an artificial life are there. External appliances, and the conditions which we designate as domestication in the lower animals, appear to be inseparable from him. The most untutored nomades subject their offspring to many artificial influences, such as have no analogy among the marvellous instinctive operations of the lower animals. Without, therefore, running to the extreme of Dr. Morton, who denied, for the American continent at least, the existence of any true dolichocephalic crania, or indeed any essential variation of

* *Types of Mankind*, p. 452.

ethnic form, it becomes an important point for the craniologist to determine how far certain apparently inherent diversities of form may, after all, be traceable to undesignated artificial causes.

Every scheme of the craniologist for systematising ethnical variations of cranial configuration, and every process of induction pursued by the ethnologist from such data, proceed on the assumption that such varieties in the national form of cranium are constant within certain determinate limits of variation, and originate in like natural causes with the features by which we distinguish one nation from another. By like means the comparative anatomist discriminates between the remains of the *Bos primigenius*, the *Bos longifrons*, and other kindred animal remains, frequently found alongside of the human skeleton, in the barrow: and by a similar crucial comparison it is attempted to classify the crania of the ancient Briton, Roman, Anglo-Saxon, and Scandinavian, apart from any aid derived from the evidence of accompanying works of art. But if it is no longer disputable that the form of the human head is liable to modification from external causes; it becomes indispensable to assign some means for eliminating this disturbing element, before we can determine the true significance of national forms of skull. If, for example, crania from the British graves of Roman times reveal a different form from that of the modern Celtic Briton: the cause may be an intermixture of races, like that which is clearly traceable among the mingled descendants of Celtic and Scandinavian blood in the north of Scotland; but it may also be, in part, or wholly, the result of a change of national customs following naturally on conquest, civilisation, and the abandonment of paganism for christianity. When Blumenbach divided the whole human race into five classes, distinguished by physical form and colour; and Retzius found two divisions of cranial conformation, with an equal number of subdivisions, suffice for his whole system of craniology: the science was simple and of easy application. But as it grows under the combined labours of many intelligent observers, it becomes obvious that it is beset by difficulties akin to those of other sciences; and in its relations to the investigations of the comparative anatomist, it reveals the same complexities which disclose themselves to the naturalist, when turning from the study of the lower animals to man, he finds the natural history of the latter inseparable in many respects from the attributes of his moral and intellectual nature.

It is in this respect, accordingly, that the artificial causes tending to alter the natural conformation of the human head, invite our special study. They appear at present purely as disturbing elements in the employment of craniological tests of classification. It is far from improbable, however, that when fully understood they may greatly extend our means of classification; so that when we have traced to such causes certain changes in the physical form, in which modern races are known to differ from their ethnical precursors, we shall be able to turn the present element of disturbance to account, as an additional confirmation of truths established by inductive craniology. Certain it is, however, whatever value may attach to the systematising of such artificial forms, that they are of frequent occurrence; and may be traced apparently to the following causes:—

I. Undesigned changes of form superinduced in infancy by bandaging or other custom of head-dress; by the form of pillow or cradle-board; and by persistent adherence to any unvarying position in suckling and nursing.

II. Artificial deformation undesignedly resulting from the habitual carrying of burdens on the head, or by means of straps or bandages pressing on any part of the skull, when such is continued from very early youth.

III. Artificial configuration designedly resulting from the application of mechanical pressure in infancy.

IV. Deformation resulting from posthumous compression, or any mechanical force brought into operation after death.

To the first of those I have drawn attention in more than one former paper,* and its influence I believe to be extensive and deserving of minute attention. Among the Red Indian Flatheads, where malformation of the skull is purposely aimed at, the infant's head is tightly bound in a fixed position, and maintained under continuous pressure for months. But it is a mistake to suppose that in the ordinary use of the cradle-board the pappoose is subject to any such extreme restraint. The objects aimed at are facility of nursing and transport, and perfect safety for the child. But those being secured it is nurtured with a tenderness of maternal instinct, surpassing that of many savage nations. The infant is invariably laid on its back, but the head rests on a pillow of moss or frayed soft bark, and is not

* *Canadian Journal*, Vol. II. p. 426, Vol. VI. *Edinburgh Philosoph. Journal*, N. S., Vol. VII. p. 25, Vol. XIV. 269.

further restrained in a fixed position than necessarily results from the recumbent posture in which the body is retained by the bandages securing it in the cradle. This fact I have satisfied myself of from repeated observation. But the consequence necessarily is, that the soft and pliant bones of the infant's head are subjected to a slight but constant pressure on the occiput during the whole protracted period of nursing, when they are peculiarly sensitive to external influences. Experiments have shewn that at that period the bones specially affected by the action of the cradle-board are not only susceptible of changes, but liable to morbid affections, dependent on the nature of the infant's food. Lehmann supposes the *craniotabes* of Elsässer to be a form of rachitis which affects the occipital and parietal bones during the period of suckling; and Schlossberger ascertained by a series of analyses of such bones that the 63 per cent. of mineral constituents found in the normal occipital bones of healthy children during the first year, diminished to 51 per cent. in the attenuated parts, and in some cases even to 28 per cent. in the thickened and spongy bone.* The fluctuations in proportion of the mineral constituents of bones are considerable, and vary in the different bones, but in the osseous tissue they may be stated at from 67 to 70 per cent. It is obvious, therefore, that, under the peculiar physiological condition of the cranial bones during the period of nursing, such constant mechanical action as the occipital region of the Indian pappoose is subjected to, must be productive of permanent change. The child is not removed from the cradle-board when suckling, and is not therefore liable to any counteracting lateral pressure against its mother's breast. One effect of such continuous pressure must be to bring the edges of the bones together, and thereby to retard, or arrest the growth of the bone in certain directions. Of this I have observed distinct proof in an extreme case of artificial deformation in a Flat-head skull, from the occurrence of exostosis at the sutures. The same cause must tend to shorten the zygoma; whereas if it were possible to alter the adult skull by pressure similarly applied, the zygomatic arch being then fully developed, would betray its effects by bulging out, and increasing the width of the face. One element of variation in the parieto-occipital flattening resulting from the ordinary use of the cradle-board, depends on the greater or less elevation of the pillow. In many Indian skulls, where there is no in-

* Schlossberger, Arch. f. phys. Heilk. Lehmann, Physiol. Chem. Vol. III. p. 23.

dication of purposed malformation, the flattening is not in a vertical plane, affecting the occiput proper, with the posterior part of the parietal bones; but chiefly modifies the latter, extending towards the apex: as in the interesting example of a British dolichocephalic skull from the remarkable tumulus, near Littleton Drew, Wiltshire, represented on plate 24, Decade III., of the *Crania Britannicæ*. This I conceive to be traceable to the use of the board with a mere cover of moss or soft leather, whereby the head is thrown back so as to come in contact with the cradle-board about the region of the lambdoidal suture. Similar forms repeatedly occur among ancient British crania, and are probably traceable to the same cause.

One result of the recognition of this artificial source of cranial deformation was to lead me, before I left Scotland, to institute a series of careful observations on the heads of the coal-porters of Edinburgh, and the fishwives of the neighbouring fishing villages, with a view to determine how far the heads of either are affected by their practice of carrying heavy loads by means of a leathern strap resting on the forehead; and of the bakers who bear similar loads on a board or tray laid on the top of the head. Since coming to Canada I have also made such observations as opportunity offered on the heads of Indian squaws, as they habitually support heavy burdens by a strap across the forehead. But the low flat forehead is characteristic of the Indian; and a poor frontal development may also be looked for in such a class as the coal-porters. Some of the results of those observations are given in a forthcoming work, but in all the cases referred to the pressure is only brought to bear on the full-grown head; and investigation satisfies me that the adult cranium may be subjected to extreme and oft repeated pressure without affecting its form. The process pursued by the Flathead Indians seems to show that its susceptibility to change is limited to infancy. The whole operations, by means of which the most radical change of form is produced, are effected during the first year. Whatever alteration takes place afterwards is in an opposite direction, consequent on the natural growth of the brain and skull. Accordingly the extreme deformation superinduced on the infant head among the Chinooks and other tribes of the Pacific coast is only seen to its full extent during childhood. It undergoes some modification in early youth, from the expansion of the brain in the efforts of nature to resume the normal shape. But long before puberty the

head has assumed its determinate form, dependent mainly on the influences affecting it during the first year. This is the result of design ; but by many apparently trifling and unheeded causes, consequent on national customs, nursing usages, or the caprices of dress and fashion, the form of the head may be modified in the nursery. The constant laying of the infant to rest on its side, the pressure in the same direction in nursing it, along with the fashion of cap, hat, or wrappage, may all influence the shape of head among civilised nations, and in certain cases tend as much to exaggerate the naturally dolichocephalic skull, as the Indian cradle-board to increase the short diameter of the opposite type. Such artificial cranial forms as that designated by M. Foville, the *Tête annulaire*, may have predominated for many centuries throughout certain rural districts of France, solely from the unreasoning conformity with which the rustic nurse adhered to the traditional or prescriptive bandages to which he ascribes that distortion. All experience shows that such usages are among the least eradicable, and long survive the shock of revolutions that change dynasties and efface more important national characteristics. To such causes as the helmet of the Roman soldier, and the turban of the Turk, some writers have assigned the sources of national forms of head. But the dome of the skull acquires a firm consistency, along with its permanent shape in youth, and appears thereafter to resist all external pressure less than that which suffices to crush the bony arch, until the vital spark has fled. Then, deprived of its vascular covering, or softened by the chemical action of its decaying tissues, and subjected to moisture and unwonted compression, some of the peculiar abnormal shapes are produced, now recognised as clearly traceable to posthumous action.

But now that attention has been directed to this subject, its full bearings begin to be appreciated, and the operation of artificial causes is recognised in the modification of the dolichocephalic as well as the brachycephalic head. More recent studies in the New World have satisfied me of the occurrence of both types in the same Peruvian cemeteries,—not as examples of extreme latitudes of form in a common race, but as the results of the admixture either of conquering and subject races, or of distinct classes of nobles and serfs, most generally resulting from the predominance of conquerors. Among the Peruvians the elongated cranium pertained to the dominant race ; and some of the results of later researches in primitive

British cemeteries seem to point to an analogous condition of races. In my original investigations into the physical characteristics of the primitive races of Scotland, I was led from observed facts, to separate from the others an elongated dolichocephalic type of head, for which the distinctive title of kumbecephalic was suggested,—derived from its peculiar boat-like shape,—and to arrange this provisionally as the oldest in the order of succession of Scottish cranial forms. Of the insufficiency of the data then accessible for any absolute conclusions on so important a point I was fully aware, and accordingly I remarked, when setting forth the idea with the accompanying evidence: “Of the existence of primitive races prior to the Celtæ, I think no doubt can now be entertained. Of the order of their succession, and their exact share in the changes and progressive development of the native arts which the archæologist detects, we still stand in need of further proof; and the assumed primeval position of the kumbecephalic race of Scotland is advanced here only interrogatively, and with the view of inducing others to take up the same interesting inquiry. The subject demands much more extended observation before any such conclusion can be dogmatically affirmed concerning the primitive Scottish races. We have also still to obtain the proofs of that abrupt change from the one form to the other, only to be procured as the result of numerous independent observations, but which can alone satisfactorily establish the fact of the intrusion of new races.”*

The idea thus thrown out, as deduced from direct, though necessarily limited observation, had this further significance, that it either indicated the primitive races of Britain to have succeeded each other in a different order from those hitherto recognized by Scandinavian ethnologists and archæologists in relation to Northern Europe, or it pointed to a race which had preceded their oldest Allophylæ. Its reception from the large class of antiquaries who practically believe in no world older than the Romans, could easily be guessed; but while challenged on the one hand as improbable or false, on the other it very speedily received partial confirmation from independent observations, and especially from those of Mr. Thomas Bateman of Lomberdale House, Derbyshire. In a communication to the British Archæological Association, soon after the publication of my views, Mr. Bateman states as the result of extensive investigations chiefly in the Derbyshire grave-mounds, that the chambered barrows, which

* *Archæology and Prehistoric Annals of Scotland*, p. 177.

he justly regards as assignable to a more remote antiquity than others explored by him, invariably yield the elongated form of cranium. "Although the mounds of this character," he remarks, "have not been numerous, the interments within the chambers they contain have been many, and apparently continued over some length of time. In these the boat-shaped (kumbecephalic) skull has uniformly been found by me, rarely accompanied by any instrument, but in one or two cases with arrow-points of flint."* To this opinion subsequent researches extending through successive years to 1858, appeared to him to lend additional confirmation; and in his "Ten Years' Diggings in Celtic and Saxon Grave Hills," published in 1861, much additional evidence is produced. On the exploration of the chambered tumulus of Ringham Low, in 1855, one of its large cists was found to contain a quantity of human bones partially disturbed. "These," he states, "have since been ascertained to include the remains of twelve individuals, comprising two infants and ten adults, mostly exhibiting the lengthened form of skull I have before observed to be constantly found in tumuli of the same description as the present."† Again, when describing researches in Longlow barrow, which led to the discovery of a megalithic cist, or sepulchral chamber, Mr. Bateman remarks: "This is the first opportunity we have had of exploring an undisturbed cist in a chambered cairn of this peculiar structure. It is on this account a discovery of unusual interest, and when compared with the results of previous or subsequent excavations in similar grave-hills, yields to none in importance. The mound, composed of stone, enclosing a chamber or cist formed of immense slabs of stone, occasionally double or galleried, indicates, in this part of the country at least, a period when the use of metal was unknown, the sole material for the spear and arrow being flint, which is often carefully chipped into leaf-shaped weapons of great beauty. The interments within these cists have in every case been numerous, and apparently long continued. They are marked by a strongly defined type of skull, styled by Dr. Wilson kumbe-kephalic, or boat-shaped, the more obvious features being excessive elongation, flattening of the parietal bones, and squareness of the base, producing, when viewed from behind, a laterally compressed appearance, which is enhanced by the sagittal suture being sometimes elevated into a ridge. The

* *Journal of Archaeol. Association*, Vol. VII., p. 211.

† *Ten Years' Diggings in Celtic and Saxon Grave Hills*, p. 95.

adult male skull found in the centre of the Longlow cist has been selected to appear in the *Crania Britannica*, as a typical example of this form. The crania of a female, and of a girl about seven years old, from the same cist, exhibit the same form in a remarkable degree, as do the others which are more imperfect. Crania from the chambered barrows at Bole Hill, Bakewell Moore; Stoney Low, Bassington Moor; Ringham Low, near Monyash; Five Wells Hill, Taddington, are of the same type.”*

The skull above referred to, selected from those recovered from the Long Low chambered barrow, has since been produced in the fourth Decade of the *Crania Britannica*, and in the beautiful illustrations of its form, amply bears out Mr. Bateman’s remarks. Mr. J. Barnard Davis, by whom it is described, repeatedly expresses his dissent from the pre-Celtic hypothesis; and apparently maintains the idea of extreme latitudes in the variation of form from a common type. He specially notes the fact that examples of brachycephalic crania have been found in chambered barrows; and thus seeks to solve the difficulties presented by the evidence furnished from that of Long Low: “The most marked similarity, however, exists between the man’s skull and that of the girl from Long Lowe. It is a very probable explanation, that the three skulls belonged to one family, and are the remains of a father, mother, and their child.. This would reduce the unusual longness and narrowness to a mere family peculiarity. In this case it may be nothing more.”† The word *family*, it is obvious, is used here in a singularly loose sense, including as it does husband and wife; a relationship involving no necessary uniformity in the shape of the heads. But while Mr. Davis abandoned the title of *Crania Celtica*, originally proposed by him for the great national work now far advanced towards completion, he has not found it so easy to divest himself of the ideas in which it originated. Beginning his chapter on the “Views of preceding Observers,” with Julius Cæsar, and rejecting with little ceremony those of writers who are slow to believe that the oldest historic race is necessarily the primeval one, he thus closes that department of his subject:—“We have now quoted at sufficient length descriptions and opinions bearing more or less upon the people who first inhabited the forests and wilds of these Islands, after they had been rendered fit, in the sublime plans of the Divine

* *Ten Years’ Diggings in Celtic and Saxon Grave Hills*, p. 146.

† *Crania Britannica*, Dec. IV., pl. 33 (5).

benevolence, for the extension of intelligent happiness, by making them the abode of men. Of the Imperial invaders of these primitive people"—and so he passes on to the Romans. In this easy fashion the author takes for granted that the people found by the Romans in occupation of Britain were necessarily the descendants of those who first entered there after it had become fitted for human habitation. When enthusiastic Celtic scholars advance another favoured theory, that Welsh or Gaelic was the language of Paradise, the deduction is arrived at by very much the same process of reasoning, which assumes that the oldest known race and language must necessarily be the first. Mr. Davis having thus committed himself to opinions irreconcilable with any pre-Celtic hypothesis, its influence is repeatedly apparent in his subsequent comments on British crania. But on this very account the following description of those of the Long Low barrow is the more valuable, unbiassed as it is by any leanings to a theory in favour of the greater antiquity, or special ethnical distinction of the long-headed builders of the megalithic chambered mounds: "One of the skeletons derived from the centre of this capacious cist owned the cranium we have been permitted to delineate, now in the rich Celtic Museum of Mr. Bateman. It is a remarkably regular, narrow, and long skull, of good shape, medium thickness, and presenting few of the harsh peculiarities of the ancient British race; on the contrary, there is about it an air of slenderness and refinement. In some features it assimilates to the modern English cranium, although decidedly narrower; whilst its genuine and remote antiquity is determined by unquestionable evidence. It belongs in an eminent degree to the class of dolichocephalic skulls; and is the cranium of a man of about forty years of age." After describing the bones of the face in minute detail, he thus proceeds: "The side view shows a considerable elevation proceeding from the coronal region along the sagittal suture: a large surface, from the flatness of the skull; and a regular pleasing outline. The bosses of the parietals are not prominent, yet the area of these bones is extensive. The upper portion of the occipital projects, and terminates below in a distinct ridge and protuberance. The skull is unusually smooth and equable among the British series, and exhibits a long narrow oval when viewed vertically, slightly depressed in the left temporal region. Its widest part is just above the mastoids, so that the occipital development is not deficient, and this

region is more capacious than any other."* The one female skull he describes as that of a woman of probably fifty years of age; the other that of a girl not more than seven years of age; but "it is remarkable that both, although not quite agreeing in form with that of the man, exhibit the same dolichocephalic conformation." Mr. Davis, in his concluding remarks, again reverts to the "pre-Celtic hypothesis," and adds: "If we assume with those who receive this hypothesis, that the possessors of these long crania were a race distinguished by a particular kind of sepulchres, stone chambers, or chambered barrows, it must not be overlooked that dolichocephalic crania are still met with in other barrows and cists." But this argument is based on a wholly incorrect view of the question. The Egyptians were pyramid-builders, but all Egyptians were not interred under pyramids, or in chambered catacombs. The chambered barrows cannot be regarded as common places of sepulture, but as the costly and laboriously constructed sepulchres of royal or noble dead; and in this respect their osteological contents present a striking analogy to those of the noble Inca race recovered from the ancient cemeteries of Peru, mingled with the crania of a markedly diverse type.

Through the kindness of Dr. Thurnam, I have been favoured with his notes of a singularly interesting exploration of a chambered barrow at West Kennet, near the celebrated megalithic circles at Abury, in Wiltshire, as prepared for the *Crania Britannica*. The tumulus, he remarks, is one of the largest known, measuring 385 feet in length; and appears to have been surrounded by an inclosing range of upright monoliths surmounted by horizontal slabs, somewhat in the style of Stonehenge. It had been entered at various former periods, and bore evidence suggestive of its having been searched in Roman times. But the skeletons had only been partially disturbed; and it still contained considerable remains of primitive pottery and various implements of flint; but no traces of metal. The chamber contained six skeletons; five being probably of males, from 17 to 60 years of age, and the sixth that of an infant. With one exception, as Dr. Thurnam notes, they were of less than middle stature, and two of the skulls were remarkable for distinct traces of fracture, unequivocally inflicted before death. The following are his minute observations on the most remarkable of the crania:—

* *Crania Britannica*, Dec. IV. pl. 33. (4)

"The principal skeleton, to which the skull described belongs, and by far the most characteristic of the series, was that of a man about 35 years of age. It was deposited in the north-west angle of the chamber, with the legs flexed against the north wall. The thigh-bone measured $17\frac{3}{4}$ inches, giving a probable stature of 5 ft. 7 in. Near the skull was a curious implement of black flint,—a sort of circular knife with a short projecting handle, the edges elaborately chipped. The skeleton was, perhaps, that of a chief, for whose burial the chamber and tumulus was erected, and in honour of whom certain slaves and dependants were immolated.

"The valuable cranium we have to describe is not only remarkable for its form and for the character of the tomb whence it was derived, but also for being restored from an extraordinary number of fragments. Notwithstanding this disadvantage, the original form has evidently been reproduced. The skull is thick, measuring nearly half an inch in the thickest part of the parietals. It is of medium capacity, and has contained a brain weighing about $50\frac{1}{2}$ oz. Av., or about the average weight of the adult male brain. It is decidedly dolichocephalic, narrow, and very flat at the sides, and realizes more nearly than any we have yet had to figure the kumbecephalic or boat-shaped form described by Dr. D. Wilson. The frontal region is narrow, moderately arched and elevated, but sloping away on each side. The parietal region is long, and marked by a prominent ridge or *carina* in the line of the sagittal suture, which is far advanced towards obliteration, whilst the other sutures are quite as perfect as usual. The occiput is full and prominent; the supra-occipital ridges only moderately marked. There is a deep digastric groove, and a slight paroccipital process on each side. The external auditory openings are somewhat behind the middle of the skull, and very much behind a vertical line drawn from the junction of the coronal and sagittal sutures.* Turning to the face, we notice the decidedly full glabella and overarching brows, continued almost to the external angles of the small retangular orbits: the eyes must have been very deeply set. The narrow nasal bones are separated from the forehead by a deep indent, and are implanted at a very abrupt angle. The malar bones are somewhat flattened, and have a nearly vertical

* Dr. Gosse (*Déformations Artificielles du Crâne*, pp. 7, 59) concludes that when this vertical line falls either much behind or much in front of the auditory opening, the existence of artificial distortion is proved."

position; notwithstanding which, the narrow forehead and high vertex above give a decidedly pyramidal aspect to the front view of the skull, such as is considered characteristic of the Turanian type, and has before been observed in skulls from the chambered long-barrows of this country. The face has been small, short, and narrow; the superior maxilla is very short; the alveolar processes (intermaxillaries) not so prominent as in many skulls from the round barrows; and, though the upper incisors overlap the lower, the jaw is tolerably orthognathic. The teeth are medium size; the enamel of the crowns moderately reduced by attrition, but not sufficiently so to expose much of the dentine. The canine teeth are much smaller than is usual in the British series; and this is particularly obvious in the less external prominence of the fangs of these teeth in the upper jaw, upon which the semiprognathic and broad, muzzle-like character of the jaw in the skulls to which we refer seems in part to depend. In the lower jaw, which deviates considerably from the normal type, a very prominently angular and square, but narrow, chin is observed; the base is unusually thick, measuring seven-tenths of an inch at the thickest parts; the ascending rami are rectangular and broad, and the angles remarkably everted. The breadth of the base of the jaw—as is very unusual,—nearly equals the greatest breadth of the face, and adds materially to the pyramidal appearance of the front view of the skull.”

Dr. Thurnam further refers to another skull from the same chamber, as one which most nearly resembles it in form. “It belonged to the skeleton occupying the south-west angle of the chamber. All its characteristics are less marked; but it bears a striking resemblance to the former skull, and, like it, presents no marks of violence: they are possibly those of brothers. The two skulls which appeared to have been fractured during life are of less elongated form, and otherwise differ from those before us,—as is consistent with the view that they belonged to slaughtered slaves, taken perhaps from some other tribe.”

It thus appears that the researches of successive craniologists labouring without concert, and controlled in their deductions by diverse theories, nevertheless all point to the fact of certain marked differences distinguishing the crania of the Chambered Barrows from those of the ordinary earth-mounds and cists. The neglect of this important branch of inquiry by Sir R. C. Hoare, in his researches

among the barrows of Wiltshire, has already been referred to; yet it was impossible that he could examine, even in a cursory manner, the many crania exhumed by him without acquiring some familiarity with their characteristic form. Accordingly it is of peculiar interest in relation to the present inquiry to note that when, in 1817, he communicated to the Society of Antiquaries the notice of a Chambered Barrow at Stoney Littleton, in Somersetshire, which attracted his attention as a species of tumulus altogether new to him, he concludes his description by remarking:—"I shall now request the attention of my brother Antiquaries, and especially of those versed in the science of craniology, to the two skulls discovered in this tumulus, which appear to be totally different in their formation from any others which our researches have led us to examine."* He does not enter into any general comparison, but indicates their remarkably depressed foreheads as the most noticeable feature: but the fragments of the skulls have been traced by Dr. Thurnam to the Philosophical Institution at Bristol; and their general resemblance to the corresponding portions of the Uley cranium,—one of the most characteristic of all the skulls recovered from Chambered Barrows,—is pronounced by him as sufficiently apparent.†

So obvious and constant are the points of difference between the brachycephalic crania of the ordinary earthen mounds, and the dolichocephalic crania of the Chambered Barrows, that Dr. Thurnam, in his early notice of one from Littleton-Drew, Wiltshire, asks: "Can the long-headed builders of these chambered barrows have been some Iberian or Ibero-Phœnician settlers?" But further observations on this class of crania have suggested other ideas in regard to them; and accordingly, after the description of those of West Kennet, quoted above, he takes into consideration the possible influence of artificial appliances in the production or modification of this remarkable type of head, and then proceeds: "In like manner as the Ballard Down skull (Plate 45 of *Crania Britannica*), recalls the cranial form of many American and Polynesian tribes, so does that now described the narrow and elongated skulls of the Australians and Esquimaux. The Ballard Down skull bears marks of artificial flattening of the occiput; this calls to mind the artificial lateral flattening of the skull characteristic of the ancient people called Macro-

* *Archæologia*, Vol. XIX., pl. 47.

† *Crania Britannica*, Dec. I., pl. 5-6.

cephali, or long-heads, of whom Hippocrates tells us, that 'while the head of the child is still tender, they fashion it with their hands, and constrain it to assume a lengthened shape by applying bandages and other suitable contrivances, whereby the spherical form of the head is destroyed, and it is made to increase in length.' This mode of distortion is called by Dr. Gosse the *temporo-parietal*, or '*teté aplatie sur les côtés*.' It appears to have been practised by various people, both of the ancient and modern world, and in Europe as well as the East. The so-called Moors, or Arabs of North Africa, affected this form of skull; and even in modern times, the women of Belgium and Hamburgh are both described as compressing the heads of their infants into an elongate form.* Our own observations lead at least to a presumption that this form of artificial distortion may have been practised by certain primeval British tribes, particularly those who buried their distinguished dead in long chambered tumuli. It has been shown by Dr. Minchin,† that an abnormally elongated form of skull may be strictly congenital, and depend on obliteration of the sagittal suture, or on the development of the parietal bones from a vertical centre, rather than from the sides. Such an explanation, however, does not seem applicable to the skulls from the chambered barrows of Britain, any more than to those of the Macrocephali of Herodotus. The premature obliteration of the sagittal suture observed in the skull before us, and to a still greater degree in that figured by Blumenbach, under the name of '*Asiatæ Macrocephali*,' appears to be an ordinary concomitant of the compressed and elongate skull. On the whole, the writer thinks this obliteration has been produced by pressure or manipulations of the sides of the head in infancy, by which it was sought to favour the development of a lengthened form of skull; to which, however, there was probably, in the present instance at least, a natural and inherent tendency." Dr. Thurnam adds as a note: "The regular and ovoid form of head which now prevails in England, is probably in part due to the practice of mothers and nurses gently rubbing the heads of infants with the palm of the hand, with the object of favouring regularity of shape. In accordance with this, it has to be remarked that it is in the most degraded and neglected classes that

* See the authorities in Gosse, pp. 55-57."

† *Dublin Journal of Medical Science*, Nov. 1856, 'Contribution to Craniology.'

the more striking departures from a symmetrical form of head are to be observed."

Such are the remarkable characteristics of crania recovered from ancient megalithic tombs: as those of Uley, Gloucestershire; Long Low and Ringham Low, Staffordshire; and Littleton Drew and West Kennet, Wiltshire. The tendency of the evidence, derived from independent observers, appears to confirm the idea of the prevalence of a dolichocephalic form of head at the earliest ascertained period of regular sepulture; nor are there wanting traces of such specialities in this primitive British dolichocephalic skull as induced me, when first observing it, to separate it into a kumbecephalic class, distinct from the very different oval head of the medieval and modern descendants of Britons and Anglo-Saxons. In an introductory chapter of the *Crania Britannica*, Mr. Davis remarks on my proposed classification of the succession of ethnical forms, as—1st. Primitive Dolichocephalic, or Kumbecephalic; 2nd. Brachycephalic; 3rd. Celtic: "The reader will perceive that only a slight attempt appears to have been made to discriminate the sexes to which the skulls might be referred; and that the number of examples is obviously quite inadequate for any trustworthy conclusion; further inquiry has produced a serious question of the authenticity of some of the series. The skulls of the supposed Druids of Iona and the Hebrides, Dr. Thurnam has ascertained are doubtless those of Christian monks of the eighth or ninth century."*

Of the more ancient crania referred to, including all that were then accessible, the majority wanted the teeth and lower jaw, and in eight of them the facial bones were defective or entirely absent. Under similar circumstances some craniologists appear to have no hesitation in determining the sex; but I am at a loss to comprehend the data on which their opinion is founded. The fine cranium of an ancient German, found under a tumulus in Weimar, and presented by Goethe to Blumenbach, is engraved in the sixty-first Table of his *Decades* as that of a woman. But it wants the under jaw, which gives so much of the character to the female skull; and to Mr. J. B. Davis's eye it "conveys the impressiou of its being rather the cranium of a young man."† It was not therefore without reason that I hesitated to speak with confidence, where the point was so open to dispute,

* *Crania Britannica*, Decade I. p. 2.

† *Crania Britannica*, Dec. I., p. 25.

though fully alive to its importance. The second clause of the critique, in speaking of the inadequacy of the number of examples, only paraphrases my own words, while at the same time it overlooks general and cumulative evidence suggestive of a hypothesis to which the special examples produced appeared to lend confirmation. Well aware that I was breaking new ground, I had myself, in summing up the deductions from examples produced, introduced certain suggestive provisional inductions with these remarks: "Such are the elements from which it has been attempted to deduce some conclusions of general import in regard to the successive primitive races that have occupied Scotland prior to the era of authentic historic record. The data are much too few to justify the dogmatic assertion of any general inferences, or to admit of positive answers to the questions naturally suggested. . . . They include, however, all the examples that could be obtained, and are in so far valuable as trustworthy examples of the cranial characteristics of Scottish races, that they have been selected from various localities, by different individuals, with no single purpose in view."* In the brevity of his note Mr. Davis has probably compressed his remarks into a form implying somewhat more than they were intended to convey; but from the remaining portion of the above comment, no reader unfamiliar with the original text, could fail to understand that I had produced certain spurious skulls as "Druids of Iona." A reference to the text will show that, in describing five crania presented to the Phrenological Society in 1833, by Mr. Donald Gregory, I mentioned that they were each marked by him as the "Skull of a Druid from the Hebrides." My own remarks are as follows: "Mr. Donald Gregory was secretary to the Iona Club, and one of the ablest Celtic scholars of his day. The designation which he affixed to the crania brought from Iona may be accepted as undoubted evidence of their having been found under circumstances which afforded proof of their high antiquity; though it is not necessary to assume from this that they had pertained to Druids. Most probably nothing more was intended by the epithet, than to indicate in the briefest manner, that he believed them to have belonged to the native population prior to the introduction of Christianity in the sixth century."† The skulls were produced by me as examples of the Celtic

* *Prelistoric Annals of Scotland*, p. 176.

† *Ibid.*, p. 173.

type. Whether they belonged to Pagan Celts prior to the sixth century or Christian Celts of the eighth, could not affect their value for the object in view. One Celtic skull, presented to me as from Harris, in the Hebrides, was subsequently found to have been from Harray, in Wales. I am unaware of any other error that can justify the "serious question of the authenticity of some of the series" produced by further inquiry; though well aware of the nature of the inquiry, as I had promptly responded to Dr. Thurnam's application, soon after the publication of my *Prehistoric Annals of Scotland*, for an opportunity of inspecting the crania referred to. I accordingly sent him those in my own collection and under my control, and exerted myself in procuring the transmission of others, with the requisite documents; a courtesy which I have found him equally ready to return. One of the documents transmitted with the skulls from the Phrenological collection consisted of the letter from Mr. Donald Gregory to Mr. Robert Cox, W. S. of the Edinburgh Phrenological Society, dated 11th September, 1833, accompanying the "Druid" skulls, and ran as follows:—

"Along with this you will receive six ancient skulls* procured under the following circumstances: There is a place here called *Cladh na Druineach*, i.e., the burial place of the Druids, in which I have caused some deep cuts to be made. An incredible quantity of human bones has been found; and as it is perfectly certain that this place has never been used as a Christian church-yard, or as a place of interment at all, since the establishment of Christianity here by St. Columba, there can be no doubt of the antiquity of the skulls now sent. They are by every one here firmly believed to be the skulls of the Druids, who were probably interred here from distant parts as well as from the neighbourhood, on account of the sanctity of the island, which formerly bore the name of *Innis na Druineach*, or the Druid's Isle.

"The six skulls herewith sent were selected with care by myself, from a much larger number. One you will observe is higher in the forehead than the rest. But this is an exception; for I am satisfied,—and others whose attention I directed to the matter agree with me,—that the general character of the skulls is a low forehead, a considerable breadth in the upper and posterior part of the head, which you will no doubt readily perceive. Although, with the exception mentioned, those skulls have the same general character, (as far as I can judge,) yet there are sufficient differences in the individuals to make them of considerable interest to the phrenologist. I must not omit to mention that the present race in the island appear to have much better foreheads than the Druids, and in

* One of them existed only in fragments in the Phrenological Museum at the period when I examined the other five.

point of intellect and intelligence are perhaps above the average of the Highlanders and Islanders.

"Some of the skulls did not present such strong individual character as those sent, and were more equally developed. But, as I was limited in the number to be taken, I preferred choosing well marked skulls, particularly as the general character of the whole was so much the same."

The author of this letter, at the time that it was written, was engaged, as secretary of the Iona Club,—a society formed for the publication of ancient Celtic literature,—in superintending a series of researches and excavations in Iona, under the authority of the Duke of Argyle, the president of the Club, by means of which many of the beautifully sculptured monuments of the ancient Christian cemetery of Relig Oran were brought to light. He was at the same time secretary of the Society of Antiquaries of Scotland, a zealous archæologist, foremost among the Celtic scholars of his day, and equally zealous as a craniologist. It would be difficult indeed to name another man whose authority was deserving of equal weight on the points it is produced to substantiate.

But Mr. Davis is obviously sensitive on the whole question of a pre-Celtic hypothesis. He returns to its assault at every opportunity; as in his description of the Green Gate Hill crania, Dec. I., 34, (2) which, though they "bear a striking general resemblance," yet "whilst the one is of the brachycephalic form, the other approaches more to the dolichocephalic character." Having accordingly defined their points of difference, he thus proceeds: "These will go far to render questionable the opinion which has been assumed, that by ascending to the earliest prehistoric times we shall find the crania endowed with uniformity, or as it were, stereotyped,"—an idea not to be met with, so far as I am aware, elsewhere. Again he reverts to the subject in describing the Wetton Hill cranium, Dec. II., pl. 12, (4); those of the Long Lowe barrow, Dec. IV., pl. 33, (6), &c. He has demolished the hypothesis, and all that relates to it as we have already seen, when dealing, in his introduction, with the "Views of previous observers," and might have been expected to reserve its *coup de grace* to the conclusion, along with "other subjects to which a review of the whole series of crania depicted is essential." But the ghost of the discomfitted hypothesis haunts him in an uncomfortable fashion, and apparently not without reason. I had not intended to revert to this subject till all the valuable data and tables of measurements of the *Crania Britannica* were completed, and

the joint labours of its gifted authors had been crowned with their own final summary and deductions. But being in some degree compelled to notice it, by what appears to me an appropriation of my views on one of the points in question, after pronouncing so summary a judgment on others, I may here indicate the apparent bearings of the evidence at the present stage. Deducting from the crania already described and illustrated in the four published decades, those classed as Roman, Anglo-Saxon, and Scandinavian, the remainder admit of division into two distinct classes; 1st, those derived from Chambered Barrows and Cromlechs or Megalithic cists; 2nd, those found in ordinary barrows and cists. The following tables exhibit the results of such a classification. The first includes every skull of its class of which the measurements are given in the first four Decades, with the exception of the very imperfect cranium of a female child (C) from Long Low: and also embraces those of West Kennet chambered barrow, supplied to me by Dr. Thurnam, but which have probably been published before this appears, in Decade V. of the same work. The second table includes every skull from a British barrow or cist, in the same four Decades, with the exception of two, plates 25 and 34, both of which are so imperfect as not to supply the requisite measurements. Of the former, from Kinaldie, Aberdeenshire, Mr. Davis says, "This cranium, derived from the country of the Picts, may probably have belonged to one of that people." Its unusually short longitudinal diameter, 6.8, would have increased the difference apparent between the two classes of skulls; and the same may also be said of the Wetton Hill skull, a "remarkably elevated acrocephalic skull," with partial parieto-occipital flattening; but the longitudinal diameter is not included among the measurements given. From the illustration, however, it appears to measure 7.0 in length; so that both are below the average of the brachycephalic crania in the table, and would therefore increase the characteristic differences. The results of the comparison of such unexceptionable data, it will be seen, are no mere averages of miscellaneous crania. The measurements are: 1. *Longitudinal Diameter*; 2. *Frontal breadth*; 3. *Parietal breadth*; 4. *Occipital breadth*; 5. *Parietal height*; 6. *Intermastoid arch*; 7. *Horizontal circumference*. They supply the tests of length, breadth, height, and circumference, along with the relative frontal, parietal, and occipital breadth; and show a general uniformity distinguishing each class. This is still more apparent from the drawings; for measure-

similar circumstances, and conforming to the same elongated type.* Of the more abundant brachycephalic crania of the ordinary barrows, Table II. furnishes sufficient materials for comparison with the previous one.

TABLE II.—CRANIA FROM BRITISH BARROWS AND CISTS.

			L.D.	F.B.	P.B.	O.B.	P.H.	I. A.	H.C.
1. Ballidon Moor, Derbyshire..	Barrow	M.	7.0	4.8	5.4	5.3	4.8	15.0	20.5
2. Green Gate Hill, Yorkshire.	"	M.	7.0	4.8	5.5	5.0	4.7	14.7	20.0
3. Arras, Yorkshire	" (Bronze)...	M.	7.6	4.7	5.6	5.2	5.2	15.8	21.1
4. Wetton Hill, Staffordshire...	"	M.	7.4	5.5	6.0	5.3	4.7	15.4	21.5
5. End Lowe, Derbyshire	" (Bronze)...	M.	7.2	...	...	5.2	4.8	...	...
6. Codford, Wiltshire	"	M.	6.8	4.6	5.7	5.1	4.7	14.5	20.0
7. Juniper Green, Midlothian..	Cist	M.	7.0	...	5.8	5.0	4.7	14.7	20.3
8. Lesmurdie, Banffshire.....	"	M.	7.3	...	6.2	5.0	4.8	15.5	21.5
9. Kennet, Wiltshire.....	Barrow (Bronze)...	M.	7.8	5.0	5.7	5.4	5.3	16.1	21.7
10. Newbigging, Orkney	"	M.	7.1	5.1	5.7	5.3	5.1	15.6	21.0
11. Caedegai, Denbighshire	"	M.	7.4	4.8	5.5	4.4	4.9	15.2	21.2
12. Acklam, Yorkshire	"	M.	7.7	4.5	5.6	5.5	5.1	16.2	21.6
13. Morgan's Hill, Wiltshire ...	"	M.	7.6	4.6	5.6	5.2	5.5	16.0	21.3
14. Middleton Moor, Derbyshire	"	F.	7.1	4.5	5.5	4.2	4.6	14.6	20.0
MEAN .....	.....	...	7.30	4.51	5.68	5.08	4.92	15.33	20.90

The relative mean length and breadth of the two classes of crania, as shown thus far, is: Crania of the Megalithic Tombs, 7.58 by 5.35; Crania of the Barrows, 7.30 by 5.68. Supposing that further research should tend to confirm the idea that the chambered barrows, and others of the most ancient tombs, appear to be the work of a long-headed-race: it does not therefore follow that we are to look for a stereotyped kumbecephalic form, or any more absolute uniformity than is implied in the craniological postulate that the ethnical forms of the skull are permanent, and not transmutable in the different races. We may anticipate the occurrence of the same variety within certain limits as is observed in the heads of all nations, tribes, and even families; and if Dr. Thurnam's idea is correct that the kumbecephalic shape is the artificial exaggeration of a naturally lengthened skull, an additional element of variation will tend to increase the divergence from the typical form. As, moreover, the megalithic tombs are apparently sepulchral monuments of distinguished families, and not common places of sepulture, other examples of the elongated head may be expected to occur; and the race itself may have lingered long after the intrusion of its supplanters. But if the antiquity of this

* In reality, taking all the crania of this type, including those in too imperfect a state to supply more than indications of their correspondence to the accompanying perfect crania, as referred to by Hoare, Bateman, Thurnam, and Davis, they amount to little short of sixty in number; while those of an opposite type are rare and exceptional.

megalithic race is as great as I believe it to be, we owe the preservation of its crania to the secure resting-places provided by the chambered catacombs; and their discovery beyond such limits must be of rare occurrence.

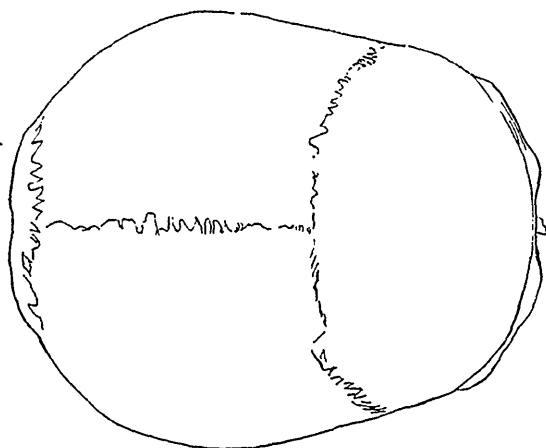
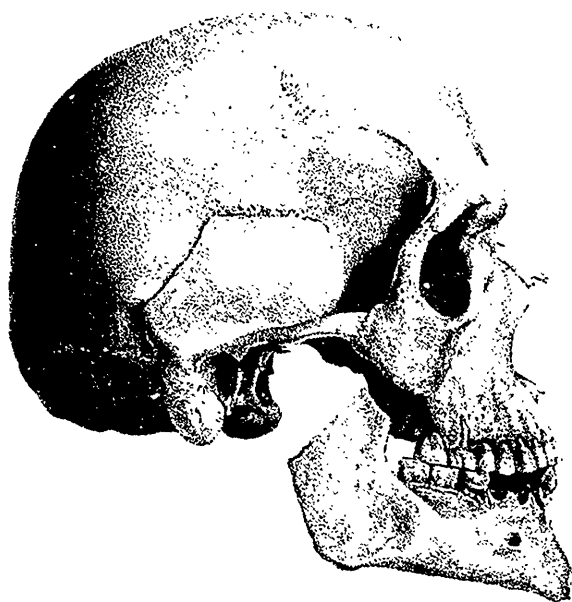
In his communication to the Academy of Natural Sciences of Philadelphia "On the Crania of the Ancient Britons," Mr. Davis deals specifically with the questions here referred to. He begins by assuming the Britons to have been, in the strictest sense, "the aboriginal people of the British Isles;" and then reverting to the general correspondence of cranial form in each race—on which, indeed, the whole science of craniology rests,—he indicates the latitude of divergence which may be looked for within such ethnical limits, and thus proceeds:—"Under these circumstances, we are prepared to expect diversity of form among the crania of the ancient Britons; but it is not unreasonable also to expect that, true to the beautiful principle of nature, of an endless diversity under a comprehensive uniformity, this diversity will be restrained within limits and be subjected to definite rules." Having thus defined the basis of his argument, he proceeds to select the Ballidon Moor, Green Gate Hill, and Codford skulls (Nos. 1, 2 and 6 of Table II.,) as representatives of the typical form of the ancient Briton; while he disposes of the long crania of the megalithic tombs under the convenient designation of *aberrant forms*, and selects the Uley skull as "an example of this peculiar aberration." This affords an opportunity for demolishing "the theory of the dolichocephalic pre-Celtic race to its very foundations;" in doing which, he remarks:—"The circumstance that these long skulls have usually been found in chambered barrows may be a mere contingency, little more than accidental." It has been shown above, that this supposed "mere contingency" has hitherto been fully as constant as the occurrence of the opposite type in the circular earth-barrows; and that, rare as such ancient examples must necessarily be, they already number upwards of thirty well identified illustrations. Let us then see how far this latitude of aberrant cranial forms is made to stretch, in order to bolster up the gratuitous assumption that the Britons of the year B. C. 51, were necessarily the lineal descendants of the primeval race that colonized the British Isles with its first human occupants, at the lowest computation, thousands of years before. The condition of the Britons when first visited by the Romans was by no means one of complete isolation; and the history of subsequent centuries is

little reconcileable with the theory of a race of autochthones having held undisputed possession of the British Isles through all previous centuries since its first occupation by man. Here are Mr. Davis's own selected examples of typical and aberrant cranial forms in so far as they refer to the question under discussion, as the platycephalic and acrocephalic crania are confessedly rare and exceptional :—

TABLE III.—“TYPICAL AND ABERRANT CRANIAL FORMS.”

	L.D.	F.B.	P.B.	O.B.	P.H.	H.C.
Ballidon Moor skull	7.	4.8	5.4	5.3	4.8	20.5
Green Gate Hill skull.....	7.	4.8	5.5	5.	4.7	20.
Codford skull.....	6.8	4.6	5.7	5.1	4.7	20.
Uley Chambered Barrow skull	8.1	4.7	5.7	5.	5.1	21.7

Here we have a supposed typical skull, measuring 6.8 by 5.7, and the aberrant deviation from it : 8.1 by 5.7—to speak of comparison in a case of such extreme contrast is impossible. If this furnishes a fair illustration of aberrant deviation from a typical form, what comes of “the beautiful principle of nature, of an endless diversity under a comprehensive uniformity;” or what indeed are the practical results to be hoped for from the science, if skulls as short as the most brachycephalic Mongol, and others longer than the most dolichocephalic Ethiopian, are to be ranked as mere varieties of the same ethnical type? With indefatigable zeal Mr. Davis has devoted himself to the task of constructing an adequate “Crania Britannica;” and in the successful pursuit of so worthy an aim, he has proved that the mantle of Professor Samuel George Morton has fallen to no unworthy successor. But in this idea of British autochthones, *Celtic, aboriginal, primordial* and *idiogeneous* in character, it seems as if he were resolved to perpetuate the very creases and flaws of the sacred mantle : for here we have Dr. Morton's homogeneous cranial type reproduced to trammel the investigations of British craniologists, as it has already done those of America. One theoretical type is assumed, and every example which will not conform to its requirements thenceforth becomes an aberrant form. In reality, however, the only aberrant form among the above crania is the Codford skull; while in that from Uley Barrow we have a strongly marked illustration of the essentially diverse British dolichocephalic type, which Mr. Wilde recognizes as corresponding to primitive Irish crania found under similar circumstances,



pertaining to what he designates "the long-headed aborigines of Ireland."*

During the fourteen years that have intervened since the first publication of my ideas on some of the questions now referred to, in the course of much familiar correspondence with the authors of the *Crania Britannica*, and others engaged in similar researches, I have endeavoured to help forward the discovery of scientific truth, wholly irrespective of any theories or systems of my own; not unmindful of the Laureate's rebuke:—

Our little systems have their day;
They have their day and cease to be.

Interrupted, as I was, in favourite studies, by transfer to other and widely contrasting scenes, I have looked on from a distance, while many zealous and enthusiastic labourers have been devoting themselves to different departments of prehistoric research, which only a few years since were unheeded or discountenanced. In 1850, the question was started in the Ethnological sub-section of the British Association, whether "craniological" papers should be permitted a hearing. But now, after an interval of twelve years characterized by extensive research in the special department of scientific inquiry under review, which, in Britain at least, had previously met with little encouragement; I may be permitted to feel some gratification in finding one of my "guesses at truth," in which I ran counter to the deductions of continental as well as British scientific observers, finding, thus far, so much confirmation from independent sources. I await with interest the completion of the labours of Dr. Thurnam and Mr. Davis, on their admirable national work; and especially the summing up of their deductions from the data there accumulated; prepared to accept the truth, whether it conform to preconceived theories or not. But meanwhile the evidence produced on various hands appears so far to coincide in revealing a dolichocephalic, if not the kumbecephalic form of cranium, as the predominant one in the chambered barrows: characterised by Mr. Davis as "unquestionably of vast antiquity;"† and without doubt the most ancient examples of regular British sepulture hitherto explored.

It has been shown by repeated references in the previous pages,

* *Ethnology of the Ancient Irish*; by W. B. Wilde, M.R.I.A.

† *Proceedings of the Acad. Nat. Sciences, Philadelphia, 1857*, p. 43.

that the idea of artificial causes supplying one means of accounting for aberrant cranial forms is already receiving very general acceptance, and it appears from a reference of Mr. Davis that Dr. L. A. Gosse has not only illustrated this subject at some length in relation to the extreme compression of the occiput, but incidentally notices the peculiarity referred to in Scottish and Scandinavian skulls, and traces it to the same probable source of the cradle-board. His remarks are: "Passant dans l'ancien continent, ne tardons-nous pas à reconnaître que ce berceau plat et solide y a produit des effets analogues. Les anciens habitants de la Scandinavie et de la Calédonie devaient s'en servir, si l'on en juge par la forme de leurs crânes."*

There is perhaps, a danger, now that the operation of such undesigned influences is recognised, that more may be ascribed to them than is legitimate. Such was undoubtedly the effect on Dr. Morton's mind from his familiarity with the results of artificial deformation on American crania, coupled perhaps with the seductive influences of a favourite hypothesis. In his latest recorded opinions, when commenting on some of the abnormal forms of Peruvian crania, he remarks: "I at first found it difficult to conceive that the original rounded skull of the Indian could be changed into this fantastic form; and was led to suppose that the latter was an artificial elongation of a head remarkable for its length and narrowness. I even supposed that the long-headed Peruvians were a more ancient people than the Inca tribes, and distinguished from them by their cranial configuration. In this opinion I was mistaken. Abundant means of observation and comparison have since convinced me that all these variously-formed heads were originally of the same shape, which is characteristic of the aboriginal race from Cape Horn to Canada, and that art alone has caused the diversities among them."† In contrast to such sweeping deductions, the observations of Sir Robert H. Schomburgk on the Maopityans, or Frog Indians, of British Guiana, are well worthy of consideration. They are the remnant of a nearly extinct tribe. Of their cranial formation he remarks: "The flatness of the head, and consequently the long face and short circumference, is peculiar to the tribe. I have not been able to learn, upon the most minute inquiries, that the form is given to the head by artificial

* Dr. L. A. Gosse, quoted by Mr. Davis "Essai sur les Déformations artificielles du Crâne," p. 74.

† *Physical Type of the American Indian*. Schoolcraft: p. 326.

means. The occiput of the men is high, and almost perpendicular above the front; the frontal bone is small with regard to extent, and in no comparison to the face below the eyes; the cheek bones are harsh and prominent; but the most remarkable part of the head is the great extent between ear and ear, if measured from the upper part of that organ, and the line continued above the eyebrows to the commencement of the other ear. It surpasses the measurement of other Indians generally by an inch or two." Notwithstanding the inability of this intelligent and observant traveller to recover any traces of artificial causes influencing so remarkable a form of head, we might still be tempted to refer it to a source so familiar to the American craniologist. But three days after his arrival at the settlement, one of the women, a Maopityan, but the wife of a Taruma,—a neighbouring tribe characterised by an unusually small and differently formed head,—was delivered of a male child. Sir Robert Schomburgk states: "The Indians invited me to see the infant, and accordingly, provided with some suitable presents, I went. The newborn child had all the characteristics of the mother's tribe. It was not quite an hour old when I saw it, and the flatness of its head as compared with the heads of other tribes, was very remarkable."* Such a narrative, resting as it does on unquestionable authority, shows the danger of error in referring all seemingly abnormal cranial forms to artificial causes, and might almost tempt the theorist to recur to the idea entertained by Hippocrates, relative to the Macrocephali of the Crimea, that long heads ultimately became so natural among them that the favourite form was perpetuated by ordinary generation.

But as we have thus derived illustrations of our subject from Europe, Asia, and America, we also find in ancient Africa a diverse form of head, to which art may have contributed, solely by leaving it more than usually free from all extraneous influences. Such at least is the conclusion suggested to my mind from the examination of a considerable number of Egyptian skulls. Among familiar relics of domestic usages of the ancient Egyptians is the pillow designed for the neck, and not the head, to rest upon. Such pillows are found of miniature sizes, indicating that the Egyptian passed from earliest infancy without his head being subjected even to so slight a pressure as the pillow, while he rested recumbent. The

* *Journal of the Royal Geographical Society*, vol. xvi. pp. 53, 57.

Egyptian skull is long, with great breadth and fulness in the posterior region. In its prominent, rounded parieto-occipital conformation, an equally striking contrast is presented to the British brachycephalic skull with truncated occiput, and to the opposite extreme characteristic of the primitive dolichocephalic skull; though exceptional examples are not wanting. This characteristic did not escape Dr. Morton's observant eye; and is repeatedly indicated in the *Crania Aegyptiaca* under the designation, "tumid occiput." It also appeared to me after careful examination of the fine collection in the Academy of Natural Sciences of Philadelphia, that the Egyptian crania are generally characterised by considerable symmetrical uniformity: as was to be anticipated, if there is any truth in the idea of undesigned artificial compression and deformation resulting from such simple causes as the mode of nurture in infancy.

The heads of the Feejee Islanders supply a means of testing the same cause, operating on a brachycephalic type of cranium; as most of the Islanders of the Feejee group employ a neck pillow nearly similar to that of the ancient Egyptians, and with the same purpose in view: that of preserving their elaborately dressed hair from dishevelment. In their case, judging from an example in the collection of the Royal College of Surgeons of London, the occipital region is broad, and presents in profile a uniform, rounded conformation passing almost imperceptibly into the coronal region. Indeed the broad, well rounded occiput is considered by the Feejeeans a great beauty. This fact is the more important, as we are now familiar with the fact that the artificially flattened occiput is of common occurrence among the islanders of the Pacific Ocean. "In the Malay race," says Dr. Pickering, of the United States Exploring Expedition, "a more marked peculiarity, and one very generally observable, is the elevated occiput, and its slight projection beyond the line of the neck. The front is depressed, or the cranium inclines backwards, while in the Malay it is elevated or brought forward. The Mongolian traits are heightened artificially in the Chinooks; but it is less generally known that a slight pressure is often applied to the occiput by the Polynesians, in conformity with the Malay standard."* Dr. Nott, in describing the skull of a Kanaka of the Sandwich Islands who died at the Marine Hospital at Mobile, mentions his being struck by its singular occipital formation; but this he learned was due to an

* Pickering's *Races of Man*, p. 45.

artificial flattening which the Islander had stated to his medical attendants in the hospital, was habitually practised in his family.*

Dr. Morton,—as I pointed out when first noticing the probable artificial origin of an occipital form peculiar to certain British skulls,—had already recognised undesigned artificial compression as one source of abnormal cranial conformation, and he accompanied its demonstration with a reference to the predominant unsymmetrical form in all such skulls. “This irregularity,” he added, “chiefly consists in the greater projection of the occiput to one side than the other,” and “is not to be attributed to the intentional application of mechanical force.” Such want of uniformity in the two sides of the head is much more strongly marked in the Flathead skulls, which have been subjected to great compression. It is clearly traceable to the difficulty of subjecting the living and growing head to a perfectly uniform and equable pressure, and to the cerebral mass forcing the skull to expand with it in the direction of least resistance. Hence the unsymmetrical form accompanying the vertical occiput in the Lesmurdie and Juniper Green skulls. Wherever therefore a very noticable inequality exists between the two sides of a skull, it may be traced with much probability to designed or accidental compression in infancy; and by its frequent occurrence in any uniform aspect, may, quite as much as the flattened occiput, furnish a clue to customs or modes of nurture among the people to whom it pertains.

In so far as the preceding observations refer to British crania, and their artificial distortion, I have anticipated remarks already prepared for publication in a different form, owing to the appearance in the July number of the *Natural History Review*, of an article from the pen of Mr. Joseph Barnard Davis, entitled: “Note on the Distortions which present themselves in the cranium of the ancient Britons.” In this the author begins by remarking: “During the lengthened and minute investigation of ancient British skulls, to which I have been impelled by the preparation of the ‘Crania Britannica,’ I have been frequently struck with a peculiar flatness in the occipital region prevailing among them. It often extends over a good part of the parietals, about the posterior portion of the sagittal suture, and over the upper part of the occipital bone. Hence I have denominated it *parieto-occipital flatness*.” He next proceeds to notice the results of posthumous compression in the distortion produced by the pressure of the

* *Types of Mankind*, p. 436.

superincumbent earth acting constantly upon the moist and slightly plastic skull ; and then proceeds thus : "Others, whose remains were inclosed in cists, kistvaens, and cromlechs, were mostly defended from the mechanical influences which produced posthumous deformation. Still the effects of this kind of compression are often evident in the occipital region. Hence they serve to interfere with our appreciation of that deformity which manifests itself in the parieto-occipital flatness. It was only after witnessing many examples in which both kinds of distortions were present, and observing that they were not coincident, but quite independent of each other, that their real distinctness became fully apparent." From observation of many artificially flattened Indian skulls, female as well as male, including those obtained from canoe-biers on the Columbia River which had never been interred, I have been led to form a different opinion, and believe that what Mr. Davis describes as "the original parieto-occipital flatness, and at the same time another distinct and non-coincident flattening, generally on one side of the occipital region which is clearly posthumous," are in reality both results of the same pressure, and produced in infancy. I cannot, moreover, conceive of any pressure on a skull inclosed in a shallow stone cist capable of affecting its shape. If so slight a cause could do so, the wonder would be that we should ever disinter a symmetrical skull, or indeed one not violently distorted. "To this subject" Mr. Davis adds, "I have directed attention in the description of the Newbigging skull in the *Crania Britannica*, plate 21, p. (4,) and more at length in the description of the Green Lowe skull, plate 41, p. (2)."

I think it only just to myself, and to this journal, in which my remarks on the artificial origin of the vertical occiput appeared, not only to claim priority, in the publication of ideas now reproduced by Mr. Davis ; but to assign my reasons for considering that he only repeats and enlarges on remarks originally produced in this journal. Under ordinary circumstances I should have left this unnoticed ; but it happens unfortunately that in a forthcoming work, the sheets of which are already thrown off, I have spoken of Mr. Davis as "giving the weight of his concurring testimony" to ideas which, so far as now appears, he claims to have been the first to make known. I have not yet seen the notice of the subject referred to above, as introduced in the description of the Green Lowe skull: the Fifth Decade of the *Crania Britannica* not having yet reached Canada. That in the description of

the Newbigging skull, occurs in the Third Decade, dated, in the accompanying editorial note on the wrapper, September, 1858, and reads as follows: "Regarding the cranium from behind, there is an obvious irregularity in the sides of the occiput; the right bulging out more than the left. This appearance, which is common to this and the Juniper Green and Lesmurdie crania and others, may not improperly lead us to question whether a slight distorting process may not have influenced the cranial conformation of the Britons, at least of the northern tribes."* In these remarks, published more than a year after I had in nearly similar words, suggested "whether such may not furnish an indication of some partial compression,"† &c., the writer appears to have still followed me, even in his limiting this cranial conformation to "the northern tribes." But in a subsequent and it is to be presumed later written portion of the same Decade, devoted to the description of a skull from the Caedegai barrow, on the domain of Plas Heaton, Denbighshire, where no such feature furnishes any reason for introducing the subject, he thus returns to it:—

"In this cranium we possess the native unmodified form of head of the ancient Cymric Briton. Our description of those from Juniper Green, Lesmurdie, and Newbigging, has made known an unusual and rather abrupt flattening in the occipital region, which we consider to have been the work of art at an early period of life.‡ A few remarks upon this subject occur in the description of the last skull, where we were unable to insert any allusion to similar deformations in other races. Among the American races in general, there is so marked a flatness in the occipital region that Professor Morton was induced to regard it as one of the few typical characters of the skull belonging to the American nations, and spreading from one end of the continent to the other. This position, which is no doubt founded in truth, must be allowed to be liable to many exceptions. Yet the crania of Americans figured by Sandifort and by Milne-Edwards, the latter given as a typical skull, are both distinguished by a considerable occipital projection. Professor Daniel Wilson, of Toronto, in an able paper, (*Canadian Journal*, 1857, Vol. II., p. 406), has expressed a reasonable doubt whether this occipital flatness, or great vertical diameter, be properly a universal character of the American races, and has supported his argument by observations made upon crania disinterred in Canada, and considered to have belonged to the Iroquois and Hurons. He has also given expression to a query, which the examination of skulls remarkable for vertical diameter and flatness of occiput naturally induces, whether the American races may not owe these cranial characters, in

* *Crania Britannica*, Decade III. pl. 21, (4).

† *Ante*, p. 403.

‡ As shown by previous extracts from the original descriptions of the Juniper Green and Lesmurdie skulls, this flattening, "the work of art at an early period of life," is an opinion subsequently adopted. It is there ascribed to posthumous deformation.

some measure at least, to artificial distortion. That nature has accorded to many of them a brachycephalic skull, and also that this feature is so marked as to be regarded as a typical character among the majority of the races of the Western Continent, may be admitted. Still, art has been frequently, almost generally, called in to heighten this conformation in a smaller or greater degree. And it is by no means improbable that its influence may be perceived among the aboriginal crania of the British Isles, especially in this greater or less occipital flatness, which is frequently unsymmetrical."

It was on the faith of this passage, that I was led to speak of Mr. Davis as confirming my views; and that I now feel some surprise on finding him refer to Gosse and other continental craniologists, while wholly ignoring the source of the idea alone originally noted by him. Certainly if the passage is critically analysed, it appears only to credit me with the theory of artificial distortion as one source of the forms in question occurring in American crania, and probably most readers may have assumed the concluding remark relative to the occipital flatness in certain British crania,—since expanded into the paper in the *Natural History Review*,—as Mr. Davis's own; but as it is little more than a repetition of remarks in the paper to which he refers in the previous sentence, and, indeed, occurring partly on the same page, where Dr. Morton's views on the subject, in its American aspects, are discussed, it can be no great presumption to believe that "if he had not plowed with my heifer, he had not found out my riddle."

MATERIALS FOR A FAUNA CANADENSIS.

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THE difficulties attending the study of every branch of Natural History in Canada, are greatly aggravated by the want of books fitted to afford to the student, in a convenient and scientific form, such assistance as the present state of our knowledge renders practicable. A lover of Nature, who applies himself to any special department in his own locality, may collect specimens, but they will afford him very little satisfaction unless named and arranged; to which end he must have a good system, and must have characters of the received genera and known species, so that he can ascertain the history of the object

he finds, if known; and if he is so fortunate as to meet with anything new, may have the means of knowing it to be so, that he may communicate his observations upon it without fear of merely repeating what others have done, and perhaps creating useless names, which encumber the science he wishes to advance. To a beginner in the study of Nature, nothing can be more discouraging than to have to search out every object in the most extensive general works (provided he is so fortunate as to have access to them) because there is as yet no attempt at a list of the productions of his country, where the limited number would facilitate his investigations.

Those who contribute local catalogues in any department of Natural History, render important assistance: but something more is required. It has occurred to me that the publication in this Journal of fragmentary portions of a *provisional* Fauna Canadensis might contribute not a little both to assist the cultivators of Zoological Science and to accumulate useful materials for future labourers who may be enabled to attempt what would now be premature,—a general systematic work on Canadian Zoology. By a *provisional* Fauna, we mean a systematic arrangement with the essential characters of all such genera and species as have either, to our knowledge, actually been found in Canada, or are deemed very likely to be found there—being known as inhabitants either of the more northern or the immediately southern regions. In this way, without pretending to be yet in a condition to offer any reliable account of all the living creatures inhabiting our country, we may afford useful assistance to those who are disposed to examine them, and by their labours thus assisted our conjectural list will gradually change into an authenticated record of observed facts. Many, who without such aid could do nothing, or would remain insulated collectors, unable to determine whether what they obtained was known or unknown, scarce or familiar, would be at once enabled, with a great increase to their own enjoyment from the study of Nature, to become contributors to scientific knowledge;—to assist in determining the range of species, and to call attention to hitherto undescribed forms.

There may be branches of Natural History in which the advances already made, as well as the extent and general interest of the subjects, would warrant the publication of volumes specially dedicated to their illustration. I have already announced my desire, restrained only by necessary considerations of prudence, of publishing from ma-

terials now in my hands, a *Flora Canadensis*, the utility of which I think cannot be doubtful; though no one can be more conscious than I am how much remains to be done in the way of diligent herborisation throughout all parts of the Province, and it is in promoting this interesting labour, that I think the work I propose would be especially useful. The birds which annually visit us are beginning to be well known. We have public and private museums of considerable richness. A French-Canadian gentleman—M. Lemaire—has published in his own language, a good popular account of them, which has met with well-deserved success; and we know that he has proposed to our highly-valued friend, T. W. Cottle, Esq., of Woodstock,—whom nobody excels in a familiar practical acquaintance with the birds of Canada,—to translate his work into English, with such modifications as his own judgment might suggest; thus producing an Ornithological manual for Canadians using the English language, which could not fail of giving a great impulse to this attractive branch of Zoology. Even our own means, from the extensive collection of the University, aided by local catalogues and occasional notices, would enable us to do much in relation to the birds of Canada, and we may possibly attempt a sketch of their arrangement; but for particulars respecting species, their distinctions, and their habits, we should gladly come as learners to such an authority as we have named, and we earnestly hope that he will be induced to engage in the undertaking we have referred to. We could easily name a friend who possesses admirable materials for working out several of the more difficult orders of Canadian Insecta; and there are not wanting considerable materials for the illustration of the land and fresh-water Mollusca. How far it may seem expedient to proceed with these papers we cannot yet judge; but the following fragment relating to Neuropterous Insects will at least shew what we propose, and what means are at our disposal for working out our plan.

The great class *Insecta*, includes articulate animals with jointed limbs; a distinct head, with two antennae; respiration by tracheae; and distinct sexes. It is obvious that these characters exclude, on the one hand, *Arachnida*; on the other, all grades of *Crustacea* and *Annulata*, as well as the lower form *Rotifera*. Thus defined, the class includes a lower sub-class termed *Myriapoda*, with limbs to each articulation, and whose development is not much beyond that of the larval forms of the higher division; together with the true, or *Hexa-*

podous insecta, having the lower appendages developed on three articulations only, and the upper, assuming the form of wings, if at all, on two articulations only. The *Apterous* examples will probably appear more certainly the more their structure is understood to be degraded forms of some of the other divisions. It is at least certain that the different groups of *Apterous* insects differ more from each other than they do from some of what are considered as higher forms, whilst there are various special instances of the absence of wings in species obviously allied to others which are furnished with them; so that on the whole, the distinction of winged and wingless insects is of little value, and the *Apterous* orders commonly received might probably be appended to others of which they are but less developed examples. The degree of importance really belonging to some other of the characters relied upon in classifying insects, is very doubtful. One much employed is the mandibulate or suctorial character of the oral apparatus, yet it has been proved that the same elements occur in both structures, and the transitions from one to the other are most remarkable. We cannot think that either the abortive hind wings of the *Diptera*, or their more completely suctorial mouth, should prevent the recognition of their close affinity with *Hymenoptera*, and we incline to the opinion that these two orders, the most peculiarly typical of all insects, would, combined together, occupy a central position in a natural distribution, around which the other leading forms might be placed in the order of their tendencies of development: 1. *Neuroptera*; 2. *Lepidoptera*; 3. *Coleoptera*; 4. *Orthoptera*; 5. *Hemiptera*. Confining our attention now to the *Neuroptera*, it seems to us, in the first place, abundantly evident that the Caddis-flies, which have been elevated into a distinct order under the name of *Trichoptera*, only exhibit a modification of the *Neuropterous* structure in analogy with *Lepidoptera*. Reviewing, then, the various sections which have been proposed, we are inclined to the following view of the families of *Neuroptera*. We place first *Libellulida*, the Dragon-flies, as exhibiting the greatest power and ferocity; 2. *Phryganeida*, the Caddis-flies; 3. *Termitida*, the White Ants, distinguished by their social habits and their large consumption of food, obtained without violence; 4. *Panorpidida*, the Planipennes of authors, including several well-marked sub-families; and, 5. *Ephemerida*, May-flies, in some respects having the lowest organisation in the order, yet approaching the *Libellulida* in their imperfect metamorphosis, as well as in the character of their antennae.

We now proceed to give a synopsis of Canadian *Neuroptera*. The following table will distinguish the families :

		ORDER NEUROPTERA : Wings four, nearly equal, membranous, usually reticulate, rarely suppressed; mouth more or less completely mandibulate; never properly suctorial; larva hexopod. Antennae.	
	very short setiform, with not more than six or seven joints		
	Mouth		
	with its parts hard and distinct, properly mandibulate		
	and indistinct		
	.....	.....	1. <i>Tibellulida</i> .
	.....	.....	5. <i>Ephemera</i> id.
	.....	.....	4. <i>Panorptida</i> .
	.....	.....	2. <i>Phrygane</i> id.
	.....	.....	3. <i>Termitida</i> .
long, variously-formed		Wings	
Insects		generally of equal size; the under sometimes smaller, or differing in shape; not folded	
	not living in families; wings not caducous	unequal; the lower layer folded	
	living in families containing many individuals with undeveloped sex; wings caducous		

The curious and interesting family of *Termitida*, which in this group represents the Ants among the *Hymenoptera*, may be omitted,

as being confined to tropical and sub-tropical climates. Taking the others in order, we give the following analysis of *Libellulida*, adopting Rambur's sub-families :

Lateral lobes of the under lip (labial palps)	{ of three pieces or joints	Eyes	{ scarcely touch- ing, or separ- ate	widely separat- ed; sometimes pedicellated	<i>Agrionina.</i>
				touching at a point, or a lit- tle separated	<i>Gomphina.</i>
				contiguous, to some extent	<i>Aeschnina.</i>
	{ of two joints				<i>Libellulina.</i>

In characterising the genera, we have not thought it necessary to preserve all Hagen's new genera, but have adopted those of Rambur.

Genera of <i>LIBELLULINA.</i> triangle of the anterior wings	{ well distin- guished from the other arco- le, its base formed by a single nervule	Eyes	{ with a protrusion in the mid- dle posteriorly	swelled like a <i>Didymops.</i> grain	
				not swelled (body brassy- green)	<i>Cordulia.</i>
				without the pos- terior enlarge- ment, connect- ed in a short space	<i>Libellula.</i>
	{ imperfectly dis- tinguished, its base formed by two nervules				<i>Nannophya.</i>

Genera of *AESCHININA.*

- Anal angle of the posterior wings of the male rounded off; second abdominal segment of female not auriculated (abdomen with a lateral interrupted carina)..... *Anax.*
- Anal angle of the posterior wings of the male acute; second abdominal segment of the female auriculated; last segment not spinous beneath..... *Aeschna.*
- Last segment of the female spinous beneath, otherwise like *Aeschna* *Gynacantha*

Genera of *GOMPHINA.*

It is only necessary to notice the two following, out of seven genera characterised by Rambur, as being alone likely to afford any species to the Canadian naturalist :

- Under legs entire ; triangle without nervules ; eyes separated *Gomphus*.
 Under lip divided at its extremity ; eyes slightly touching *Cordulegaster*

Genera of AGRIONINA.

Out of eleven given by Rambur, only three seem likely to occur to the Canadian collector, which may be thus distinguished :

Nervules of the first Costal division	}	more or less numerous ; pterostigma very small, or only seen in females	<i>Calopteryx</i> .	
		two only	pterostigma lozenge-shaped, small ; insects of small size ; areolæ quadrangular	<i>Agrion</i> .
			pterostigma parallelogram-shaped ; areolæ often pentagonal	<i>Lestes</i> .

SYNOPSIS OF THE SPECIES.

LIBELLULIDA.

§1 LIBELLULINA.

Gen. NANNOPHYA. *Rambur*.

N. BELLA, *Uhler*.—Black ; front white, with a quadrangular black spot ; dorsum of the thorax, each side with an interrupted yellow line on the male ; sides with two oblique stripes and a triangular patch behind, interrupted, yellow ; abdomen black, with yellow bands and spots—these parts in the female black, pruinose ; wings hyaline, fulvous at the base in the male. Pterostigma small, black, terminated with a white nervule at each end in the female : length 18 millimeters ; alar expansion 33 mill : rather less in the female.

Hab.: U. S. as far north as Maine.

Gen. LIBELLULA, *Linn.* (as limited by Rambur.)*a. Perithemis, Hagen.**L. DOMITIA, Drury.* (*Perithemis Domitia, Hagen.*)

Posterior lobe of the prothorax large, broad, bilobed ; abdomen much shorter than the wings, broad, depressed, narrower at the base ; flavescent, villose ; dorsum of the abdomen with an interrupted brownish-black line on each side ; wings flavescent, or at least the basal half, with two fuscous, transverse stripes, the internal one often almost absent in the female ; pterostigma rufo-fuscous. In the North-

ern var. the sides of the thorax fuscous with two interrupted yellow lines on each side: all the wings of the male with a basal fuscous point. Length 23 millim.; alar expanse 36 millim.; pterostigma 2 millim.

Hab.: U. S. as far north as the States of N. Y. and Mass.

b. Diplax, Charpentier. Posterior lobe of the prothorax large, broad, bilobed; abdomen a little shorter than the wings, slender, triquetral, compressed at the base; feet long, slender; first sector of triangle sinuated; triangle moderate, broad.

L. HUDSONICA, Selys. Very near to the European *L. dubia* (which is thus described: *L. dubia*, black; front white, labium black, labrum white, margined with black; vertex and band before the eyes black; thorax obscure brassy-green, with brown villosity; dorsum with a subinterrupted fulvous stripe on each side; sides spotted with fulvous; feet black; abdomen slender, triquetral, the dorsum spotted with yellow; wings hyaline or fumose, anterior pair with two basal points, posterior with a point and a triangular spot at the base, black; pterostigma quadrangular; nigro-fuscous. Length 37 millim.; alar expanse 58 millim.; pterostigma 2 millim.

Hudsonica is smaller; the basal spot of the posterior wings small; the vortex yellow above; the labrum scarcely margined with black. Length 27 millim.; alar expanse 46 millim.

Hab.: Hudson's Bay, New Brunswick.

L. INTACTA.—DIPLAX INTACTA, *Hagen.*

Fuscous; mouth and front white; labium of adult male all black, of fem. black in the middle; front with a black band before the eyes; vertex black, with a pale spot, or all black; thorax nigro-fuscous; dorsum with obsolete fulvous stripe on each side; sides fuscous, varied with black; thorax of adult male brassy-black; abdomen short, somewhat broader before the apex; fuscous, with dorsal phalarate fulvous spots: in the adult male black, with a yellowish spot on 7th segment; wings hyaline, posterior ones at the base with a triangular black spot; base flavescens in the females; pterostigma short, quadrangular, black. Length 32 millim.; alar expansion 52 millim.; pterostigma 2 millim.

Hab.: U. S. Wisconsin, Chicago, Mass.

L. RUBICUNDULA, Say.—*DIPLAX RUB.*, Hagen.

Yellowish subrufescent; front yellowish, with a black band before the eyes; thorax rufous, the sides sometimes luteous; feet black; anterior femora luteous beneath; abdomen rather long, slender, sanguineous in the male, or yellowish rufous; the sides with a maculose black stripe; wings hyaline, the extreme base yellowish; pterostigma quadrangular fuscous, pale at each end. Length 32–37 millim.; alar expanse 50–58 millim.; pterostigma 2 millim.

Hab.: U. S. Mass., &c.

L. ASSIMILATA, Uhler.—*DIPLAX ASS.*, Hagen.

Yellowish; mouth and front pale yellow, a narrow black band before the eyes; dorsum of the thorax luteous, its sides yellow; abdomen slender, the base compressed, inflated, yellowish; dorsum of first and second segments black at the base; segments 4–9 each side, with a marginal black stripe; wings hyaline, the base flavescens; males with the basal half flavescens; pterostigma short, yellow. Length 33–37 millim.; alar expanse 56–60 millim.; pterostigma 2½ millim.

Hab.: U. S.—N. W. States.

c. Mesothemis, Hagen.—Posterior lobe of prothorax large, broad, bilobed; abdomen a little shorter than the wings, narrow, triquetral, the base compressed, somewhat expanded before the apex; feet long, rather strong; first sector of triangle sinuated; triangle moderate narrow; sides of eighth segment of the female not dilated.

L. SIMPLICICOLLIS, Say.—*MESOTHEMIS SIMPLICICOLLIS*, Hagen.

Yellowish-green; mouth and front yellowish; a narrow black band before the eyes; thorax yellowish green, the sides varied with black below; abdomen compressed at the base, vesiculose, triquetral, yellowish-green, the sutures and margins black; segments 4–10, with a quadrangular black dorsal spot behind; last segments sometimes altogether black; venter obscure; appendages yellow; feet black, anterior femora yellowish beneath; wings hyaline; pterostigma oblong, yellow. Adult male with the thorax and abdomen blue pruinose. Length 41–45 millim.; alar expansion 60–70 millim.; pterostigma 3½–4 millim.

Hab.: U. S. as far north as Illinois, Pennsylvania, N. Y., Mass.

- d. Libellula, Hagen.*—Posterior lobe of prothorax small, entire; abdomen stout, rotundo-triquetral, narrowing posteriorly; triangle narrow, long, first sector sinuated.

L. QUADRIMACULATA, Linn.

Reddish yellow, villose; trout pale, terminated with black; sides of thorax yellow, lined with black; feet black; abdomen attenuated at the apex; fuscous behind; sides yellow; wings yellow at the base anteriorly, a costal spot, and sometimes an apical one; posterior wings with a triangular spot at the base, reddish black, veined with yellow; pterostigma brownish black. Length 48 millim.; alar expanse 80 millim.; pterostigma 4 millim.

Hab.: Northern U. S.; Canada.

- e. Plathemis, Hagen.*—Posterior lobe of prothorax small, entire; abdomen short, broad, depressed; legs stout, short; pterostigma long, oblong; front sector of triangle sinuated; triangle narrow, long; eighth segment in the female dilated at the sides.

L. TRIMACULATA, De Geer.—*PLATHEMIS TRIMAC. Hagen.*

Rufescent; thorax with two oblique yellowish stripes at each side; abdomen of the male pruinose; female with lateral oblique yellow spots, margined with fuscous; feet black; base of the femora rufescent; wings hyaline, a basal, longitudinal stripe, which is margined inferiorly with lacteons on the posterior wings and a broad band in the middle, in the male; or with the basal stripes a spot upon the middle anteriorly, and the apex fuscous in the female; pterostigma fuscous. Length 40 millim.; alar expanse 70 millim.; pterostigma 5 millim.

Hab.: U. S. widely diffused, reaching to Maine and Minnesota.

CORDULIA, Leach.

C. SEPTENTRIONALIS, Hagen.

Brassy-green, hairy; labium luteous; front brassy-green above, each side with a yellow spot; vertex brassy-green; thorax brassy-green, the dorsum having a spot at each side at the wings, and the sides each two maculose stripes, yellow; feet black, anterior femora yellowish at the base; abdomen slender, behind the base inflated; then attenuated, with the apex equal, brassy-black, sides of the base and apex luteous; wings hyaline, the posterior ones with a small basal triangular brownish-black spot; pterostigma small, fulvous; anal

angle in the males subacute. Length 43 millim.; alar expanse 60 millim.; pterostigma $2\frac{1}{2}$ millim.

Hab.: Labrador.

C. ALBICINCTA, *Hagen*.

Brassy-green, hairy; labium luteous, front inferiorly, and at the sides luteous, above and the vertex brassy-green; thorax bright green-brassy; feet black; abdomen slender, inflated at the base, then slenderer, the apex equal, brassy-black, the base on each side and the last segment at the apex being luteous; wings hyaline, anterior margin in the females subflavescent; pterostigma fulvous; anal angle of the males subacute. Length 48 millim.; alar expanse 66 millim.; pterostigma 3 millim.

Hab.: Labrador.

Several other species have been attributed to Canada and Nova Scotia, but their characters are not given.

Subf. *AESCHNINA*.

AESCHNA, *Fabricius*.

Æ. HEROS, *Fabr.*

Fuscous, marked with yellowish-green; front obscure luteous, fuscous above, each side with a yellowish green spot; occiput of the female bifid; thorax fuscous, with a stripe at each side of the dorsum; angulated at the wings, and the sides with no oblique stripes, green; feet black, base of the femora subrufous; abdomen long, stout, hardly broader at the base, fuscous, the base, middle, and apex of the segments with a subinterrupted, narrow, green fascia; wings hyaline, subflavescent in the middle, the apex sometimes infuscated; pterostigma long, narrow, fulvous. Length 85-96 millim.; alar expanse 108-120 millim.; pterostigma 5-6 millim.

Hab.: U. S. Indiana, N. Y. Mass. and Southward.

Æ. CONSTRICTA, *Say*.

Brownish-black, spotted with green and blue; labrum yellow; head yellowish-green in front, with a black T spot above; thorax fuscous, dorsum with a stripe on each side, which is broader at the wings, the sides each with two oblique green stripes; feet black, femora and tibiæ above rufous; abdomen long, equal, blackish fuscous, very much narrowed behind the inflated base; segments 3-10, with two dorsal, apical, quadrangular blue spots, 3-8 with two medial triangular yellow

low spots, each side with a basal divided blue spot; second segment with a basal dorsal line, each side with a transverse line upon the middle, yellow, the last segment flat above; wings hyaline, pterostigma small, fuscous. Length 70 millim.; alar expanse 96-100 millim.; pterostigma 3 millim.

Hab.: U. S. Wisconsin, Indiana, Pennsylvania, Connecticut.

Subf. GOMPHINA.

CORDULEGASTER, *Leach.*

C. OBLIQUVS, *Selys.*—*Æ. OBLIQUA*, *Say.*

Black, spotted with greenish yellow; head yellow, with two black bands in front, occiput tuberculoid; thorax black with grey hairs, dorsum with a cuneiform stripe on each side, sides each with two oblique yellow stripes; feet black, base of the femora fuscous; abdomen long, equal, black, dorsum with a greenish-yellow central line, which is dilated in the middle on segments 5-8; wings hyaline, pterostigma long, fulvous. Length 83-88 millim.; alar expanse 112-124 millim.; pterostigma 6 millim.

Hab.: U. S. Indiana, Connecticut, and Southward.

GOMPHUS, *Leach.*

G. PARVULUS, *Selys.*

Black; head black, a fascia in front and two yellow spots; thorax black, dorsum with a small yellow line on each side; sides yellow, with two contiguous stripes and a third posterior, black; feet black; abdomen equal, black, the dorsum with a basal maculore yellow stripe; wings hyaline; pterostigma blackish, fuscous. Length 40 millim.; alar expanse 54 millim.; pterostigma 3 millim.

Hab.: Nova Scotia.

G. SPICATUS, *Hagen.*

Fuscous spotted with luteous; head pale yellow; thorax clothed with fuscous hairs, dorsum with a stripe on each side, and the sides with two stripes, luteous; femora luteous, fuscous above; tibiae blackish fuscous, exteriorly yellowish, tarsi black; abdomen equal, inflated at the base, fuscous, the dorsum with an interrupted yellow line, the base with a yellow stripe at each side; wings hyaline, pterostigma yellow. Length 49 millim.; alar expanse 60 millim.; pterostigma 3 millim.

Hab.: N. Y., Canada.

G. COLUBRINUS, *Hagen*.—OPHIOGOMPHUS, COL., *Selys*.

Greenish-yellow; head yellow, with four black lines, labium black in the middle; thorax greenish-yellow, a middle stripe, and one on each side, narrow fuscous; sides each with three narrow black lines; feet yellow, the posterior femora exteriorly fuscous, tibiae black, with an exterior yellow line; abdomen cylindrical, dilated before the apex, the dorsum black, segments 3-7 with a basal yellow stripe, the rest with a yellow spot; wings hyaline, pterostigma pale fuscous. Length 50 millim.; alar expanse 64 millim.; pterostigma 3 millim.

Hab.: Hudson's Bay.

Subfam. AGRIONINA.

AGRION., *Fabricius*.A. VIOLACEUM, *Hagen*.

Violaceous: head with a transverse black stripe above, a large violaceous occipital spot on each side; posterior margin of the prothorax rounded, subexcised in the middle; dorsum of the thorax violet, with a narrow medial black stripe: sides pale violet, a bifid stripe above at the wings, and a line upon the middle black; feet pale, femora exteriorly, tibiae interiorly, and the whole of the tarsi black; abdomen violet, varied with black; abdomen of female yellowish-green, varied with black; wings hyaline, pterostigma rhomboidal fuscous. Length 33-36 millim.; alar expanse 40-44 millim.

Hab.: U. S. Mass. Connecticut, New York, Pennsylvania, Illinois.

A. SAVCIUM, *Burm.*

Red; head black above in the male, blackish fuscous in the female; posterior lobe of the prothorax short, the middle subdepressed; dorsum of the thorax black in the male, red in the female, sides yellowish-red; feet pale yellow; abdomen red, the seventh segment with the sides at the apex black, the remaining segments black: in the female the apex of the seventh segment has a point on each side; wings hyaline, pterostigma rhomboidal fuscous. Length 26-22 millim.; alar expanse 31-27 millim.

Hab.: U. S. Illinois, Pennsylvania, Maine, Mass. and Southward.

A. THASTATUM, *Say*.—A. ANOMALUM, *Rambur*.

Brassy-green, varied with orange and yellow; head brassy-green in front, with an orange occipital point at each side; prothorax with the posterior lobe somewhat produced in the middle; dorsum of the

thorax brassy-green, with a narrow yellow stripe on each side; sides yellow, brassy-green above, with a black stripe at the wings below; feet yellow, apex of the femora with an exterior black stripe; abdomen yellow, segments 1-2, having the dorsum brassy-green, the rest spotted with brassy-green, somewhat varied according to age; the tenth segment has a long process upon the middle, oblique, cylindrical, and bifid at the apex; wings hyaline, pterostigma of the posterior ones rhomboidal, black, of the anterior larger, rufous, surrounded with yellow, not attaining to the costal margin. The female differs in having more orange on the head, thorax, and abdomen, and the pterostigma of each of the wings regular yellowish. Length 23-27 millim.; alar expanse 23-30 millim.

Hab.: U. S. Indiana, Maine, Mass. and Southward.

A. IRENE, Hagen.

Bright brassy-green; head yellow in front; third article of the antennæ aunulated with pale colour; posterior margin of the prothorax broad triangular in the male, biemarginated in the female; dorsum of the thorax bright brassy-green, sides yellowish, brassy-green above; feet pale, exteriorly lineated with black; abdomen slender, brassy-green; the sides and a basal lunule on segments 3-6 yellow; segment 8 with an apical spot, 9 with a triangular dorsal one, 10 almost altogether blue in the male, 9 blue at the sides, 10 at the apex in the female, margin of 10th segment excised dentated; wings hyaline, pterostigma short, rhomboidal, luteous. Length 25-28 millim.; alar expanse 28-30 millim.

Hab.: U. S. Chicago, Wisconsin, Illinois.

LESTES, Leach.

L. FORCIPATA, Rambur.

Brassy-green; mouth yellow; dorsum of the thorax brassy-green in the male, with a middle line and stripe on each side yellow in the female; sides yellow, with a superior green brassy stripe, dilated at the wings, or the male with an interior black stripe; feet yellow, femora bilineated with black, interior of tibiæ and tarsi black; abdomen brassy-green with yellow sides, pruinose at the base and apex in the male, a basal lunule upon the segments yellow; wings hyaline, pterostigma black, margined with yellow at the sides. Length 35 millim.; alar expanse 40 millim.; pterostigma 1½ millim.

Hab.: U. S. Chicago, Wisconsin.

L. HAMATA, Hagen.

Brownish-brassy; mouth yellow; dorsum of the thorax brown-brassy, with a median line and a broad stripe on each side, narrowed at the wings, yellow; sides yellow, pruinose with a superior broad brown-brassy stripe and a black spot upon the pectus; beneath yellow; feet yellow, femora exteriorly, tibiae interiorly, and tarsi black; abdomen obscure green-brassy, with a basal yellow lunule to the segments; wings hyaline, pterostigma oblong, black, the sides margined with yellow. Length 42-38 millim.; alar expanse 45-43 millim.; pterostigma $1\frac{1}{2}$ millim.

Hab.: U. S. Chicago, Wisconsin; also Red River.

L. UNGUICULATA, Hagen.

Green-brassy; mouth yellow; dorsum of the thorax brassy-brown, a median line and narrow stripe on each side yellow; sides yellow pruinose, with a broad superior brassy-brown stripe, and a black broad vitta below; beneath yellow; feet yellow; femora bilineated with black, tibiae interiorly and tarsi black; dorsum of the abdomen green, the apex brown-brassy, a yellow lunule at the base of the segments, base and apex of the tergum pruinose, the sides yellow, venter black; wings hyaline, pterostigma oblong fuscous, the sides margined with yellow. The inferior fascia of the thorax wanting in the female. Length 40-30 millim.; alar expanse 43-37 millim.; pterostigma $1\frac{1}{4}$ millim.

Hab.: U. S. Chicago, Wisconsin, New York.

L. EURINA, Say.

Blue, varied with green and violet; mouth yellow; dorsum of the thorax with a yellow stripe on each side, which is cleft and dilated at the wings; sides yellow; abdomen blue, segments green at the apex; venter black; feet black, femora beneath and tibiae exteriorly pallid; wings hyaline, pterostigma black. Length 47 millim.

Hab.: U. S. Mass.

L. RECTANGULARIS, Say.

Brassy-fuscous; mouth yellow; dorsum of the thorax brassy-brown, with a median line and broad stripe at each side narrowed in front, yellow; sides pale yellow, with a brassy-brown stripe superiorly, and two linear black spots posteriorly; feet yellow, femora exteriorly, tibiae interiorly, and tarsi black; abdomen long, very slender, yellow,

the dorsum fuscous, apex of the segments black, with an interrupted yellow basal lunule; apical segments entirely blackish-fuscous; wings hyaline, the costa yellow, pterostigma short, the sides a little oblique, black. Length 53-41 millim.; alar expanse 49-41 millim.; pterostigma $1\frac{1}{2}$ millim.

Hab.: U. S. Chicago, Minnesota, Indiana, Pennsylvania, New York, Mass.

CALOPTERYX, *Leach*.

C. VIRGINICA, *Drury ed. Westwood*.—*C. DIMIDIATA*, *Rambur*.

Brassy-green, shining; labium, antennae, thoracic sutures, pectus, venter, and feet black; abdomen with the dorsal stripe, venter with segments 8-10 yellow; wings narrow, hyaline, the base somewhat flavescent, the apex blackish-fuscous; pterostigma in the female snow-white. Length 50-52 millim.; alar expanse 70-72 millim.; pterostigma 2 millim.

Hab.: Hudson's Bay, U. S. Mass. and Southward.

C. MACULATA, *Beauv.*—*C. HOLOSERICCUS*, *Burm.*—

C. PAPILIONACEA, *Ramb.*

Brassy-green or blue, shining; labium, antennae, thoracic sutures, pectus, venter, and feet black; abdomen with a dorsal yellow stripe, 8-10 segments in the female; wings very broad, densely reticulated, black, sometimes with hyaline spots in the male, or clouded with fuscous, and fuscous at the apex, the female with a snow-white pterostigma. Length 38-48 millim.; alar expanse 63-65 millim.; pterostigma 2- $2\frac{1}{2}$ millim.

Hab.: U. S. Chicago, Mass. and Southward. A species common and widely diffused.

C. APICALIS, *Burm.*

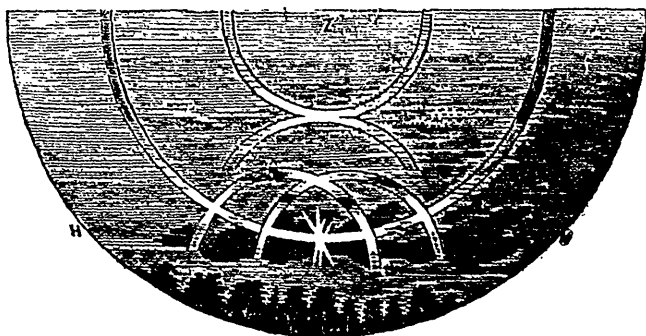
Brassy-green, shining; labium, antennae, thoracic sutures, and pectus black, or in the female in part flavescent; feet long, black, with long cilia; wings narrow, hyaline, or with the apex narrowly fuscous, pterostigma absent. Length 42 millim.; alar expanse 62 millim.

Hab.: U. S. Pennsylvania, Mass.

NOTICE OF MOCK SUNS, AS SEEN NEAR THE MUSKOKA RIVER. IN NOVEMBER, 1861.

BY A. CLIFFORD THOMSON, P. L. S.

While camped near the mouth of the Muskoka River, Canada West, on the 10th of November, 1861, I observed at about 9.40 A.M., the somewhat remarkable phenomenon of seven mock suns, as shewn in the accompanying sketch. In this drawing the H. H. represents the horizon, and the point *z.* the zenith. Unfortunately, I had not any instrument with me at the time, to enable me to note the posi-



tion of the halos; but two of these were quite excentric, both with regard to the sun and the zenith. The sun was too bright to be regarded with the naked eye, though the atmosphere was slightly hazy. The wind was light, and from the N. W.

I venture to send this brief notice to the *Canadian Journal*, as I believe the phenomenon to which it refers, is rarely witnessed in so southern a latitude. It was observed on this occasion at Orillia and other places more or less distant from the point at which the above sketch was taken on the Muskoka River. The latitude of this point is $45^{\circ} 10' N.$

REVIEWS.

Isca Silurum; or, An Illustrated Catalogue of the Museum of Antiquities at Caerleon. By John Edward Lee, F. A. S., F. G. S., Honorary Secretary to the Monmouthshire and Caerleon Antiquarian Association. London: Longman, Green, Longmans and Roberts, Paternoster Row. 1862.

Caerleon, in Monmouthshire, in which the second Legion was stationed for many years during the Roman occupation of the island, has long been celebrated for the ancient relics which have been found there. Of these there has been no more zealous or successful collector than the author of the work now under review. Indeed, it is chiefly to his exertions that antiquaries are indebted for the extensive and interesting Museum in which are preserved so many memorials of Isca Silurum.

The first work which Mr. Lee published on the subject appeared in 1845. Its title was "Delineations of Roman Antiquities found at Caerleon (the ancient *Isca Silurum*) and the neighbourhood." This was succeeded in 1850 by a "Description of a Roman building and other remains lately discovered at Caerleon." In the "Illustrated Catalogue," which has recently appeared, Mr. Lee has combined the substance of the two former volumes with an account of recent discoveries. The work also contains a notice of the excavation, directed by Octavius Morgan, Esq., M.P., at Caerwent, (the ancient *Venta Silurum*) which produced some of the best specimens in the Museum; a full abridgement or a valuable paper on the early history of Caerleon by Thos. Wakeman, Esq.; and fifty-two lithographic illustrations; all the plates being either transferred from the author's own etchings, or drawn by him direct upon the stone. These illustrations form a most valuable portion of the volume, as they are drawn with more than ordinary care and are perfectly reliable as faithful copies. In the literary part of the catalogue, Mr. Lee obtained assistance from some of the most highly esteemed authorities in Archæology. He makes his acknowledgments to Professor Mommsen and Dr. E. Hübner of Berlin; to Octavius Morgan, Esq., M.P., Rev. C. W. King, M.A., Albert Way, Esq., A. W. Franks, Esq., W. S. Walford, Esq., Thos. Wakeman, Esq., Henry Montonnier Hawkins, Esq., C. Roach Smith, Esq., and Dr. Thurnam, of England; and to the Rev. Dr. McCaul, of Canada.

The principal part of the volume is occupied by the Roman remains,

which, in consequence of their numbers, are placed first. The few Celtic antiquities are next described; then the fragments which may be called early Welch; and lastly the Mediæval remains and the objects of later date. In the description of the Roman remains the arrangement of Mr. Wilde, in the Catalogue of the Museum of the Royal Irish Academy, has been adopted; and they are classed under the heads of stone, earthen, vegetable, animal, and metallic materials,—the coins being described last. Of the Numismatic relics, of which there are specimens beginning with Claudius and ending with Honorius and Arcadius, a well prepared list has been furnished by the Rev. C. W. King, so favourably known by his valuable contributions to our knowledge of antique gems. Of the Latin inscriptions there are—exclusively of those on fictile remains—about twenty that are perfect, some on altars and tablets and others on grave-stones. The most remarkable of these is the following:—

IMPP · VALERIANVS ET GALLIENVS
 AVGG · ET VALERIANVS · NOBILISSIMVS
 CAES · COHORTI · VII · CENTVRIAS · A SO
 LO RESTITVERVNT · PER · DESTICIVM IVBAM
 VC LEGATVM · AVGG · PRPR · ET
 VITVALSIVM LÆTINIANVM LEG LEG
 II · AVG · CVRANTE · DOMIT · POTENTINO
 PRAEF · LEG · EIVSDEM.

i.e., Imperatores Valerianus et Gallienus Augusti et Valerianus nobilissimus Cæsar cohorti (not *cohortis*, as Mr. Lee gives it) septimae centurias a solo restituerunt per Desticium Jubam virum clarissimum legatum Augustorum propraetore et Vitulasium Laetinianum legatum legionis secundae Augustae curante Domitio Potentino praefecto legionis ejusdem.

This inscription has two peculiarities which we have not observed in any other. The first is the use of *centurias* which Mr. Lee correctly explains as meaning “*soldiers’ quarters*,”—the other, which Mr. Lee does not notice, is the singular mention of a legate and a praefect at the same time in the same legion. Of this the most probable explanation seems to us to be, that Domitius Potentinus was *praefectus castrorum*.

In the restoration and interpretation of the less perfect inscriptions, we notice two examples from amongst those found at Caerleon, but not now in the Museum, in which the ingenuity and learning of a distinguished fellow-townsmen, whose communications have occasionally

enriched our own pages, are remarkably displayed. After copying the several inscriptions from the works in which they are preserved, Mr. Lee says, "It had not been my intention to have suggested any reading or made any remark on the inscriptions given above in type, and which are not now in the Museum; but while these sheets are in the printer's hands, the Rev. J. McCaul, LL.D., of Toronto, has favoured me with a letter containing many curious observations respecting them. It is his intention shortly to collect into a volume his 'Notes on Roman Inscriptions in Britain;' but as he very liberally allows me to make use of his communication, I cannot resist giving extracts from his letter which refers to two of these inscriptions."

We copy the inscriptions as given from Coxe's History of Monmouthshire, and add to each Dr. McCaul's note. The eighth inscription runs thus :—

DEDICATV
VRF
OG ES
VE NIO
MAXIMOIE
FVRPAN^o
COS

Dr. McCaul says: "This inscription evidently meant the dedication or inauguration of some buildings; and as usual the *consuls* are stated. Read the last three lines thus :—

MAXIMO Ī
ET VRBANO
COS

i.e., A.D. 234."

The ninth inscription is thus given :—

DD
VIII
OCCB
PRCB
EIML
COS
CVR
VRSO
AGTÆ
EI : IVS

The fixing of the date to the very day by Dr. McCaul is highly interesting. He says: "In this inscription, read the second to the sixth lines thus:—

VIII
 OCTOB
 PRGR
 ET EMIL
 COS

i.e., Sept. 23rd, A.D. 244, in which year Peregrinus and Aemilianus were consuls."

To many who are able to appreciate and enjoy the results, the skill here manifested will appear almost magical. In fact, if to a thorough knowledge of the Latin language we add familiarity with the ancient modes of writing and inscribing, and with the phraseology of inscriptions as acquired by a comparison of all those which have been preserved and collected, and suppose also the sort of quickness which practice gives in any peculiar exercise of the mind as well as the body, we can well understand how the thing is done, whilst we cannot but admire the patience, ingenuity, and learning which are so successfully brought to bear upon the subject.

There is another restoration of Dr. McCaul's mentioned by Mr. Lee in a note to a fragment of a Legionary stamp, figured on Plate xxiii., fig. 19. He says: "It may be well here to mention a unique and very singular impress which was found at Caerleon, and which was given many years ago by Mr. King to the museum at Cambridge. A sketch of it will be found in the 'Delineation of Roman Antiquities at Caerleon,' but it is not drawn here, as this Catalogue is confined to objects in the museum. The letters LEG are lost; the remainder consists of the usual stamp IIAVG together with a monogram which may stand either for MV or MA followed by a T. The whole stamp may, therefore, be read either IIAVGMVT or IIAVGMAT: Mr. King's opinion decidedly leans to the first." The author then quotes the opinions of Mr. Bunbury and Mr. King, and seems about to give up the subject in despair of obtaining any satisfaction; but he adds "While the above was in the printer's hands, the Rev. J. McCaul, LL.D., of Toronto, kindly communicated the following note, which doubtless the correct reading of this stamp: "read LEG · II · AVG · ANT"; *i.e.*, *Antoniniana*. From Orelli, n. 2129, we learn that the title *Antoniniana* was borne by the LEG · II · A · P · F · scil · *adjutrix, pia, fidelis*; the same mentioned in one of the Bath and one of the

Lincoln inscriptions." Those who have looked carefully at the exact copy of the stamp will readily acknowledge that the monogram or nexus which had been explained as MV or MA is still more like AN, though that reading did not occur to interpreters who had no clue to the meaning, but to Dr. McCaul who had noticed the use of the title *Antoniniana* it would at once suggest itself, enabling him to overcome a great difficulty and to penetrate a mystery hitherto inexplicable.

Our limited space does not permit further extracts, but we cannot take leave of Mr. Lee and his very attractive and useful volume, without expressing the hope that the example set by the publication of illustrated catalogues of the local Museums in Newcastle-on-Tyne and Caerleon, may be followed in other towns where there are collections of ancient relics, such as York and Bath, each of which could supply not only ample materials for a valuable volume, but also highly qualified editors, as their respective antiquities have been successfully investigated by the Rev. John Kenrick and the Rev. H. Scarth.

W. H.

SCIENTIFIC AND LITERARY NOTES.

ON THE TRANSFORMATION OF ENTOZOA. BY P. J. VAN BENEDEN.

The following abstract taken from the "Annals and Magazine of Natural History," will fulfil our promise of laying before our readers the discussion arising out of a paper of MM. Pouchet and Verrier. This paper "called forth from Professor Van Beneden a letter, the chief points of which are as follow:—

"He first states that MM. Pouchet and Verrier are in error in supposing that he regarded *Cœnurus cerebrealis* as the scolex of *Tænia serrata*; he has described the Tape-worm produced by *Cœnurus* as a distinct species, under the name of *T. cœnurus*, and that produced by the *Cysticercus pisiformis* of the Rabbit as *Tænia serrata*. He ascribes the doubts of MM. Pouchet and Verrier to their having failed to distinguish these two species of Tape-worms. He does not, however, attempt to explain the main point dwelt upon by the French authors, namely, the presence in the intestines of the dogs of a much larger number of Tape-worms than that of the heads of *Cœnurus*, but expresses a hope that, by the continuation of their experiments, those gentlemen themselves will be able to clear up the mystery.

"Referring to the failure of MM. Pouchet and Verrier in producing staggers in sheep by the administration of mature ova of *Tænia serrata*, he shows that in experiments made simultaneously at Louvain, Giessen, and Copenhagen, with ova obtained from a single dog which had been fed with *Cœnuri*, precisely the same phenomena were produced nearly after the same lapse of time. In all

these cases the young sheep were attacked by staggers about the fifteenth day—the only difference being that, at Copenhagen, only two out of three sheep were affected. The failure of the French experimentalists is ascribed by M. Van Beneden to their having administered ova of *Tænia serrata* instead of those of *T. cœnurus*.

“M. Van Beneden also communicates to the Academy the results of an experiment just completed by M. Leuckart.

“For some years a second species of *Tænia* the *T. mediocanellato*, has been indicated in the subject, but its mode of introduction and the characters of its *Cysticercus* were unknown. M. Leuckart has administered ova of *Tænia mediocanellata* to calves, and in a short time found a development of *Cysticerci*, especially in the muscles, so abundant as to cause a sort of leprosy. The *Cysticercus*, while still in the cysts of the calf, presents all the distinctive characters of the adult *Tænia*. Thus Tape-worm is developed by the use of veal and beef; but it is a distinct species, which has always been confounded with *Tænia solium*. In the present state of science, it may be asserted that *Tænia solium* is introduced into the human body by pork; *T. mediocanellata* by veal and beef; and the *Bothriocephalus*, or Broad Tape-worm of the older writers (in Switzerland, Poland, and Russia), by water.*

“At the Meeting of the Academy of Sciences on the 16th of June, MM. Pouchet and Verrier replied to Prof. Van Beneden's remarks, asserting that they have not committed the error ascribed to them by him, as, if his *Tænia cœnurus* be really a distinct species, of which they express great doubts, it was this that they administered to their young sheep. They add that in a recent experiment, in which each of two dogs received a hundred heads of *Cœnurus cerebralis*, the examination of the intestines two months after the administration showed in one dog two specimens of *Tænia cucumerina*, 50 centimetres in length, and filled with ova, and in the other, two of *T. Serrata*, one 12 millimetres and the other 20 centimetres in length.—*Comptes Rendus*, June 2 and 16, pp. 1157 and 1207.

SPONGIADÆ.

We perceive that Dr. Bowerbank has recently laid before the Royal Society his third paper “On the Anatomy and Physiology of the Spongiadæ.” The scientific world has long looked to him for information on this curious and interesting, but hitherto neglected, branch of Natural History, upon which both his extensive collections (accumulated during many years) and his skill as a microscopic observer qualify him to throw new light, and which has been long known to have engaged his special attention. We are now at length made acquainted with his general views, and we are led to expect details respecting genera and species, in a promised work to be brought out by the Ray Society.

Dr. Bowerbank, rightly we think, prefers for the Sponges the name *Porifera*, introduced by Dr. Grant to De Blainville's name *Amorphozoa*. *Porifera*, with

“* Dr. Koch, of St. Petersburg, has lately stated that the embryos of *Bothriocephalus latus* are covered with vibratile cilia, and that, in the form of Infusoria, they live free in the water. He adds this interesting remark, that in Moscow, where spring water is drunk, the *Bothriocephalus* is rare; whilst at St. Petersburg, Riga, and Dorpat, where river-water is used, it is very common.”

Rhizopoda and *Infusoria*, are the classes of the sub-kingdom PROTOZOA. Dr. Grant proposed to divide *Porifera* into three orders, according to the material of which the skeleton is composed, whether horny, calcareous, or siliceous. This division furnishes to Dr. Bowerbank the orders of his class, under the names of *Calcareæ*, *Siliceæ*, and *Keratosa*. *Calcareæ* is the smallest in numbers as well as the lowest in position of these orders: it includes only the Sponges which formed Fleming's genus *Grantia*, now divided by Bowerbank, according to the structure of the skeleton, into four genera. The second order, *Siliceæ*, is far more extensive, and is divided according to the structure of the skeleton, into seven sections or sub-orders, several of which contain numerous genera. In these the skeleton is characterised as being either: 1. Spiculo radiate; 2. Spiculo-membranous; 3. Spiculo-reticulate; 4. Spiculo-fibrous; 5. Compound-reticulate; 6. Siliceo-fibrous; or, 7. Canalculated Siliceo-fibrous.

The third order, *Keratosa*, consisting of Sponges with horny skeletons, is likewise divided into seven sub-orders, according to as the skeleton is solid non-spiculate kerato-fibrous; solid semi spiculate kerato-fibrous; solid spiculate kerato-fibrous; simple fistulo-fibrous; compound fistulo-fibrous; regular semi-areno-fibrous; or irregular, entirely areno-fibrous.

Under these divisions, both the genera previously received and those established by himself are carefully characterised by Dr. Bowerbank, in accordance with their anatomical structure. He has added a dissertation on the discrimination of species, with a review of the portions of the organisation that may be employed with advantage in their scientific determination, and directions for the examination and preservation of specimens.

Dr. Bowerbank's series of papers communicated to the Royal Society, supplies a desideratum in the literature of Natural History, and his further communications will be awaited with much interest.

W. H.

METEOROLOGY.

MEAN RESULTS OF METEOROLOGICAL OBSERVATIONS AT HAMILTON, C. W., FOR THE YEAR 1861.

MONTHS.	THERMOMETER.					BAROMETER.			DAYS.			YEARS.
	Mean 9 A.M.	Mean 9 P.M.	M. of both.	High- est.	Low- est.	Mean.	High- est.	Low- est.	Rainy	Slight Shr.s.	Dry.		Mean Temperature.
January.	20.64°	22.61°	21.129°	45°	-16°	29.628	30.25	29.00	4	9	18	1849... 48.105°
Feb	28.00	29.10	28.550	60	-16	.550	.02	.08	6	7	15	1850.....48.732
March	29.12	29.90	29.510	68	-4	.608	.10	.10	5	10	16	1851.....48.756
April.....	43.66	44.06	43.860	75	27	.570	.07	.16	4	9	17	1852.....48.248
May.....	53.00	51.03	52.015	78	36	.566	29.97	28.76	4	6	21	1853.....49.474
June.....	68.53	66.03	67.289	90	45	.625	.80	29.30	1	5	24	1854.....49.103
July.....	72.35	71.00	71.679	93	42	.632	.88	.33	1	5	25	1855.....47.316
August....	70.25	69.90	70.080	98	53	.714	.92	.48	4	7	20	1856.....44.888
Sept.....	62.53	62.63	62.580	85	43	.692	30.10	.18	4	6	20	1857.....45.868
October....	50.51	51.61	51.060	75	30	.648	.05	.02	3	8	20	1858.....48.142
Nov	38.43	39.00	38.710	62	20	.606	29.92	.10	1	7	22	1859.....46.996
Dec.....	31.90	35.80	33.850	62	11	.736	30.16	.22	2	5	24	1860.....47.357
Mean temp. of year.	47.525			M. height 29.623					30	84	242	

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—JUNE, 1862.
 Latitude—43 deg. 30.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day	Ba. om. at temp. of 32°.			Temp. of the Air.			Excess of mean above Normal.			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Velocity of Wind.			Rain in Inches.		Snow in Inches.	
	G.A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	Re-sult.	M.E.S.	Re-sult.	M.E.S.
1	29.400	29.331	29.477	57.2	61.0	65.8	358.414	76	75	87	77	77	77	Calcu.	Calcu.	6.5	0.0	3.04	3.10	...	...		
2	29.436	29.470	29.506	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
3	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
4	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
5	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
6	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
7	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
8	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
9	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
10	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
11	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
12	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
13	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
14	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
15	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
16	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
17	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
18	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
19	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
20	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
21	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
22	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
23	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
24	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
25	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
26	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
27	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
28	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
29	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
30	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
31	29.470	29.470	29.470	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
MEAN	29.532	29.532	29.532	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		
MEAN	29.532	29.532	29.532	55.8	55.8	55.8	358.282	73	76	87	77	77	77	Calcu.	Calcu.	0.0	0.0	2.27	3.29	...	...		

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JUNE, 1862.

amounted to one-third of the average depth; it was absolutely the driest June during the last 24 years.

COMPARATIVE TABLE FOR JUNE.

Year	TEMPERATURE.			RAIN.			SNOW.			WIND.	
	Mean.	Diff. above ave. %.	Min. above.	No. of days.	Inches.	No. of days.	Inches.	No. of days.	Inches.	Direction.	Mean Force or Velocity.
1840	59.8	0.8	5	11	4.860	0	...	...	...	...	0.38 lbs.
1841	65.6	+4.2	92.3	43.7	1.950	0	...	...	...	...	0.31
1842	65.6	5.8	73.4	28.0	6.739	15	...	...	...	...	0.27
1843	58.4	-3.0	81.3	28.5	4.636	12	...	...	...	...	0.19
1844	59.9	1.5	8	33.1	49.7	9	...	...	...	...	0.37
1845	61.0	0.4	83.6	40.9	3.715	0	...	...	...	...	0.32
1846	63.3	+1.9	83.3	41.8	1.920	0	...	...	...	...	0.30
1847	58.4	-3.6	78.3	36.7	2.625	0	...	...	...	...	4.3 inlbs.
1848	62.9	+1.5	92.5	33.3	1.816	0	...	...	...	...	3.32
1849	63.2	+1.8	84.9	45.2	2.026	8	...	...	...	...	4.5
1850	64.8	+2.9	83.2	43.0	3.345	10	...	...	...	...	4.42
1851	59.2	-0.6	79.2	41.2	2.635	7	...	...	...	...	4.42
1852	60.8	0.6	89.1	43.6	3.166	10	...	...	...	...	4.42
1853	65.5	+4.7	89.3	43.3	1.554	9	...	...	...	...	4.42
1854	64.1	+2.7	88.7	47.4	1.460	9	...	...	...	...	4.42
1855	59.0	-1.5	90.7	40.6	4.070	0	...	...	...	...	4.42
1856	62.1	+0.7	82.6	48.3	3.433	13	...	...	...	...	4.42
1857	62.1	+4.6	75.1	48.7	3.200	17	...	...	...	...	4.42
1858	59.2	-4.8	86.3	43.7	5.069	0	...	...	...	...	4.42
1859	63.2	+1.8	81.2	33.0	4.085	2	...	...	...	...	4.42
1860	63.2	+1.8	81.4	50.0	2.329	13	...	...	...	...	4.42
1861	61.3	-0.1	89.5	31.1	1.007	0	...	...	...	...	4.42
1862	60.5	-0.9	83.2	44.3	1.007	10	...	...	...	...	4.42
Mean	61.36	...	83.77	41.37	3.100	...	...	...	...	...	5.27
Diff.	-0.84	...	0.57	+2.03	...	...	...	...	...	...	0.71

Highest Barometer..... 30.109 at 6 a. m. on 16th } Monthly range = 0.346 inches.
 Lowest Barometer..... 29.163 at 2 p. m. on 18th }
 Maximum Temperature..... 85.4 on p. m. of 26th } Monthly range = 46°
 Minimum Temperature..... 39.3 on a. m. of 9th }
 Mean maximum Temperature..... 69.12 } Mean daily range = 18-14
 Mean minimum Temperature..... 50.97 }
 Greatest daily range..... 39.5 from a. m. to a. m. of 17th
 Least daily range..... 6.2 from a. m. to p. m. of 24th.
 Warmest day..... 19th... Mean temperature..... 73.92 } Difference = 21°22.
 Coldest day..... 10th... Mean temperature..... 52.10 }
 Maximum } Solar..... 102.90 on 26th } Monthly range = 71°2
 Minimum } Terrestrial..... 39.98 on 9th }
 Aurora observed on 2 nights, viz.—13th and 16th.
 Possible to see Aurora on 17 nights; impossible on 13 nights.
 Snowing on 9 days, depth 1.007 inches; duration of fall, ... hours.
 Raining on 10 days, depth 1.007 inches; duration of fall 26.1 hours.
 Mean of cloudiness = 0.69. Below average 0.07.
 Most cloudy hour observed, 2 p. m., mean = 0.74; least cloudy hour observed, 10 p. m.; mean = 0.32.

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

North,	South,
2191.74,	1016.45
East,	876.41
West,	1413.92

Resultant direction N. 28° W.; 5.03 miles per hour.
 Maximum velocity 1.77 miles per hour.
 Mean velocity..... 29.4 miles, from 1 to 2 p. m. on 30th.
 Maximum velocity..... 29.4 miles, from 1 to 2 p. m. on 30th.
 Most windy day..... 30th } Mean velocity, 15.29 miles per hour. } Difference = 13.63 miles.
 Least windy day..... 10th } ditto. }
 Most windy hour..... 11 a. m. to noon..... Mean velocity, 8.30 ditto. } Diff. ince = 3.75 miles.
 Least windy hour..... 5 p. m. to 6 p. m..... Mean velocity 4.51 ditto. }
 7th. Ground fog 6 to 8 a. m.; thunderstorm 7 to 10 a. m.—11th. Total eclipse of the moon; night very favourable for observation—14th. Five-flies first observed at 10 p. m.—17th. Solar halo from 7 a. m. till 2 p. m.—18th. Thunderstorm 4 to 8 p. m.; imperfect rainbow at 7 p. m.—19th. Ground fog at 4 a. m.—20th. Hour: frost at 5.30 a. m. (latest of the season); thunderstorm 8 to 10.10 p. m.—29th. Fog at 9 p. m.

A considerable quantity of pollen of plants fell with the rain during the thunderstorm on the 18th inst.
 Heavy Dew recorded on 3 mornings during the month.
 June, 1862, was cold and extremely dry; the amount of rain recorded only

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST, -JULY, 1862.

Latitude—43 deg. 30 s. min. North. Longitude—5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 32°.			Temp. of the Air.			Excess of above Normal.	Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Result- Direct- tion.	Velocity of Wind.			Rain in inches.	Snow in inches.		
	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.		6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.		6 A.M.	10 P.M.	Mean.			6 A.M.	10 P.M.	Mean.
1	29.445	29.387	29.400	52.6	65.4	56.9	0.0	2.280	3.15	2.97	3.01	.68	.64	.58	N	W	S	10	12.2	7.4	4.65	5.66	...	...
2	29.432	29.400	29.416	55.3	68.1	61.7	0.0	3.53	3.59	3.25	3.24	.61	.62	.61	E	N	S	7	7.5	0.5	2.97	3.33	...	...
3	29.400	29.387	29.393	58.7	70.4	64.5	0.0	4.42	4.42	4.05	4.05	.57	.57	.57	Cal.	S	E	2	4.8	0.0	1.86	2.83	...	...
4	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
5	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
6	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
7	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
8	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
9	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
10	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
11	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
12	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
13	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
14	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
15	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
16	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
17	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
18	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
19	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
20	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
21	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
22	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
23	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
24	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
25	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
26	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
27	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
28	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
29	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
30	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
31	29.387	29.387	29.387	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...
M	29.552	29.552	29.552	61.9	72.2	67.0	0.0	6.92	6.92	6.55	6.55	.53	.53	.53	Cal.	S	E	1	0.0	0.0	3.55	3.97	...	...

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1862.

Highest Barometer 29.957 at 8 a. m. on 4th. } Monthly range = 29.196 at 8 a. m. on 6th. }
 Lowest Barom. 29.196 at 8 a. m. on 6th. } }
 Maximum temperature 93.5 on p. m. of 5th } Monthly range = 7.071 inches. }
 Minimum temperature 48.2 on a. m. of 11th } }
 Difference 75.3 }
 Mean maximum temperature 59.14 } Mean daily range = 18.23 }
 Mean minimum temperature 53.14 } }
 Greatest daily range 5.8 from a. m. to p. m. of 21st. }
 Least daily range 5th } }
 Warmest day 5th } Mean temperature . . . = 77.58 } Difference = 17.05. }
 Coldest day 1st } Mean temperature . . . = 60.73 } }
 Radiation } }
 Maximum } }
 Minimum } }
 Aurora observed on 6 nights, viz.: 5th, 6th, 17th, 23rd, 24th, and 31st; Possible to see Aurora on 20 nights; Improbable on 11 nights.
 Rain: -ing on 13 days; depth, 5.34 inches; duration of fall, 35.4 hours.
 Mean of cloudiness = 0.6; above the average, 0.10. Most cloudy hour observed, 2 p. m.; mean = 0.72; least cloudy hour observed, 10 p. m.; mean = 0.42.
 Sums of the components of the Atmospheric Current, expressed in Miles, North. East. West. South.
 1410.01 1425.35 508.30 1861.52
 Resultant direction, S. 89° W.; Resultant Velocity, 1.42 miles per hour.
 Mean velocity 5.80 miles per hour.
 Maximum velocity 19.6 miles, from 4 to 5 p. m. on the 20th.
 Most windy day 6th—Mean velocity 9.43 miles per hour.
 Least windy day 21st—Mean velocity 1.37 miles per hour.
 Most windy hour, 4 to 5 p. m.—Mean velocity, 9.49 miles per hour. } Difference }
 Least windy hour, 4 to 5 a. m.—Mean velocity, 3.15 miles per hour. } 6.34 miles.
 4th. Low ground fog at 6 a. m.—6th. Sudden burst of heat from 2 to 2.30 p. m.; temperature rising from 80.8 at 2 p. m. to 94.8 at 2.30 p. m.—9th. Thunderstorm, vivid lightning, and heavy rain from 4 to 6 a. m.; dense fog at 6 a. m.—13th. Severe thunderstorm from 9 p. m. to 1 a. m. of 14th.—15th. Dense fog 9 a. m.; thunderstorm 6 to 8 a. m.—19th. Thunderstorm 5.15 to 8 p. m.; perfect rainbow 6 to 7 p. m.—23rd. Severe thunderstorm 6.30 to 7.30 a. m.; sheet lightning at night.—24th. Thunderstorm noon to 1 p. m.—25th. Sheet lightning in W. at 9 and 10 p. m.—27th. Sheet lightning in W. at 10 p. m.—28th. Heavy thunderstorm 7 to 8 p. m.—29th. Thunderstorm noon to 1.20 p. m.; sheet lightning 9 p. m. to midnight.

July, 1862, was extremely wet, having been only once surpassed in 23 years, viz, 1841, when the depth recorded amounted to 8.160 inches.

COMPARATIVE TABLE FOR JULY.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average (60°s).	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Direction.	Mean Velocity.
1840	65.8	-1.0	79.4	48.2	31.2	6	5.270	...	...	...	0.27lbs
1841	65.0	-1.8	86.3	43.2	43.1	10	8.150	...	...	...	0.33 "
1842	64.7	-2.1	90.5	42.0	48.5	4	3.050	...	...	...	0.44 "
1843	64.5	-2.3	86.1	40.2	45.9	8	4.605	...	...	...	0.11 "
1844	66.0	-0.8	86.1	40.5	45.6	12	2.815	...	...	...	0.30 "
1845	66.2	-0.6	94.6	44.5	49.0	7	2.195	...	...	...	0.29 "
1846	68.0	+1.2	94.0	45.9	49.1	9	2.895	...	...	...	0.19 "
1847	68.0	+1.2	87.5	43.8	43.7	8	3.355	...	...	...	0.19 "
1848	65.5	+1.3	82.7	46.7	36.0	10	1.890	...	...	N 14 W	0.14 4.94ms.
1849	68.4	+1.6	89.1	61.0	38.1	4	3.415	...	...	S 5 W	0.75 3.52 "
1850	68.9	+2.1	84.0	52.8	32.1	12	5.272	...	...	N 81 E	0.59 4.56 "
1851	66.0	-1.8	82.7	52.1	30.6	12	3.625	...	...	N 60 W	0.88 4.13 "
1852	66.8	-0.0	90.1	49.5	40.6	8	4.025	...	...	N 43 W	0.86 3.33 "
1853	66.6	-1.2	85.4	49.4	36.0	10	0.915	...	...	S 58 E	0.24 4.03 "
1854	72.5	+6.7	93.6	53.0	40.6	5	4.805	...	...	S 49 W	0.87 4.03 "
1855	67.0	+3.1	88.4	53.1	35.3	13	3.245	...	...	S 19 W	0.73 6.47 "
1856	69.9	+3.9	82.0	51.4	40.6	8	1.120	...	...	N 79 W	1.67 5.84 "
1857	67.9	+3.1	85.4	52.4	33.0	15	3.475	...	...	S 68 E	0.81 4.74 "
1858	66.9	+0.1	87.7	50.5	37.2	12	3.072	...	...	N 15 E	1.13 5.76 "
1859	66.0	-2.9	85.8	47.5	37.3	12	2.611	...	...	N 56 W	1.48 6.81 "
1860	63.9	-4.9	82.9	49.4	33.5	18	4.336	...	...	N 60 W	2.15 7.29 "
1861	65.4	-1.4	82.0	47.5	34.5	15	2.635	...	...	N 74 W	1.43 4.66 "
1862	66.7	-0.1	88.0	52.6	36.0	15	5.344	...	...	S 80 W	1.42 5.80 "
Results to 1861.	66.85	...	87.21	48.32	38.69	10.0	3.490	...	...	N 65 W	0.49 4.91
Diff. for 1862.	-0.16	...	+1.39	+4.28	-2.89	5.0	1.854	...	...	...	+0.80

Great Thermometric Ranges:
 6th p. m., 83°
 7th a. m., 61°
 Range in 16 hours 34°
 Range in 18 hours 31°

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST--JUNE, 1862.
(NINE MILES WEST OF MONTREAL,)

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

Latitude--45° 32' 32 min. North. Longitude--73° 36 min. West. Height above the Level of the Sea--118 feet.

Date	Barom. corrected and reduced to 32°		Temp. of the Air--F.			Tension of Vapour.			Humidity of Air.			Direction of Wind.		Horizontal Movement in Miles in 24 hours.	Mean of Ozone. (tenths).	Rain in Inches.	Snow in Inches.	WEATHER, &c.		
	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.
1	29.682	29.639	29.535	50.1	60.5	0.271	816	367	75.75	71.75	88	SSW	SSW	SSW	17.80	1.5	...	...	Clear.	C. C. Str. 4.
2	60S	516	60S	44.0	63.0	218	884	488	76.77	71.75	88	SSW	SSW	SSW	0.00	1.5	...	...	Hazy.	C. C. Str. 10.
3	654	810	930	58.4	62.1	372	553	406	78.75	74.75	88	NNE	NNE	SSW	3.90	1.5	...	...	Clear.	C. C. Str. 8.
4	674	80.085	900	60.0	55.7	245	273	205	78.75	75.75	88	NNE	NNE	SSW	16.11	1.0	...	...	Clear.	C. C. Str. 4.
5	682	83.853	855	60.0	66.0	365	459	353	79.37	61	88	SSW	SSW	SSW	15.00	2.0	...	...	Hazy.	[S.H.]
6	777	723	746	52.2	56.2	282	584	363	73.68	61	88	NNE	NNE	NNE	24.10	1.5	...	...	Hazy.	C. C. Str. 10.
7	663	714	706	44.6	62.4	159	319	269	64.58	61	88	NNE	NNE	NNE	125.20	1.5	...	...	Hazy.	C. C. Str. 4.
8	562	808	865	65.4	53.4	232	303	269	69.39	62	88	NNE	NNE	NNE	158.60	2.0	...	...	Clear.	C. C. Str. 8.
9	891	864	861	56.1	77.8	269	285	409	62.30	70	88	SSW	SSW	SSW	212.46	2.0	...	...	Hazy.	C. C. Str. 4.
10	872	795	765	58.4	83.5	355	552	400	73.48	61	88	SSW	SSW	SSW	79.00	2.0	...	...	Hazy.	C. C. Str. 4.
11	574	307	445	57.1	82.5	265	578	549	63.54	80	88	NW	NW	NW	234.80	1.5	...	...	Clear.	C. C. Str. 4.
12	593	516	553	62.7	82.1	369	366	355	85.65	84	88	NW	NW	NW	70.00	1.5	...	...	Clear.	C. C. Str. 4.
13	673	714	727	60.0	64.7	222	219	263	83.64	82	88	NW	NW	NW	8.40	1.5	...	...	Clear.	C. C. Str. 4.
14	783	872	953	62.2	53.2	211	316	238	72.42	71	88	SSW	SSW	SSW	70.00	1.5	...	...	Clear.	C. C. Str. 4.
15	1630	144	30.070	44.0	46.1	302	699	476	82.51	61	88	SSW	SSW	SSW	8.30	1.5	...	...	Clear.	C. C. Str. 4.
16	341	324	344	61.5	77.0	406	639	462	74.69	61	88	SSW	SSW	SSW	187.74	3.0	...	...	Clear.	C. C. Str. 10.
17	482	483	483	61.1	64.4	521	403	398	86.67	90	88	SSW	SSW	SSW	225.80	3.0	...	...	Clear.	C. C. Str. 10.
18	482	534	702	63.0	57.3	334	403	410	86.73	88	88	SSW	SSW	SSW	152.90	3.0	...	...	Clear.	C. C. Str. 10.
19	730	700	732	47.2	76.7	280	648	398	88.71	90	88	SSW	SSW	SSW	68.70	2.5	...	...	Clear.	C. C. Str. 4.
20	801	808	816	52.2	71.9	351	403	357	86.51	75	88	SSW	SSW	SSW	230.70	2.5	...	...	Clear.	C. C. Str. 4.
21	925	849	879	51.1	86.2	253	762	342	71.62	78	88	SSW	SSW	SSW	68.50	2.0	...	...	Clear.	C. C. Str. 6.
22	812	835	806	47.2	69.2	349	629	456	77.75	88	88	SSW	SSW	SSW	30.80	2.0	...	...	Clear.	C. C. Str. 2.
23	778	845	834	50.1	77.5	391	632	454	87.67	69	88	SSW	SSW	SSW	24.80	1.5	...	...	Clear.	C. C. Str. 4.
24	750	720	700	60.1	89.8	374	802	510	73.57	78	88	SSW	SSW	SSW	42.90	1.5	...	...	Clear.	C. C. Str. 4.
25	665	572	634	64.6	96.0	437	633	632	71.88	78	88	SSW	SSW	SSW	61.10	2.0	...	...	Clear.	C. C. Str. 4.
26	687	654	607	65.0	96.1	476	626	594	75.37	61	88	SSW	SSW	SSW	20.80	1.0	...	...	Clear.	C. C. Str. 6.
27	666	595	572	62.4	80.2	370	630	462	68.45	65	88	SSW	SSW	SSW	56.80	2.0	...	...	Clear.	C. C. Str. 4.
28	416	522	430	60.5	53.0	466	652	348	83.5	80	88	SSW	SSW	SSW	101.70	2.5	...	...	Clear.	C. C. Str. 10.

A cloudy sky is represented by 10;
A cloudless sky by 6.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—JULY, 1862.
(NINE MILES WEST OF MONTREAL.)

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

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

Day	Barom. corrected and reduced to 32°			Temp. of the Air.—°F.			Tension of the Vapour.			Humidity of Air.			Direction of Wind.			Horizontal Movement in Miles in 24 hours.	Mean of Ozone. In inches.	Rain In inches.	Snow In inches.	WEATHER, &c.									
	6 A.M.	3 P.M.	10 P.M.	6 A.M.	10 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	29.517	29.455	29.509	50.0	67.8	60.0	309	418	365	85	62	76	W S W	W S W	S W	193	10	...	...	...	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	
2	30.1	743	834	60.1	84.2	62.9	374	631	423	77	60	77	S S W	S W	S E	82	80	...	...	...	C. Str.	4.	Do.	Do.	Do.	C. Str.	4.
3	30.002	833	30.030	54.7	81.2	63.0	282	677	429	67	60	77	S S W	S S W	S S E	82	80	C. Str.	4.	C. Str.	4.	C. Str.	4.	C. Str.	4.	
4	30.002	833	30.030	54.7	81.2	63.0	305	848	624	69	61	77	S S W	S W	S W	197	10	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
5	29.333	814	762	70.0	93.5	74.2	592	897	641	83	56	77	W S W	S W	S W	163	20	0.050	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
6	29.333	814	762	70.0	93.5	74.2	592	897	641	83	56	77	W S W	S W	S W	235	50	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
7	754	600	468	63.3	84.3	71.0	416	704	476	72	60	64	S	W S W	S S W	55	60	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
8	431	472	547	65.0	85.4	51.7	576	637	276	92	55	65	S	W S W	S W	86	40	...	...	...	Slight Rain.	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.
9	414	473	547	47.4	61.4	45.4	246	442	245	77	83	81	S W	S S W	S W	114	40	Inap.	Cu. Str.	10.	Cu. Str.	10.	Cu. Str.	4.	Cu. Str.	4.	
10	702	705	759	49.5	70.6	54.7	273	616	315	80	67	78	W S W	W S W	W S S	103	80	0.206	...	...	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.
11	898	705	801	52.1	72.8	61.2	257	606	438	60	60	68	W S W	W S W	W S S	182	60	...	...	...	Hazy.	Hazy.	Hazy.	Hazy.	Hazy.	Hazy.	Hazy.
12	738	550	650	55.0	72.8	65.4	353	489	311	73	62	73	W	S W	S	211	90	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
13	496	344	479	50.0	82.2	74.2	404	572	397	77	62	71	S W	W S W	S S W	149	50	0.300	Cu. Str.	10.	Cu. Str.	10.	Cu. Str.	4.	Cu. Str.	4.	
14	606	644	700	50.0	73.6	60.5	240	654	403	68	67	70	N E	S W	S E	86	10	...	...	...	Clear.	H. Dew.	Do.	Do.	Do.	Do.	Do.
15	695	701	712	49.4	80.0	62.4	472	624	366	88	62	74	S W	S W	N E	83	60	0.533	...	...	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.
16	806	601	742	69.1	79.2	60.2	436	624	397	88	62	74	S W	S W	S W	235	40	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
17	806	601	742	69.1	79.2	60.2	436	624	397	88	62	74	S W	S W	S W	28	10	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
18	806	601	742	69.1	79.2	60.2	365	601	413	77	62	73	N E	S W	S W	28	10	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
19	806	601	742	69.1	79.2	60.2	315	790	433	77	62	73	N E	S W	S W	35	50	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
20	806	601	742	69.1	79.2	60.2	367	692	444	71	57	71	S W	S W	S S E	154	40	0.100	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	
21	806	601	742	69.1	79.2	60.2	510	514	413	88	73	81	S E	S E	S E	50	65	...	...	...	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.
22	806	601	742	69.1	79.2	60.2	208	632	561	77	67	79	N E	N E	S E	107	80	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
23	806	601	742	69.1	79.2	60.2	300	459	420	83	67	91	S S W	S S W	S S W	107	80	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
24	806	601	742	69.1	79.2	60.2	520	802	453	80	72	91	S S W	S S W	S S W	265	50	0.094	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	
25	806	601	742	69.1	79.2	60.2	453	632	436	85	67	85	S S W	S S W	S S W	120	10	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
26	806	601	742	69.1	79.2	60.2	453	632	436	85	67	85	S S W	S S W	S S W	106	40	...	...	...	Do.	Do.	Do.	Do.	Do.	Do.	Do.
27	806	601	742	69.1	79.2	60.2	453	632	436	85	67	85	S S W	S S W	S S W	199	00	Inap.	...	...	Clear.	H. Dew.	Clear.	Clear.	Clear.	Clear.	Clear.
28	806	601	742	69.1	79.2	60.2	644	639	436	77	89	94	S W	S W	S W	34	60	0.400	Cu. Str.	6.	Cu. Str.	6.	Cu. Str.	6.	Cu. Str.	6.	
29	806	601	742	69.1	79.2	60.2	569	603	436	77	89	94	S W	S W	S W	25	60	0.271	Rain.	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.	Cu. Str.	4.
30	806	601	742	69.1	79.2	60.2	449	617	592	86	58	63	S W	S W	S W	39	50	1.157	C. C. Str.	10.	C. C. Str.	10.	C. C. Str.	10.	C. C. Str.	10.	
31	806	601	742	69.1	79.2	60.2	430	634	523	81	58	72	N N W	S E	S S W	8	50	...	...	...	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.	Clear.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR JUNE, 1862.

Barometer	{	Highest, the 16th day	30.114
		Lowest, the 30th day	29.322
		Monthly Mean	29.713
		Monthly Range	0.792
Thermometer ...	{	Highest, the 28th day	96°1
		Lowest, the 26th day	86°2
		Monthly Mean	64°61
		Monthly Range	59°9
Greatest intensity of the Sun's rays		101°2	
Lowest point of Terrestrial Radiation		33°1	
Mean of Humidity .....		.660	
Amount of evaporation		4.16	
Rain fell on 8 days, amounting to 1.132 inches; it was raining 18 hours and 15 minutes, and was accompanied by thunder on 2 days.			
Most prevalent wind, S.W.			
Least prevalent wind, E.			
Most windy day, the 22nd day; mean miles per hour, 9.62.			
Least windy day, the 2nd day; Calm.			
The Eclipse of the Moon was visible.			
The Electrical state of the Atmosphere has indicated high intensity.			
Fire flies (<i>Lampyrus Corusca</i>) 1st seen 11th day.			

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR JULY, 1862.

Barometer	{	Highest, the 4th day	30.062
		Lowest, the 9th day	29.397
		Monthly Mean	29.731
		Monthly Range	0.665
Thermometer	{	Highest, the 6th day	94°0
		Lowest, the 14th day	40°0
		Monthly Mean	65°33
		Monthly Range	54°0
Greatest intensity of the Sun's Rays		102°1	
Lowest Point of Terrestrial Radiation		37°4	
Mean of Humidity .....		.737	
Amount of evaporation		3.01	
Rain fell on 12 days, amounting to 3.767 inches; it was raining 35 hours and 6 minutes, and was accompanied by thunder on 5 days.			
Most prevalent wind, the S. W.			
Least prevalent wind, the S.			
Most windy day, the 6th; mean miles per hour, 11.81.			
Least windy day, the 31st; mean miles per hour, 0.37.			
The Electrical state of the Atmosphere has indicated moderate intensity.			