

LECTURES.

PHYSICAL ETHNOLOGY.

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PART I.

THE AMERICAN CRANIAL TYPE.

Among the novel questions to which the progress of science has given prominence, under aspects undreamt of in very recent years, is that of the relation of man to the inferior orders of being, and his true place in nature as one of the animal creation. In this respect, the investigations of the craniologist, and the whole bearings of physical ethnology, are now acquiring an interest and importance very partially accorded to them before. The geologist, who long ignored all that related to man and his works, as recent, and therefore without the pale of his comprehensive researches, now recognizes both his remains and his works of art as pertaining to the department of palæontology; and disputes with the archæologist the appropriation of the primitive flint-implements of the drift, once claimed exclusively by him for his Age of Stone. This has materially affected the aspects of the study of physical ethnology; for until very recently the differences between man and all other animals have been assumed 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 recognize 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 realizations of Greek sculpture; and by such means he determined the long-accepted statuary scale of the human head and figure. Nor can the influence of this artistic ideal be overlooked in the direction it gave to some of the speculations of the craniologist, and to the theoretical conception of the fully-developed man. 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 brachycephalic or short skull; his dolichocephalic or long skull; his kumbecephalic or elongated (boat-shaped) skull; his pyramidal or acrocephalic; his platycephalic or flattened; his truncated, oval, and spherical skulls; as well as many intermediate forms. An idea, however, has long prevailed with reference to the aborigines of the New World, the origin of which is traceable to this distinguished American craniologist, Dr. Morton, that throughout the vast continent, from the arctic circle to the icy shores of Terra del Fuego, the Esquimaux constitutes the one exception to a predominant uniform cranial type.

The opinions advanced by one so distinguished and indefatigable in his study of the science as the author of the *Crania Americana* well merited the attention they have received, and might even seem to justify the assumption of them as indisputable scientific canons. Only one other authority could have carried any corresponding weight, and that is produced to confirm the conclusion referred to. "The nations of America," says Humboldt, "except those which border on the polar circle, form a single race, characterized by the formation of the skull, the color of the skin, the extreme thinness of the beard, and straight glossy hair."

Very few and partial exceptions can be quoted to the general unanimity of American writers—some of them justly regarded as authorities in ethnology—in reference to this view of the nations of the whole American continent, north and south, as one nearly homogeneous race, varying within very narrow limits from the prevailing type, and agreeing in so many essentially distinctive features, as to prove them a well-defined variety, if not a distinct species, of the genus *Homo*. Lawrence, Wiseman, Agassiz, Squier, Gliddon, Nott and Meigs, might each be referred to in confirmation of this opinion, and especially of the prevailing uniformity of certain strongly-marked cranial characteristics; but in reality the most of them only echo the opinions of Dr. Morton, and reproduce conclusions which his laboriously-accumulated evidence was supposed to have established beyond dispute. His views underwent considerable modification on some points relating to the singular cranial conformation observable in certain skulls found in ancient American graves; especially in reference to the influence of artificial means in perpetuating changes of form essentially different from the normal type; but the tendencies of his matured opinions all went to confirm his original idea of universal approximation to one cranial type throughout the New World. In his final contribution to his favorite science, on "The Physical Type of the American Indians,"* his matured conclusions relative to the cranial type of the American continent are thus defined: "The Indian skull is of a decidedly rounded form. The occipital portion is flattened in the upward direction, and the transverse diameter, as measured between the parietal bones, is remarkably wide, and often exceeds the longitudinal line.† The forehead is low and receding, and rarely arched, as in the other races; a feature that is regarded by Humboldt, Lund, and other naturalists, as a characteristic of the American race, and serving to distinguish it from the Mongolian. The cheek-bones are high, but not much expanded; the maxillary region is salient and ponderous, with teeth of a corresponding size, and singularly free from decay. The orbits are large and squared, the nasal orifice wide, and the bones that protect it arched and expanded. The lower jaw is massive and wide between the condyles; but not-

* Schoolcraft's History of Indians, vol. II, p. 316.

† No such excess of the parietal over the longitudinal diameter is ever found except in a greatly distorted flathead or other artificially deformed skull; and of this only one example occurs in the *Crania Americana*.

withstanding the prominent position of the face, the teeth are for the most part vertical."

The views thus set forth, on such high authority, have exercised an important influence on all subsequent investigations; of which, perhaps, no instance is more illustrative than that of Stephens, who submitted to Dr. Morton the broken fragments of a skull rescued by him from an ancient grave in the ruins of Ticul, and though the observant traveller had already noted essential differences of ethnical characteristics between the physiognomies and head-forms sculptured on the ruins of Central America and those of the living race of Indians, he appears to have implicitly resigned his judgment to the homogeneous theory of Dr. Morton, and reproduces his opinion of the skull as that of a female, presenting "the same physical conformation which has been bestowed with amazing uniformity upon all the tribes on the continent, from Canada to Patagonia, and from the Atlantic to the Pacific ocean"*

This supposed prevalence of a remarkable uniformity of cranial conformation throughout tribes occupying forest, prairie, mountain plateau, or oceanic archipelago, and ranging from the arctic circle through every degree of latitude almost to the antarctic circle, being assumed as an established truth, has furnished the basis for further deductions of an equally comprehensive kind. Professor Agassiz, in discussing the provinces of the animal world and their relation to the different types of man, points out certain physical features of the western hemisphere which tend to adapt it for a much more uniform distribution of fauna than the European, Asiatic, and African regions present in corresponding latitudes. "The range of mountains which extends in almost unbroken continuity from the Arctic to Cape Horn, establishes a similarity between North and South America which may be traced also to a great degree in its plants and animals. Entire families which are peculiar to this continent have their representatives in North as well as South America—the cactus and didelphis, for instance; some species, as the puma or American lion, may even be traced from Canada to Patagonia. Thus, with due qualification, it may be said that the whole continent of America, when compared with the corresponding twin continents of Europe—Africa or Asia—Australia is characterized by a much greater uniformity of its natural productions, combined with a special localization of many of its subordinate types. With these facts before us, we may expect that there should be no great diversity among the tribes of man inhabiting this continent; and, indeed, the most extensive investigation of their peculiarities has led Dr. Morton to consider them as constituting but a single race, from the confines of the Esquimaux down to the southernmost extremity of the continent."† That the elements of diversity dependent on physical geography and the consequent influences of climate on food, temperature, &c., by which the distribution of the fauna of every region is controlled, are much less varied throughout the American continent than elsewhere is indisputable. But the effects of this comparative uniformity, or rather smaller range of diversity of climate and physical influences, in so far as they control the distribution of plants and animals, differ essentially from the operation of the same causes in producing an apparent uniformity among the tribes of men inhabiting the same continent. Fin, Celt, German, Slave, Magyar, and Turk, all present as great a superficial resemblance as the diverse tribes and nations of the New World, where they have been long subjected to the same equalizing influences of climate, social intercourse, and intermingling of blood. But the ethnologist still finds the osteological indices of diversity of race unobliterated; and the results of the investigations set forth here have sufficed to satisfy me that the same diversity is still traceable among the ancient and living tribes and nations of this continent.

* Stephens's Yucatan, vol. I., p. 284

† Provinces of the Animal World, &c. Types of Mankind, p. lxix.

Whilst, however, the supposed unity in physical form asserted by Dr. Morton, and accepted as an established scientific truth in relation to the races of man in the New World, has been reiterated on many occasions, its originator was not unaware that it was, at most, only an approximation to his assumed type, and was subject to variations of a very marked kind; although he did not allow their just weight to these when determining the conclusions which seemed legitimately to result from his carefully accumulated data. He thus remarks, in his *Crania Americana*, on certain unmistakable diversities of form into which the assumed American cranial type may be subdivided, when classing the so-called *barbarous nations*: "After examining a great number of skulls, I find that the nations east of the Alleghany mountains, together with the cognate tribes, have the head more elongated than any other Americans. This remark applies especially to the great Lenapé stock, the Iroquois, and the Cherokees. To the west of the Mississippi we again meet with the elongated head in the Mandans, Ricaras, Assinaboins, and some other tribes."* The Minetaries, Crows, Blackfeet, and Ottoes are named along with those in his latest reference to the subject, thereby transferring the Ottoes from the brachycephalic to the dolichocephalic class, in which he had previously placed them; for, to his earlier statement, Dr. Morton superadds the further remark: "Yet even in these instances the characteristic truncature of the occiput is more or less obvious, while many nations east of the Rocky mountains have the rounded head so characteristic of the race, as the Osages, Ottoes, Missouris, Dacotas, and numerous others. The same conformation is common in Florida; but some of these nations are evidently of the Toltec family, as both their characteristics and traditions testify. The heads of the Caribs, as well of the Antilles as of *terra firma*, are also naturally rounded; and we trace this character, as far as we have had opportunity for examination, through the nations east of the Andes, the Patagonians, and the tribes of Chili. In fact, the flatness of the occipital portion of the cranium will probably be found to characterize a greater or less number of individuals in every existing tribe from Terra del Fuego to the Canadas. If their skulls be viewed from behind, we observe the occipital outline to be moderately curved outward, wide at the occipital protuberances, and full from those points to the opening of the ear. From the parietal protuberances there is a slightly curved slope to the vertex, producing a conical or rather a wedge-shaped outline." These opinions are still more strongly advanced in Dr. Morton's most matured views, where he affirms the American race to be essentially separate and peculiar, and with no obvious links, such as he could discern, between them and the people of the Old World, but a race distinct from all others.

Some of the uniform features above referred to, and especially the flattened occiput, are the product, as I believe, not of the approximation to any typical form of skull, but of the subjection of the living head to the same artificial compression, with a nearly uniform result. But this department of the subject will come under review at a later stage. The views now set forth relative to the American cranial type are founded on an extensive series of observations originally commenced in Canada, without any design to challenge the opinions set forth by the author of the *Crania Americana*, and subsequently reiterated by other distinguished American ethnologists. After having devoted minute attention to some departments of primitive British craniology, my removal to Canada placed within my reach opportunities of judging for myself of the physical characteristics of the aboriginal occupants of the American forests and prairies, and I availed myself at first of those in the full anticipation of meeting with such evidences of a general approximation to the assigned normal American cranial type, as would confirm the deductions of previous observers. My chief

* *Crania Americana*, p. 65; *Physical Type of the American Indians*; *History of Indian Tribes*, vol. ii, p. 317.

aim, indeed, originally was to acquire specimens of skulls approximating to the peculiar brachycephalic type found in one important class of early British graves. It was, accordingly, simply with a sense of disappointment, that I observed the results of repeated explorations in different cemeteries furnish crania which, though undoubtedly Indian, exhibited little or no traces of the rounded form with short longitudinal diameter, strikingly apparent in certain ancient Mexican and Peruvian skulls, as well as in the rare examples hitherto recovered from the mounds of the Mississippi valley. Slowly, however, the conviction forced itself upon me that to whatever extent this assigned typical skull may be found in other parts of the continent, those most frequently met with along the north shores of the great lakes are deficient in some of its most essential elements. Similar conclusions have been recorded by different observers. They are indicated by Dr. Latham, when comparing the Esquimaux and American Indian forms of skull, as determined by Dr. Morton;* and have since been strongly affirmed by Dr. Retzius, who states that it is scarcely possible to find a more distinct separation into dolichocephalic and brachycephalic races than in America;† nor should the remark of Professor Agassiz be overlooked, when, after referring to Dr. Morton's single American race, he adds: "But it should be remembered that in accordance with the zoological character of the whole realm, this race is divided into an infinite number of small tribes, presenting more or less difference one from another." It is indeed necessary to determine what must be regarded as the essential requisites of Dr. Morton's American typical cranium; for neither he nor his successors have overlooked the fact of some deviation from this supposed normal type, not only occurring occasionally, but existing as a permanent characteristic of some tribes. As has been already shown, Dr. Morton recognized a more elongated head as pertaining to certain of the northern tribes, but this he speaks of as a mere slight variation from the more perfect form of the normal skull; and he adds: "Even in these instances the characteristic truncation of the occiput is more or less obvious."‡ So also Dr. Nott, after defining the typical characteristics of the American cranium, remarks: "Such are more universal in the Toltec than the barbarous tribes. Among the Iroquois, for instance, the heads were often of a somewhat more elongated form; but the Cherokees and Choctaws, who, of all barbarous tribes, display greater aptitude for civilization, present the genuine type in a remarkable degree. My birth and long residence in southern States have permitted the study of many of these living tribes, and they exhibit this conformation almost without exception. I have also scrutinized many Mexicans, besides Catawbas of South Carolina, and tribes on the Canada lakes, and can bear witness that the living tribes everywhere confirm Morton's type."§

In selecting a skull, which seemed to Dr. Morton in all respects to fulfil the theoretical requirements of his typical cranium, we are guided, under his directions, to that ancient people who, in centuries long prior to the advent of Europeans, originated some remarkable traits of a native civilization in the valleys of the eastern tributaries of the Mississippi. It will, therefore, coincide with his choice of an example of the true American head, if, starting from that ancient race, we pursue our comparisons downward to the nations and tribes familiar to Europeans by direct intercourse and personal observation.

Among the most prized crania in the collection of the Academy of Natural Sciences at Philadelphia is the celebrated Scioto mound skull, familiarly known to many by means of the views of it introduced among the illustrations of

* Natural History of the Varieties of Man, p. 453.

† Arch. des Sciences Naturelles, Geneva, 1860. The views set forth here were first published by the author at the meeting of the American Association for the Advancement of Science, in 1857. *Vide* Edin. Philosoph. Journal N. S., vol. vii.

‡ Crania Americana, p. 69; History of Indian Tribes, vol. ii, p. 317.

§ Types of Mankind, p. 441.

Messrs. Squier and Davis's "Ancient Monuments of the Mississippi Valley." A careful examination of the original, however, brings out features of this remarkable skull, by no means apparent in the engravings. The vertical view, especially, is inaccurate. In the original it presents the peculiar characteristics of what I have before designated the truncated form: passing abruptly from a broad flattened occiput to its extreme parietal breadth, and then tapering, with slight lateral swell, until it reaches its least breadth, immediately behind the external angular processes of the frontal bone. The occiput has been subjected to the flattening process to a much greater extent than is apparent from the drawings; but at the same time it is accompanied by no corresponding affection of the frontal bone, such as inevitably results from the procedure of the Chinooks and other Flathead tribes; among whom the desired cranial deformation is effected by bandages crossing the forehead and consequently modifying the frontal as much as the parietal and occipital bones. On this account, great as is the amount of flattening in this remarkable skull, it is probably due solely to the undesigned pressure of the cradle-board acting on a head of markedly brachycephalic proportions and great natural posterior breadth. The forehead is fully arched, the glabella prominent, and the whole character of the frontal bone is essentially different from the Indian type. The sutures are very much ossified, and even to some extent obliterated.

The "Scioto mound cranium," the best authenticated and most characteristic

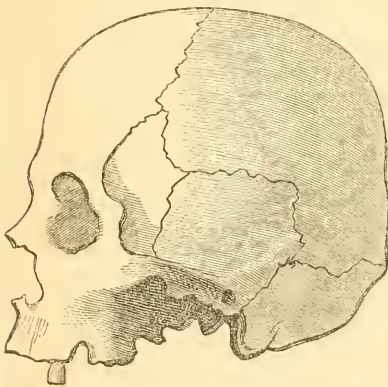


Fig. 1.

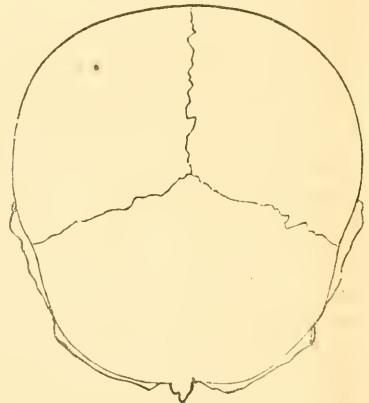


Fig. 2.

of the crania of the mound-builders, when discovered, lay embedded in a compact mass of carbonaceous matter, intermingled with a few detached bones of the skeleton and some fresh-water shells. Over this had been heaped a mound of rough stones, on the top of which, incoved by the outer layer of clay, lay a large plate of mica, that favourite material of the ancient mound-builders. This is the skull which, according to the description of Dr. Morton, furnishes the best example of the true typical American head. It is produced as such by Dr. Nott, in the *Types of Mankind*, and, as described by Dr. Morton, "it is, perhaps, the most admirably formed head of the American race hitherto discovered. It possesses 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."

Of this skull the measurements which involve the most essential typical elements, and so furnish precise materials for comparison, are—

Longitudinal diameter	6.5 inches.
Parietal diameter	6. "
Vertical diameter	6.2 "
Inter-mastoid arch	16. "
Horizontal circumference	19.8 "

So that, in fact, the cranium very closely corresponds in its measurements, in length, breadth, and height. Still further, it may be noted that the singular longitudinal abbreviation of this skull is nearly all posteriorly. A line drawn through the auditory foramen in profile, parallel to the elevated forehead, divides it into two unequal parts, of which the anterior and posterior parts are nearly in the ratio of three to two. If, however, we turn from the definition of the American typical form, as recorded in relation to this particular skull, and reduce it to the general formulæ derived by its originator from the examination of numerous examples, it amounts to this: A small receding forehead, somewhat broad at the base, but with a greatly depressed frontal bone; a flattened or nearly vertical occiput; viewed from behind, an occipital outline which curves moderately outwards, wide at the occipital protuberances, and full from these points to the opening of the ear; from the parietal protuberances a slightly curved slope to the vertex, producing a wedge-shaped outline; a great vertical diameter, and the predominant relative interparietal diameter of the brachycephalic cranium. If to those are added the large quadrangular orbits, the cheek-bones high and massive, the maxillary region salient and ponderous, and the nose prominent, we have, nearly in Dr. Morton's own words, the characteristic features of that American cranium which prevails among both ancient and modern tribes of the brachycephalic type, and has been assumed by him as universal.

It is with great diffidence that I venture to challenge conclusions adopted after mature consideration by the distinguished author of the *Crania Americana*. The frontal bone of the Scioto mound skull is by no means depressed, but well arched, and the flattened occiput bears unmistakable evidence of an artificial origin. The conical or wedge-shaped vertex of the Indian head is very partially traceable in the original, even when viewed from behind, and, altogether, when tried by Morton's own standard, it differs greatly from the American typical cranium. The same skull has been selected, by Dr. J. C. Nott,* for the purpose of instituting a comparison with the well developed and characteristic head of a modern Indian, a Cherokee chief, who died while a prisoner at Mobile in 1837, and the two crania are there engraved side by side, with other examples, "to show, through faithful copies, that the type attributed to the American races is found among tribes the most scattered; among the semi-civilized and the barbarous; among living as well as among extinct races; and that no foreign race has intruded itself into their midst, even in the smallest appreciable degree."†. But, judging merely by the reduced profile drawings, placed in juxtaposition, without reference to precise measurements, the points of agree-

* *Types of Mankind*, p. 442.

† Dr. Nott's definition is as follows: "The most striking anatomical characters of the American crania are, small size; low, receding forehead; short antero-posterior diameter; great inter-parietal diameter; flattened occiput; prominent vertex; high cheek-bones; ponderous and somewhat prominent jaws."—*Types of Mankind*, p. 441.

ment are very partial. The vertical occiput of the ancient skull rounds somewhat abruptly into a flat horizontal vertex, and with the well developed forehead and short longitudinal diameter, gives a peculiar square form to it in profile. In the modern skull, on the contrary, the occipital flattening is not so much that of the occiput proper as of the posterior part of the parietal, together with the upper angle of the occipital bone; thereby uniting with the receding forehead of the latter, to produce a conoid outline, in striking contrast to the square form of the other. Still further, a vertical line drawn through the auditory foramen shows a remarkable preponderance of posterior cerebral development in the ancient skull, constituting indeed its most striking peculiarity. But a comparison of the measurements of the two skulls serves no less effectually to refute the supposed correspondence adduced in proof of a typical unity traceable throughout tribes and nations of the western hemisphere the most widely separated alike by time and space.

	Ancient.	Modern.
Longitudinal diameter.....	6.5	6.9
Parietal	6.0	5.7
Vertical	6.2	5.4
Frontal	4.5	4.6
Inter-mastoid arch	16.0	15.5
Inter-mastoid line.....	4.5	4.75
Occipito-frontal arch.....	13.8	14.4
Horizontal circumference	19.8	20.4

It is not to be supposed that any single skull can be selected as the embodiment of all the essential typical characteristics either of the ancient or the modern cranial conformation; nor can we deduce general conclusions as to the physical characteristics of the ancient mound-builders from the remarkable example above referred to. We lack, indeed, sufficient data as yet for any absolute determination of the cranial type of the mounds; but the Scioto mound skull cannot with propriety be designated as "the only skull incontestably belonging to an individual of that race." The Grave creek Mound cranium, figured by Dr. Morton, belongs no less indisputably to the same race, and presents in its arched forehead, prominent superciliary ridges, and compact, uniformly rounded profile, a general correspondence to the previous example.* In 1853 Dr. J. C. Warren exhibited to the Boston Natural History Society the cast of a second and more perfect skull from the same mound,† which I have since examined and measured in the collection of Dr. J. Mason Warren. It is also worthy of note that several inferior maxillary bones of the mound skeletons have been recovered nearly entire. They are remarkable for their massiveness, but are described as less projecting than those pertaining to the skeletons of a later date.‡ Another skull figured by Dr. Morton, from a mound on the Upper Mississippi, was obtained from an elevated site bearing considerable resemblance to that where the Scioto valley cranium was found, but the evidence is insufficient to remove the doubts which its proportions suggest, that in this, as in so many other cases, we have only one of those later interments habitually made by the modern Indians in the superficial soil of the mounds. It is better, meanwhile, to reject all doubtful specimens than to incur the risk of cumbering such well-authenticated evidence as we may anticipate with uncertainty and confusion. The following table includes a series of measurements of mound and ancient cave crania, mostly taken by myself from the originals in the collection of the Academy of Natural Sciences at Philadelphia and elsewhere:

* *Crania Americana*, pl. liii, p. 223.

† *Proceedings of Boston Natural History Society*, vol. iv, p. 331.

‡ *Ancient Monuments of the Mississippi Valley*, p. 290.

TABLE I.—MOUND AND CAVE CRANIA.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Scioto Mound.....	6.5	6.0	4.5	6.2	16.0	4.5	13.8	19.8
2	Grave Creek Mound....	6.6?	6.0	-----	5.0	-----	-----	14.2?	-----
3	do.....	6.6	6.0	4.0	5.4	15.6	4.3	-----	20.2
4	Tennessee Mound.....	6.6	5.6	4.1	5.6	15.2	4.4	14.0	19.5
5	Huron River, Ohio.....	6.7	5.7	4.0	-----	14.8	4.4	14.?	19.8
6	do..... (Fem.).....	6.7	5.4	4.0	5.4	14.0	4.2	13.7	19.9
7	Ohio Mound.. (Fem.)....	6.4	5.3	4.0	5.0	14.2?	4.?	-----	19.0
8	Alabama Mound.....	6.2	5.4	4.3	4.9	14.6	3.8	13.3	18.5
9	Golconda Cave.....	6.7	5.4	4.3	5.5	14.5	4.1	14.0	19.3
10	Stenbenville Cave.....	7.0	6.1	4.6	5.6	15.5	4.3	14.0	20.5
11	do.....	6.8	5.9	4.4	5.7	15.5	4.5	14.4	20.5
12	do.....	6.3	5.9	4.9	5.7	15.8	5.0	14.1	20.0
13	do.....	6.6	6.0	4.6	5.1	14.6	4.2	13.3	20.0
14	do..... F.....	6.6	5.4	4.3	5.1	14.?	4.3	13.9	19.0
15	do.....	7.0	5.8	4.5	5.5	14.9	4.5	14.4	20.3
16	do.....	6.7	6.0	4.5	5.7	15.4	4.7	14.1	20.3
17	do..... F.....	6.2	6.1	4.5	4.9	15.?	4.?	13.3	19.4
18	do.....	7.1	5.7	4.6	5.0	15.0	4.4	14.2	20.2
19	do.....	6.2	6.0	4.5	5.5	14.8	4.0	13.2	19.4
20	Kentucky Cave.....	6.1	5.4	4.4	5.6	14.5	4.4	13.6	18.4
21	do.....	6.7	5.5	4.5	6.2	13.5	5.0	-----	19.7
Mound Crania mean...		6.54	5.67	4.13	5.36	14.91	4.23	13.83	19.53
Cave Crania mean....		6.62	5.78	4.51	5.47	14.85	4.42	13.87	19.77
Total mean.....		6.58	5.74	4.37	5.43	14.87	4.35	13.86	19.68

Of the series embraced in this table, though all are ancient, only the first four can be relied upon as undoubted examples of the crania of the mounds. In comparing them with others, there are indications of a peculiar cranial type partially approximating to the brachycephalic Peruvian cranium; but this assumed correspondence has been exaggerated, and some important differences have been slighted or ignored in the zeal to establish the affinities which such an agreement would seem to imply. In vertical elevation the Peruvian cranium is decidedly inferior; and another point of distinction, borne out, by the few well-authenticated mound crania, is the well-formed and arched frontal bone, unaffected by the pressure to which the flattened occiput must be in part ascribed, and accompanied by great prominence of the superciliary ridges. These differences were overlooked by Dr. J. C. Warren, who pronounced the Mound and Peruvian crania to be identical. A greater correspondence seems to me to be traceable between the most ancient crania of the Mexican valley and those of the mounds. But, tempting as are the conclusions which such analogies suggest, any final decision on the subject must be reserved until further discoveries place within our reach a sufficient number of skulls of the ancient Mound-builders as well authenticated as those of the Scioto valley and Grave creek mounds. This there is little hope of achieving, until a systematic exploration is instituted under the direction of a carefully constituted scientific commission, the organization of which would reflect credit on the government of the United States. The Cave crania, Nos. 9-21, are a remarkable series of undoubted antiquity, and present a nearer approximation to those of the Mounds than any other class. Their most notable divergence from the mound type, in the parietal diameter, disappears if the doubtful examples of the latter, Nos. 5-8, are excluded, as in Table X.

Turning from this review of the meagre data hitherto recovered from the ancient sepulchral mounds, let us next consider the two great civilized nations of the New World, the Peruvians and Mexicans. Their civilization had an independent origin and growth. The scenes of its development were distinct; and each exhibited special characteristics of intellectual progress. Nevertheless, they had so much in common, that the determination of the physical type peculiar to each will be best secured by ascertaining what is common to both.

When Dr. Morton first undertook the investigation of the cranial characteristics of the American races, he admitted the force of the evidence presented to him in the examination of a number of ancient Peruvian skulls, and has recorded in his *Crania Americana* a distinct recognition of the traces of well-defined brachycephalic and dolichocephalic races among the ancient Peruvians.* But the seductive charms of his comprehensive theory of an American ethnic unity ultimately prevailed over the earlier opinion, which, even in the *Crania Americana*, was stated as the legitimate deduction from the evidence in question, without being incorporated into the author's concluding propositions; and he accordingly states his conviction that all the extremest varieties of the Peruvian head were naturally of the same rounded shape, and owe their diversities of form to artificial deformation. In this, as in others of the deductions drawn by Dr. Morton from the carefully accumulated data which his well-directed industry contributed to the science, it is obvious that his mind dwelt too exclusively on one or two of the leading characteristics of the more numerous varieties of American crania; and, like others who have satisfied their minds in regard to one central type, he evaded every variation from it, by assuming it as a mere exceptional aberration.

A revision of the evidence accumulated by Dr. Morton, along with additional illustrations derived from other sources, suggests conclusions in reference to Peruvian cranial forms at variance with the idea of a universally prevalent rounded, or brachycephalic Peruvian head. In pursuing my researches on this subject, I have enjoyed the advantage of minutely studying and measuring an interesting collection of crania and mummied bodies, brought by John H. Blake, esq., of Boston, from ancient Peruvian cemeteries on the shores of the Bay of Chacota, in latitude $18^{\circ} 30'$ S. In addition to those the following tables of Peruvian crania include measurements made from others, in the collections of Dr. J. M. Warren and the Natural History Society of Boston; in that of the Academy of Natural Sciences of Philadelphia, and of the Smithsonian Institution, Washington. The materials upon which Dr. Morton based his final opinion that the dolichocephalic crania found in ancient Peruvian graves derive their form and proportions from artificial causes, and consequently that these have no ethnical significance, are still accessible; and the bearings of the additional evidence since accumulated justify a reconsideration of the proofs. Since the subject was taken up by him the effects, not only of designed, but also of undesigned artificial compression, and of posthumous distortion, on cranial forms, have been minutely studied. The application of continuous pressure on the skull during infancy can be carried so far as to obliterate nearly every trace of its normal proportions. But it cannot substitute for them a symmetrical artificial conformation. Even comparatively slight pressure is betrayed by a corresponding amount of inequality in the opposite sides of the head; and when the compression is such as would be required to convert a brachycephalic head, averaging 6.3 in longitudinal diameter, by 5.3 in parietal diameter, into a dolichocephalic head of 7.3 by 4.9 in diameter, the retention of anything like the normal symmetry is impossible. The following table of measurements illustrates the proportions of the Peruvian brachycephalic skull:

* *Crania Americana*, p. 98.

TABLE II.—PERUVIAN BRACHYCEPHALIC CRANIA.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Atacama	6.0	5.2	3.5	5.2	-----	-----	-----	-----
2	do	6.3	5.0	3.5	5.3	-----	-----	-----	-----
3	do	6.6	5.3	3.4	5.3	-----	-----	-----	-----
4	do	6.7	5.6	3.6	5.4	-----	-----	-----	-----
5	S. of Arica	6.1	5.6	3.4	5.1	14.6	4.1	-----	18.4
6	do	6.4	5.1	3.2	5.1	14.5	4.1	-----	19.0
7	Peru	6.2	5.8	3.7	5.6	15.1	4.2	-----	19.1
8	Lima	6.3	5.8	3.6	5.4	15.6	4.2	-----	19.7
9	Titicaca	6.3	5.9	4.0	5.3	16.0	4.1	-----	19.2
10	do. (145)	6.2	5.9	3.4	5.0	14.7	4.3	-----	20.1
11	do. (146)	6.5	5.9	4.0	5.3	15.5	4.9	-----	19.5
12	Arica	6.5	5.2	4.3	5.1	14.5	4.0	13.8	18.5
13	Temple of Sun, F.	5.8	5.7	4.4	5.1	14.5	4.1	12.7	18.4
14	do	6.1	6.0	4.7	5.5	16.0	4.5	14.1	19.5
15	Pachacamac	6.7	6.0	4.5	5.6	16.2	4.5	14.5	20.2
16	do	6.3	5.8	4.5	5.3	15.0	4.0	13.2	19.0
17	Santa	6.2	5.4	4.3	4.9	14.6	3.8	13.3	18.5
18	Rimac	6.5	5.6	4.5	5.0	14.7	3.8	13.2	19.2
19	Pachacamac, F.	6.6	6.0	4.6	5.1	15.5	4.1	13.5	19.8
20	do	6.6	5.7	4.2	5.2	15.5	4.4	13.0	19.4
21	do. F.	6.3	5.5	4.2	5.0	14.5	3.7	13.2	18.5
22	do	6.3	5.3	4.4	4.6	14.0	3.9	13.0	18.7
23	do	6.4	5.5	4.3	5.2	14.8	4.0	13.2	19.0
24	do. F.	6.2	5.5	4.4	5.0	13.6	3.8	12.6	18.7
25	do. F.	6.1	5.9	4.6	5.2	15.2	4.1	13.2	19.2
26	do	6.2	5.8	4.3	4.9	14.5	4.1	12.6	18.7
Mean		6.32	5.62	4.06	5.18	14.96	4.12	13.27	19.10

Of the diverse, elongated type of skull, undoubted examples have been repeatedly recovered from Peruvian cemeteries, both in their normal condition and modified by artificial means. They are nearly all small, narrow, and with a marked predominance of the longitudinal diameter. Several of those measured by me showed the average distance from a vertical line drawn from the external auditory foramen to the most prominent part of the frontal bone to be only 2.7 inches, while from the same line to the most prominent part of the occipital bone it was 4.3 inches. Fully two-thirds of the cavity occupied by the brain lies behind the occipital foramen, and the skull, when supported on the condyles, falls backward. Compared with brachycephalic skulls, the forehead is low and retreating; the temporal ridges approach near each other at the top of the head, a much larger space being occupied by the temporal muscles, between which the skull seems to be compressed. The zygoma is larger, stronger, and more capacious, and the whole bones of the face are more developed. The superior maxillary bone is prolonged in front, and the incisor teeth are in an oblique position. The bones of the nose are prominent, the orifices larger, and the cribriform lamella more extensive; the bony substance of the skull is thicker, and the weight greater.

Among the numerous interesting illustrations of Peruvian characteristics obtained by Mr. Blake from ancient cemeteries on the Pacific coast, the most valuable for the purpose now in view are the skulls of two children, both of the dolichocephalic or elongated type; but the one evidently in a normal condition, while the other betrays manifest traces of artificial deformation. It is impossible to examine the former without feeling convinced that it illustrates a type of head entirely distinct from the more common brachycephalic crania, while the latter shows the changes wrought by compression. Figure 3 exhibits the unaltered skull. It is that of a child, which, judging chiefly from the state of the dentition, may be pronounced to have been about seven years of age. It is

a well-proportioned, symmetrical skull, unaltered by any artificial appliances, and will be observed to present the most striking typical contrast, if compared with an unaltered juvenile skull of the brachycephalic type from the Peruvian cemetery of Santa, engraved in the *Crania Americana*, Plate vii. The other elongated skull, exhibited in Figure 4, is manifestly of the same elongated type as Figure 3, but considerably altered by compression. The forehead is depressed, and the frontal suture remains open. It is that of a child of about five years of age; so that both examples are long past the age when the form of the head admits of material alteration by artificial means.



Fig. 3.



Fig. 4.

The following measurements give the comparative proportions of the normal and abnormal skulls figured above; and of two other children's skulls, in the Morton collection, figured in the *Crania Americana*, Plates ii and vii. They are marked, A, normal child's skull; B, abnormal do.; C and D, the Atacama and Santa skulls of the *Crania Americana*:

	A.	B.	C.	D.
Longitudinal diameter	6.6	6.1	6.9	5.4
Parietal diameter	4.6	4.4	4.5	5.4
Frontal diameter	3.3	3.1	3.7	4.
Vertical diameter	4.8?	4.3?	4.3	4.6

From observations carried on in the cemeteries of Peru, Mr. Blake was led to the conclusion that the distinguishing traits thus far noted between two classes of the ancient Peruvians are not limited to the crania, but may be discerned in other traces of their physical organization. In describing those of the rounded or brachycephalic type of cranium, he adds: "The bones of the latter struck me as larger, heavier, and less rounded than those of the former, (the

elongated crania,) and in the larger size of the hands and feet they also present a noticeable difference. The remarkable narrowness and delicacy of the hands, and the long and regularly-formed finger-nails of the former, are strong evidence that they were unaccustomed to severe manual labor, such as must have been required for the construction of the great works of which the ruins remain. In all the cemeteries examined, where skulls of the rounded form have been found, those which are elongated have also been obtained." Remembering, however, that the sepulchral rites of the royal and noble Inca race were commonly accompanied by the same human sacrifices traceable among so many semi-civilized as well as barbarous nations, it is in no degree surprising that the crania of the two distinct classes, noble and serf, should be found deposited together in the same grave. After a minute comparison of all the brachycephalic Peruvian crania in the Morton collection, it appears to me that these also admit of subdivision into two classes distinguished by marked physiognomical diversity. The bones of the face in the one are small and delicate, while the other exhibits the characteristic Mongol maxillary development and prominent cheek-bones. The following table of measurements illustrates the proportions of the Peruvian dolichocephalic skull, as shown in examples brought by Mr. Blake from Peru, and in others preserved in the collections of Boston and Philadelphia:

TABLE III.—PERUVIAN DOLICHOCEPHALIC CRANIA.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Atacama	7.2	5.2	3.6	5.1	-----	-----	-----	-----
2	do.	7.3	4.9	3.3	4.9	-----	-----	-----	-----
3	do.	7.0	4.7	3.2	5.1	-----	-----	-----	-----
4	do.	7.1	5.2	3.2	5.0	14.1	4.0	15.0	20.0
5	S. of Arica	6.9	5.3	3.6	5.2	14.6	4.1	-----	19.8
6	Peru	7.2	5.3	3.5	5.6	14.6	4.0	-----	20.0
7	do.	7.0	4.9	3.0	5.3	14.0	4.1	-----	19.0
8	do. F.	7.2	5.1	3.5	5.2	13.9	4.0	-----	20.0
9	Arica	7.3	5.3	4.3	5.3	14.0	4.3	15.0	19.8
10	Atacama	7.2	5.5	4.4	5.1	14.8	4.1	13.7	20.2
11	Titicaca	6.8	5.4	4.8	5.3	14.8	4.2	-----	19.4
12	Royal Tombs, F.	6.8	5.2	3.8	5.3	14.1	4.0	-----	19.4
13	Pachacamac	6.8	5.4	4.5	5.3	14.7	4.2	14.1	19.5
	Mean	7.06	5.18	3.80	5.21	14.36	4.10	14.45	19.71

In an inquiry into the physical characteristics of the Peruvian nation, we are by no means limited to the cranial or the mere osteological remains recoverable from its ancient cemeteries. Like the Egyptians, the Peruvians employed their ingenious skill in rendering the bodies of their dead invulnerable to the assaults of "decay's effacing fingers;" and, like the inhabitants of the Nile Valley, they were able to do so under peculiarly favorable circumstances of soil and climate. The colors on Egyptian paintings, and the texture of their finer handiwork, which have shown no trace of decay through all the centuries during which they have lain entombed in their native soil or catacombs, fade and perish almost in a single generation when transferred to the humid climates of Paris or London. The natural impediments to decay probably contributed, alike in Egypt and Peru, to the origination of the practice of embalming. The cemeteries already referred to are situated in a region where rain seldom or never falls; and the dryness alike of the soil and atmosphere, when added to the natural impregnation of the sand with nitrous salts, almost precludes the decay

of animal or vegetable matter, and preserves the finest woollen and cotton textures, with their brilliant dyes undimmed by time. By the same means we are enabled to judge of the color and texture of the hair, the proportions and delicacy of the hands and feet, and the comparative physical development of two seemingly different races at various stages, from infancy to mature age. When we pass from the southern continent of America to the seats of ancient native civilization lying to the north of the Isthmus, a different class of evidence, in like manner, enlarges our range of observation. The artistic ingenuity of the ancient Peruvian potter has left valuable memorials of native portraiture, and the Mexican picture-writing, with the sculptures and terra-cottas, the products of Toltec and Aztec ceramic art, in like manner contribute important evidence illustrative of the physiognomy and physical characteristics of the ancient races of Anahuac. Still more, the elaborate sculptures and stuccoed bas-reliefs of Central America perpetuate in unmistakable characters the records of an ancient race, differing essentially from the modern Indian; and the study of their cranial characteristics serves to confirm the deductions derived from those other independent sources.

The traditions of the Mexican plateau pointed to the comparatively recent intrusion of the fierce Mexican on older and more civilized races; and various independent observers have at different times been tempted to trace associations between the ancient Mound-builders of the Ohio, the elder civilized race of Mexico, and the Peruvians, whose peculiar remains are recovered from the tombs around Lake Titicaca. The predominant Mexican race at the era of the conquest appears from evidence of various kinds, including the portraiture in ancient Mexican paintings, to have been derived from one of the great stocks of the Red Indians of the northern continent. The features represented in the paintings are thoroughly Indian, and strikingly contrast with those of the older native race of Central America, as illustrated by their sculptures, bas-reliefs, and pottery. No doubt, however, the population of the Mexican plateau in the time of Montezuma included descendants of very different races. All the traditions of Mexico point to intrusion and conquest by successive invaders; and the cranial evidence, as produced in the following tables, shows that there also, very distinctive types of skull-forms appear to perpetuate the evidence of diverse races, and of a mixed stock intermingling the characteristics of the conquering and the subject people. The same valuable American collections have furnished the materials for the following comparative tables:

TABLE IV.—MEXICAN DOLICHOCEPHALIC CRANIA.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Mexico	7.1	5.0	3.8	5.5	-----	4.2	-----	19.8
2	Otumba	7.1	5.6	4.6	5.5	15.5	4.1	15.0	20.2
3	Cerro de Quesilas	7.1	5.7	4.4	5.2	15.9	4.0	14.0	20.5
4	Acapacingo, F.	6.9	5.2	4.2	5.4	14.5	4.1	14.0	19.2
5	Tacuba	7.1	5.6	4.5	5.4	15.2	4.3	14.2	20.0
6	do	7.0	5.3	4.3	5.3	14.5	4.1	14.0	20.0
7	Mexico	7.0	5.4	4.3	5.3	15.0	4.1	14.0	19.8
8	do	7.1	5.5	4.4	5.2	15.8	4.1	14.0	20.4
	Mean	7.05	5.41	4.31	5.35	15.20	4.12	14.17	19.99

TABLE V.—MEXICAN BRACHYCEPHALIC CRANIA.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Mexico	6.6	5.8	3.9	5.9	14.7	4.3	-----	20.0
2	do.	6.6	5.7	4.0	-----	15.0	-----	14.5	20.0
3	Otumba	6.3	5.3	4.4	5.4	14.3	4.2	13.5	19.2
4	do.	6.6	5.3	4.4	5.4	14.0	4.0	14.0	19.3
5	Tacuba	6.8	5.5	4.6	6.0	15.6	4.4	14.6	19.9
6	San Lorenzo	6.4	5.7	4.5	5.4	14.6	4.5	13.5	20.2
7	Mexico, modern	6.6	5.3	4.3	5.2	14.6	4.1	13.6	19.0
	Mean.....	6.56	5.51	4.30	5.55	14.69	4.25	13.95	19.66

The Peruvians and Mexicans, with the ancient populations of Central America and Yucatan, constitute the Toltec family of the two great divisions into which Dr. Morton divided his one American "race or species." The nations lying to the north of those seats of a native civilization were all classed by him into one family of the barbarous tribes, resembling the other in physical, but differing from it in intellectual characteristics. Yet, as we have seen, even Dr. Morton recognized some differences among them; and Professor Agassiz speaks of their tendency to split into minor groups, though running really one into the other. The following tables, however, will show that the differences are of a far more clearly defined nature, and in reality embrace well-marked brachycephalic and dolichocephalic forms; while of these, the latter seems decidedly the most predominant. The examples are chiefly derived from the Philadelphia collection, though with additional illustrations from the Boston cabinets already referred to, as well as from Canadian collections. Table VI, which illustrates the form of head most widely diverging in proportions from the theoretical type, shows in reality the prevailing characteristics of the north-eastern tribes, and could be greatly extended. The opposite or brachycephalic cranial formation is illustrated in Table VII.

TABLE VI.—AMERICAN DOLICHOCEPHALIC CRANIA.

	Tribe.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Seminole.....	7.1	5.6	4.7	5.5	15.0	4.1	14.8	20.3
2	do.	7.3	5.9	4.6	5.8	15.9	4.4	15.3	20.7
3	do.	7.0	5.6	4.7	5.4	15.0	4.1	14.7	20.2
4	do.	7.3	5.6	4.2	5.6	15.2	4.7	15.0	20.4
5	do.	7.0	5.9	4.5	5.8	14.7	4.6	14.2	20.5
6	Cherokee, F.....	7.2	5.2	4.2	5.5	14.5	4.0	14.6	20.2
7	do. . F.....	7.0	5.3	4.1	5.4	14.5	4.0	14.0	19.5
8	do.	7.2	5.3	4.3	5.3	14.1	4.5	14.0	19.1
9	Choctaw	7.2	5.0	4.2	5.5	14.6	3.9	14.7	19.2
10	Sauk. . F.....	7.4	5.9	4.6	5.5	15.3	4.7	14.2	20.2
11	Ottigamie	7.0	5.9	4.7	5.5	15.0	4.2	14.2	20.9
12	Chippewa	7.3	5.8	4.8	5.5	15.1	4.6	14.2	20.9
13	do.	7.2	5.5	4.3	5.5	14.8	4.1	14.6	20.2
14	Pottowatomie	7.8	5.7	4.4	5.3	16.0	4.0	15.8	22.1
15	Mississaga	7.0	5.2	4.3	5.2	13.8	4.1	14.2	19.5
16	Delaware	7.8	5.4	4.6	5.1	14.4	4.2	14.5	20.0
17	do.	7.0	5.5	4.4	6.2	15.6	4.3	16.0	21.5
18	Miami	7.6	5.3	4.3	5.5	15.0	4.1	15.5	20.5
19	do.	7.3	5.5	4.3	5.5	14.6	4.6	14.9	21.0

TABLE VI.—Continued.

	Tribe.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
20	Naumkeag	7.4	5.5	4.4	5.9	15.0	4.3	14.0	-----
21	do	6.9	5.0	4.2	5.3	14.3	3.9	14.4	19.8
22	Assinaboine	7.6	5.8	4.6	5.1	14.9	4.3	14.9	21.2
23	do	7.5	5.7	4.4	5.2	14.7	4.6	14.7	20.8
24	Mandan, F.	7.1	5.4	4.3	5.1	14.2	3.8	14.6	20.0
25	do, F.	7.0	5.3	4.1	5.3	13.9	4.2	14.1	19.8
26	Ricari	7.0	5.2	4.1	5.1	13.5	4.0	14.0	19.5
27	Mingo	7.1	5.5	4.5	5.2	14.7	4.1	14.5	20.2
28	Menominee	7.1	5.8	4.1	5.5	14.7	4.0	-----	20.3
29	do	7.1	5.4	3.9	5.2	13.3	4.4	-----	19.3
30	do	7.5	5.4	4.0	5.5	14.5	4.2	-----	20.6
31	Minetari, F.	7.3	4.4	4.4	5.1	14.1	4.1	14.7	20.2
	Mean	7.24	5.47	4.36	5.42	14.67	4.23	14.62	20.29

TABLE VII.—AMERICAN BRACHYCEPHALIC CRANIA.

	Tribe.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Muskogee	6.8	5.8	4.2	5.6	15.4	4.3	15.0	20.0
2	do	6.6	5.7	4.5	5.3	15.3	4.5	14.0	20.4
3	Uchee	6.8	5.4	4.3	5.5	15.0	4.4	14.3	20.1
4	Minisi	6.7	5.0	4.2	5.3	14.0	4.1	13.8	19.3
5	Natick	6.7	5.2	4.1	5.7	14.5	4.1	14.3	19.0
6	do	6.7	5.2	4.3	5.3	14.2	3.9	14.1	19.1
7	Dacota	6.7	5.7	4.2	5.4	14.7	4.4	13.5	19.8
8	do	6.8	5.7	4.3	5.5	15.1	4.4	14.4	20.1
9	Pawnee, F.	6.6	5.4	4.4	4.9	13.7	4.3	13.0	19.1
10	do	6.6	5.5	4.1	5.4	15.0	4.4	14.0	19.5
11	do	6.5	5.5	4.0	5.4	14.8	4.4	14.1	19.3
12	do	6.7	5.6	4.3	5.5	15.1	4.4	14.2	19.6
13	Chetimachee	6.5	5.7	4.3	5.9	15.5	4.1	14.0	19.1
14	Chinuyan	6.5	5.4	4.2	5.2	14.3	3.8	13.4	18.8
15	Osage	6.6	5.7	4.3	5.2	14.8	4.7	13.8	19.5
16	do	6.5	5.9	4.6	5.3	15.1	4.1	13.4	19.5
17	Creek	6.9	5.7	4.6	5.4	15.5	4.7	14.4	20.4
18	Choctaw	6.5	5.1	4.0	4.7	12.5	4.1	13.0	18.7
19	do	6.4	5.1	4.0	5.1	14.0	4.0	-----	19.7
20	"Ohio Mound," F.	6.4	5.3	3.9	5.0	14.2	4.0	-----	19.0
21	Goajiro	6.7	5.3	-----	5.2	-----	-----	13.4	19.3
22	do	6.5	5.1	-----	4.9	-----	-----	13.0	18.5
	Mean	6.62	5.45	4.24	5.30	14.63	4.25	13.85	19.44

But I now turn to the region around the northern lakes, where opportunities of personal observation first suggested to me the obvious discrepancies between the actual evidence disclosed by exhumation on the sites of native sepulture, and the theory of a typical unity manifested in the physical and peculiar cranial characteristics of the most widely-separated tribes and nations of the American continent. The Scioto Mound skull, characterized by Dr. Morton as "the perfect type of Indian conformation to which the skulls of all the tribes from Cape Horn to Canada more or less approximate," presents the remarkable anterior development of a cranium whereof two-thirds of the cerebral mass was in front

of the *meatus auditorius externus*; whereas in the elongated Peruvian skull, unaltered by artificial means, this is almost exactly reversed, showing by the proportions of the cerebral cavity that fully two-thirds of the brain lay behind the *meatus auditorius*. These may be considered as representing the two extremes; but both of the two great stocks, between whom the northern region around the great lakes has been chiefly divided since the first intrusion of Europeans, belong to the dolichocephalic division. These are the Algonquins and the Iroquois, including in the latter the Hurons, who, with the Petuns, Neuters, and Eries, all belonged to the same stock, though involved in deadly enmity with each other. In the supposed typical Scioto Mound skull the longitudinal, parietal, and vertical diameters vary very slightly; and as the Mexican and Peruvian crania chiefly attracted Dr. Morton's attention, and are illustrated minutely, as a series, in his great work, it only required the further theory, which referred all the elongated skulls to an artificially modified class, to confirm in his mind that idea of a peculiarly formed cranium pertaining uniformly and exclusively to the New World. To the theoretical type of a head very nearly corresponding in length and breadth, though not in height, the most numerous class of Peruvian and Mexican brachycephalic crania unquestionably approximate. Of one of the former, from the Temple of the Sun, (Plate xi,) Dr. Morton remarks: "A strikingly characteristic Peruvian head. As is common in this series of skulls, the parietal and longitudinal diameter is nearly the same," viz.: longitudinal, 6.1; parietal, 6.0; and, tested by this standard, he was even more justified in recognizing marked points of correspondence between the Mound skulls and what he calls "the Toltec branch of the American race," than might seem reasonable from the miscellaneous character of the crania referred to by him as "Mound skulls." But the moment we test by actual measurement, a very wide difference is apparent between the brachycephalic crania of the class referred to, and the prevailing form of the head in many of the northern tribes, as among the Algonquins, Hurons, and Iroquois. The Algonquin stock are represented by Ottawas, Mississagas, Chippewas, and other tribes, within the area of Upper Canada and along the shores of Lake Superior. Of living Indians belonging to Iroquois and Algonquin tribes I have examined, and compared by the eye, many at widely-scattered places: on the Thames and Grand rivers, Rice lake, Lake Simcoe and the Georgian bay; at Mackinaw in Lake Huron, and at Sault Ste. Marie; at Ontonagon, La Pointe, the Apostle islands, and the St. Louis river, on Lake Superior; and on the Saguenay, St. Charles, St. Maurice, and Ottawa rivers, in Lower Canada; as well as on such chance opportunities as occur in the neighborhood of American and Canadian towns and villages. Physiognomically they present the large and prominent mouth, high cheek-bones, and broad face, so universally characteristic of the American Indian; but they by no means possess in a remarkable degree the wide and massive lower jaw, which has been noted as of universal occurrence among the Red Indians; and the aquiline nose is also absent in most of them.

The crania found in ancient cemeteries and ossuaries around Lakes Ontario, Erie, and Huron, chiefly belong to the two families referred to; and of the nation whose name is perpetuated in that of the last-named lake, the region occupied by it when first brought under the notice of the French Jesuit fathers is well defined; so that there is little risk of error in the determination of the race to which the remains found in its ancient graves belong. A partial difference in their relative proportions appears also to aid in the classification of the two ethnic divisions. The Algonquin cranium, though less markedly dolichocephalic than the Huron or Iroquois skulls, belongs to the same class; and to one or other of those nearly all the Canadian crania may with little hesitation be assigned.

Of Indian skulls chiefly dug up within the district once pertaining to the

Huron or Wyandot branch of the Iroquois stock, I had observed and cursorily examined a considerable number, before my attention was especially drawn to the peculiar characteristics now under consideration, owing to repeated rejection of those which turned up, as failing to furnish specimens of the assigned typical American head. Since then I have carefully examined and measured seventy Indian skulls belonging, as I believe, to the Wyandot or the Algonquin stocks, with the following results:

1. Only five exhibit such an agreement with the assigned American type, as, judged by the eye, to justify their classification as true brachycephalic crania. One very remarkable and massive skull was turned up at Barrie, on Lake Simcoe, within the Huron region, with upwards of two hundred others. It differs from all the others in exhibiting the vertical occiput so very strikingly, that when resting on it, it stands more firmly than in any other position. This is, without doubt, the result of artificial compression; and in so far as fashion regulated the varying forms thus superinduced on the natural cranial conformation, it is suggestive of an intruder from the country lying towards the mouth of the Mississippi, where the ancient graves of the Natchez tribes disclose many skulls moulded into this singular form. In some respects, indeed, it presents features strongly suggestive of comparison with the Scioto Mound skull, while the smallness of the lower jaw increases its divergence from the Huron or other northern Indian type. No note has been preserved of the general character of the crania discovered at the same time; but this one no doubt owed its selection to its peculiar form. The whole subject of occipital and varied cranial compression is deserving of minuter consideration than is admissible in reference to the Huron crania, which exhibit in general no traces of an abnormal formation. Nor is Dr. Morton's assignment of the vertical occiput as one of the most characteristic features of the true American cranium borne out by an examination of those found in Canadian cemeteries. On the contrary, I have been struck with the evidence afforded by the majority of skulls examined by me, that such was certainly no prevailing characteristic of the Huron or other tribes, by whom Upper Canada was occupied prior to its European settlement. Many of them, indeed, exhibit a total absence of any approximation to the flattened occiput. Twenty of the crania referred to show a more or less decided posterior projection of the occiput: eighteen of these being markedly so; and ten of them present such a prolongation of it, as constituted one of the most striking features in one class of ancient Scottish crania, which chiefly led to the suggestion of the term *kumbecephalic*, as a distinctive term for them. But since my observations on this subject were first published,* the special question of the prevailing form of the occiput has been taken up in a valuable monograph contributed by Dr. J. Aitken Meigs to the Transactions of the Academy of Natural Sciences of Philadelphia.† The conclusions he arrives at are: that the form of the human occiput is not constant, but varies even among individuals of the same race or tribe. He divides the different forms into three primary classes: 1st. The protuberant occiput, which is exhibited among the nations of the New World by the Esquimaux, Chippewas, Hurons, and more or less among thirty-six different American tribes or nations. 2d. The vertically flattened occiput he assigns as more or less prevalent among sixteen tribes, and characteristic of the majority of the Mound-builders. 3d. The full and rounded or globular occiput characterizes nine American nations or tribes, and occurs occasionally in a greater number. But the final summary of Dr. Meigs goes even further than this; and, treating as it does, not solely of the American, but of human

* "Supposed prevalence of one Cranial Type throughout the American Aborigines."—*Canadian Journal*, November, 1857; *Edinburgh New Philosophical Journal*, January, 1858.

† *Observations upon the Form of the Occiput in the Various Races of Men*, by J. Aitken Meigs, M. D. Philadelphia, 1850.

occipital formation generally, it very effectually deals with all theories of radical diversities of human varieties or distinct species, in so far as this important subdivision of osteological evidence is concerned, by affirming, as the result of observations made on eleven hundred and twenty-five human crania, "that there is a marked tendency of these forms to graduate into each other, more or less insensibly. None of these forms can be said to belong exclusively to any race or tribe. None of them, therefore, can be regarded as strictly typical: for a character or form to be typical should be exclusive and constant." In his elaborate observations, Dr. Meigs has still left untouched the peculiarities which distinguish the female occiput. One elongated protuberant form appears to me to be found only in the female head; but a comparative estimate of the occipital variations in the two sexes, as exhibited in the different races, is necessary to complete this interesting inquiry.

2. The tendency to the pyramidal form, occasioned by the angular junction of the parietal bones, is apparent in the majority of the skulls examined. I have noted its occurrence as a prominent characteristic in twenty-three Canadian crania, of which ten exhibit a strongly marked pyramidal form, extending to the frontal bone. Nevertheless, it is by no means constant. Both in the Morton collection, and in the examples specially noted here, it is only slightly indicated in some, while in others it is entirely wanting.

3. I am further struck with the very partial projection, and in some male skulls with the total absence of the superciliary ridge: a characteristic which, so far as I am aware, has not been noted by other observers. In some the prominent ridge stretches entirely across the brow, forming a deep hollow at the junction of the *os frontis* and the bones of the nose; and this appears to be the case in the best authenticated Mound skulls. In the Scioto mound cranium it is markedly so, and it is little less apparent in the Grave creek mound, Tennessee, and Mississippi skulls. In this respect they differ from the majority of the Peruvian crania, with which in other respects they have been supposed so nearly to agree, that, overlooking this prominent physiognomical feature, the lost Mound-builders have been thought to reappear as the ancient architects of Peru. In the great majority of the crania figured by Morton, the very slight development, and in some, the total absence of a projecting superciliary ridge, is very noticeable. In thirteen of the Canadian skulls the same feature is particularly manifest. In the majority of these the *os frontis* slopes without any indentation to the edges of the orbits; and when taken into consideration along with the pyramidal vertex and predominant longitudinal diameter, suggests affinities, hitherto overlooked, with the Esquimaux form of skull.

4. It is also worthy of note that, whereas Dr. Morton states, as the result of his experience, that the most distant points of the parietal bones are for the most part the parietal protuberances: out of fifty-one Canadian skulls, I have only found such to be the case in three, all of which were female. The widest parietal measurement is generally a little above the squamous suture, and in some examples a still wider diameter is given between the temporal bones. Somewhat minute observations, accompanied in part with measurements, of numerous examples in the unrivalled collection of the Academy of Sciences of Philadelphia, and elsewhere, incline me to believe that this is a common characteristic of American crania.

The following tables (Tables VIII, IX) exhibit the relative proportions of the crania found in Upper Canada, in so far as they can be shown by such a series of measurements. Embracing, as they do, the comparative length, breadth, height, and circumference of sixty-nine skulls, procured without any special selection from Indian cemeteries, lying, with only four exceptions, to the north of Lakes Erie and Ontario, they supply a series derived from a sufficient number to indicate some constant proportions, and to mark certain elements of contrast

instead of comparison, when placed alongside of the corresponding relative proportions in the tables of brachycephalic crania.

The measurements in Table VIII are derived from thirty-seven crania obtained from Indian graves in the region around Lake Simcoe, and on the Georgian bay, the ancient country of the Hurons.

TABLE VIII.—WESTERN CANADA: HURONS.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	II. C.
1	Orillia	7.5	5.7	4.5	5.6	15.6	4.2	15.0	21.1
2	do.	7.4	5.5	4.4	5.4	14.7	4.5	14.1	20.6
3	do.	7.3	5.7	4.2	5.7	15.3	4.3	14.1	20.5
4	do.	7.5	5.6	4.2	5.4	14.7	4.3	14.6	21.1
5	do.	7.2	5.3	4.3	5.3	14.5	4.3	14.3	20.3
6	do. F.....	7.3	5.5	4.3	5.1	13.7	4.2	14.3	20.5
7	Owen Sound	7.0	5.5	4.2	5.0	13.8	4.0	14.0	19.8
8	do.	7.3	5.3	4.3	5.3	14.4	4.2	14.2	20.4
9	do.	7.2	5.4	3.8	5.2	14.5	3.9	14.2	19.9
10	do.	7.7	5.4	4.7	5.6	14.6	4.2	15.0	21.4
11	do.	7.5	5.9	5.1	5.5	15.0	4.3	15.6	21.8
12	do.	7.6	5.5	4.5	5.4	14.6	4.5	14.9	21.3
13	Georgian Bay	7.6	5.6	4.2	5.4	14.6	4.7	15.0	21.1
14	do. F.....	6.8	5.2	4.0	5.2	13.3	3.8	13.7	19.0
15	do. F.....	7.4	4.9	4.2	5.3	13.3	-----	14.1	20.0
16	Oro	7.5	5.6	4.4	5.5	15.6	4.3	15.2	21.4
17	do.	7.4	5.4	-----	4.3	15.2	4.0	14.9	20.4
18	Medonte	7.6	5.2	3.9	5.6	14.8	4.5	15.2	20.5
19	do.	7.2	5.5	4.4	5.8	15.2	4.5	14.5	20.2
20	do.	7.6	5.6	4.5	5.6	15.4	4.2	15.0	21.4
21	do.	7.3	5.3	4.2	5.4	14.2	4.1	14.4	20.4
22	Penetanguishene.....	7.8	5.6	4.6	5.9	15.5	4.5	15.6	21.3
23	do.	6.9	5.5	4.1	5.1	14.0	4.1	-----	19.7
24	do.	7.4	5.4	4.2	5.2	14.5	4.4	-----	20.7
25	do.	7.3	5.3	4.2	5.1	14.6	4.1	14.4	20.5
26	Tecumseth	7.3	5.6	4.4	5.5	14.5	4.9	14.4	20.2
27	do. F.....	7.2	5.2	3.9	5.0	14.1	3.6	14.2	19.7
28	do.	7.9	6.0	4.6	5.7	16.0	3.4	16.1	20.0
29	do. F.....	7.6	5.3	4.3	5.6	14.0	4.1	14.3	20.2
30	do. F.....	7.5	5.2	4.1	5.1	13.4	4.2	14.8	20.5
31	do.	7.4	5.6	4.6	5.5	15.0	4.4	15.0	20.9
32	do.	7.6	5.4	4.2	5.7	15.1	4.4	15.3	20.9
33	Whitchurch	7.5	5.3	4.2	5.7	15.1	4.2	14.6	20.4
34	Newmarket	7.2	5.6	4.6	6.7	15.7	4.2	15.0	20.3
35	do. F.....	7.6	5.2	4.1	5.3	14.7	4.0	14.1	19.5
36	Oakridges	7.6	5.5	4.7	6.0	15.7	4.6	15.0	21.2
37	do. F.....	6.8	4.8	4.2	5.0	13.6	4.0	13.2	18.9
	Mean	7.40	5.43	4.35	5.43	14.66	4.23	14.85	20.49

The localities specified in the following table show the wider region from whence the skulls have been procured which are assumed to illustrate the cranial characteristics of the Algonquin stock. The table includes the measurements of thirty-two Canadian skulls, the whole of which have been obtained from graves lying to the south and east of the true Huron country, towards the shores of Lakes Erie and Ontario, or on the north bank of the St. Lawrence. Some portions of Western Canada, including localities referred to, were occupied in the early part of the seventeenth century by tribes allied to the Hurons; but on their deserted areas the Algonquins from the north and west have everywhere preceded the English settlers, and the greater number of the crania introduced in this table may be assigned without hesitation to Algonquin tribes. No. 23

is designated by Dr Morton a Mississaga skull, and probably most, if not all, of those numbered consecutively from 16 to 28 belong to the same tribe. Nos. 28 to 32 are from Abenakis graves on the St. Maurice. As a whole, the examples thus grouped together present a sufficient number to furnish some adequate approximation to the prevailing typical specialties of the Algonquin head.

TABLE IX.—CANADA: ALGONQUINS.

	Locality.	L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Windsor	7.0	5.7	4.7	5.7	15.2	4.3	14.5	20.1
2	do.	7.0	5.7	4.5	5.7	16.1	4.0	14.4	20.1
3	do.	7.4	6.1	4.9	5.7	4.5	15.5	21.4
4	do.	6.6	5.3	4.2	5.5	14.5	4.2	13.5	19.0
5	Burford	6.5	5.2	4.1	5.0	13.4	4.0	13.0	18.4
6	Grand River	6.7	5.4	4.2	5.2	14.3	4.0	13.5	19.3
7	do.	7.5	5.6	4.4	5.4	15.0	4.1	15.2	21.0
8	Burlington Bay	7.0	5.3	4.4	5.3	14.0	4.0	13.6	19.5
9	do.	7.6	5.6	4.4	5.4	15.2	4.2	14.9	20.9
10	Nelson, F.	7.5	5.2	4.2	5.5	14.0	4.6	15.0	20.4
11	do.	8.2	5.5	4.3	5.5	14.9	4.3	15.5	21.0
12	do.	7.7	5.9	5.3	5.4	15.0	4.7	15.3	21.5
13	do. F.	7.3	5.5	4.1	5.1	14.0	4.3	14.7	20.5
14	do. F.	7.3	5.4	4.0	5.2	14.4	4.3	14.4	20.5
15	do. F.	7.2	5.4	3.7	5.3	14.3	4.0	14.3	19.8
16	River Humber	7.6	5.9	5.7	5.5	15.4	4.7	14.2	21.1
17	do.	6.8	5.6	4.5	5.1	14.1	4.5	13.9	19.9
18	do.	7.5	5.5	4.2	5.3	14.5	4.2	14.3	20.3
19	Burwick	7.5	5.7	4.2	5.6	15.3	4.5	14.9	21.0
20	do.	7.2	5.1	4.4	5.6	14.3	4.3	14.7	21.0
21	Peterboro'	7.7	5.5	4.9	5.3	15.4	4.6	15.0	21.1
22	do.	7.4	5.3	4.2	5.3	13.8	4.2	14.1	20.6
23	do.	6.5	5.2	3.9	4.9	13.3	3.8	13.7	19.2
24	do.	7.0	5.2	4.3	5.2	13.8	4.1	14.2	19.3
25	Rice Lake	7.1	6.5	3.9	6.3	14.5	4.3	14.2	20.0
26	Bay of Quinte	7.9	5.8	4.5	5.3	14.3	4.9	14.8	21.7
27	do.	7.0	5.5	4.2	5.0	14.0	4.6	13.9	20.5
28	do.	7.4	6.0	4.8	5.3	14.6	4.7	14.5	20.9
29	St. Maurice	7.0	5.3	4.1	5.3	13.0	4.4	14.0	20.5
30	do.	7.5	5.7	5.0	5.5	14.2	5.0	14.4	21.0
31	do.	7.0	5.5	4.7	5.5	14.0	4.2	14.5	20.7
32	Three Rivers	7.4	6.5	5.0	5.1	14.2	4.6	15.0	21.9
	Mean	7.25	5.58	4.43	5.37	14.42	4.35	14.42	20.44

But the term Algonquin, though apparently specially employed originally in reference to Canadian tribes, is now used as a generic appellation of a very comprehensive kind, and embraces ancient and modern tribes extending from the Labrador and New England coasts to far beyond the head of Lake Superior. In this comprehensive use of the term, its application is chiefly based on philological evidence; and it points thereby to affinities of language connecting numerous and widely-severed nations throughout the whole area lying between the Rocky Mountains and the Atlantic.

The New England tribes are described as having all presented a very uniform correspondence in their predominant characteristics. Dwight, in his *Travels in New England*, says of them: "They were tall, straight, of a red complexion, with black eyes, and of a vacant look when unimpassioned;" but he ascribes to them a good natural understanding and considerable sagacity and wit. They are not, even now, entirely extinct; but, like others of the eastern tribes that

have been long in contact with the whites, it is difficult to find a pure-breed Indian among the remnants that still linger on some of their ancient sites. Judging, however, from the examples I have seen, it is probable that the red complexion, which Dwight assigns to the New England tribes, may have much more accurately justified the application of the term Red Indian to the aborigines first seen by European voyagers along the northern shores of the American continent than is now apparent when observing the olive-complexioned Chippewas, Crees, and other tribes of the west. Gallatin has grouped the New England Indians along with the Delawares, the Powhattans, the Pamlicoës, and other tribes of the Atlantic sea-board, extending as far south as North Carolina, under the comprehensive title of Algonquin-Lenapé. There is no doubt that important philological relations serve to indicate affinities running through the whole, and to connect them with the great Algonquin stock; while the essentially diverse Iroquois and Huron nations were interposed between them. The result of a careful examination and comparison of measurements of thirty-two New England crania, chiefly in the Boston and Philadelphia collections, has been to determine their classification as decidedly dolichocephalic, and is shown in the mean measurements as given in Table X.

Under the double title of Algonquin-Lenapé have been included all the Indian nations originally occupying the vast tract of the North American continent, extending from beyond the Gulf of the St. Lawrence to the area of the Florida tribes, and claiming the whole territory between the Mississippi and the sea, excepting where the Hurons and the aggressive Iroquois held the country around the lower lakes, and the Five Nations were already extending their hunting-grounds at the cost of Algonquin and Lenapé tribes. The mean of the latter, as given in Table X, is derived from twenty-three crania, chiefly in the Mortonian collection; and the mean of the Iroquois crania is based on measurements of forty-eight skulls from Canadian and other collections.

Thus far the various ethnical groups referred to are all embraced within the true American stock, of which Dr. Morton and others affirm a nearly absolute uniformity of cranial type, or such an approximation to it as serves, in their estimation, to indicate no less clearly the unity of the American race, and its specific separation, by radical diversity of ethnical characteristics, from all the races of the Old World. "Identical characters," says Dr. Nott, "pervade all the American race, ancient and modern, over the whole continent."* Again he says, "American crania, antique as well as modern, are unlike those of any other race of ancient or recent times;" and, "at the time of its discovery, this continent was populated by millions of people resembling each other, possessing peculiar moral and physical characteristics, and in utter contrast with any people of the Old World."† These may suffice to illustrate the opinions on this subject reiterated in a variety of forms by various writers, including men of high authority in questions of science. All, however, concur in excepting from this otherwise universal uniformity of ethnical characteristics those which pertain to the Esquimaux. They are referred to by Dr. Morton as "the only people possessing Asiatic characteristics on the American continent;" and the very contrast thus exhibited between them and all the other races of the western hemisphere has been assumed as a confirmation of the indigenous unity of the others. But, while this abrupt contrast in physical form is insisted on, it is acknowledged that no such philological line of demarkation can be traced; but, on the contrary, in language the Esquimaux are thoroughly American.

My opportunities for examining Esquimaux crania have been sufficient to furnish me with very satisfactory data for forming an opinion on the true Arctic skull form. In addition to the measurements of thirty-eight skulls, from which

* *Types of Mankind*, p. 291.

† *Ibid*, p. 296.

the Esquimaux mean of Table X is derived, I have recently compared and carefully measured six Tchuktschi skulls, in the collection of the Smithsonian Institution, exhumed from the burial-place of a village called Tergnyuue, on the island of Arikamechee, at Glassnappe harbor, west of Bhering's straits; and, during a recent visit to Philadelphia, I enjoyed the advantage of examining, in company with Dr. J. Aitken Meigs, a series of one hundred and twenty-five Esquimaux crania, obtained by Dr. Hayes during his Arctic journey of 1860. The comparison between the Tchuktschi and the true Esquimaux skull is interesting. Without being identical, the correspondence in form is such as their languages and other affinities would suggest. Of the former, moreover, the number is too few, and the derivation of all of them from one cemetery adds to the chances of exceptional family features; but, on carefully examining the Hayes collection with a view to this comparison, I found it was quite possible to select an equal number of Esquimaux crania closely corresponding to the Tchuktschi type: which indeed presents the most prominent characteristics of the former, only less strongly marked. In both the skull is long, high, and pyramidal, and, in the Esquimaux especially, the junction of the parietals is frequently in a keel-like ridge, which extends into the depressed and narrow frontal bone.

But the same mode of comparison which confirms the ethnical affinities between the Esquimaux and their insular or Asiatic congeners, reveals, in some respects, analogies rather than contrast between the dolichocephalic Indian crania and those of the hyperborean race. The most characteristic features of the latter, as established by such a comparison, belong to the face, including the small nasal bones and the prognathous jaw, neither of which pertain to the true American Indian. The desired comparison may easily be made between the Iroquois or Huron cranium and that of the Esquimaux; from the vertical and occipital diagrams furnished in the *Crania Americana*, (pp. 192, 194, 248.) Both are elongated, pyramidal, and with a tendency towards a conoid, rather than a flattened or vertical occipital form; and when placed alongside of the most markedly typical Mexican or Peruvian heads, the one differs little less widely from these than the other. The contrast between the Huron and Esquimaux, obvious as it is, may be defined as physiognomical rather than cerebral; while some of the elements of calvarial correspondence are striking. The characteristics of the Esquimaux skull are defined by Dr. Meigs as "large, long, narrow, pyramidal; greatest breadth near the base; sagittal suture prominent and keel like, in consequence of the junction of the parietal and two halves of the frontal bones; proportion between length of head and height of face as seven to five; . . . forehead flat and receding; occiput full and salient; face broad and lozenge shaped, the greatest breadth being just below the orbits; malar bones broad, high, and prominent, zygomatic arches massive and widely separated; nasal bones flat, narrow, and united at an obtuse angle, sometimes lying in the same plane as the naso-maxillary processes"* But, in reference to the nasal development, wherein it differs so decidedly from the true Indian physiognomy, the remarks of Dr J. Barnard Davis are worthy of note. In the Esquimaux of the eastern shores of Baffin's bay, he observes, the nasal bones are scarcely broader, though frequently longer than in some Chinese skulls, where they are so narrow as to be reduced to two short linear bones. "In those of the opposite, or American shores of Baffin's bay, they are very different, presenting a length, breadth, and angle of position almost equal to those of European races having aquiline noses."† This slight yet striking anatomical difference seems to supply a link of considerable value as indicative of a trait of physiognomical character in the more southern Esquimaux, tending, if confirmed by further observation, like other physical characteristics already noticed, to modify the abrupt transi-

* *Catalogue of Human Crania*, A.N.S., 1857, p. 50.

† *Crania Britannica*, p. 30.

tion assumed heretofore as clearly defining the line of separation between the contrasting Arctic and Red Indian races. In all the arguments based on the assumed predominance of one uniform cranial type throughout the whole western hemisphere, the Arctic American, or Esquimaux, has invariably been excluded; and he has been regarded either as the exceptional example of an Asiatic intruder on the American continent, or as the hyperborean autochthones of the Arctic realm, as essentially indigenous there as the reindeer or the polar bear. An examination of Arctic crania, and a comparison of them with those of some of the most characteristic among the true Indian tribes, seems rather to suggest affinities and intermixture; while the same test applied to determine the amount of diversity among Indian races shows that they also intermingle very clearly defined elements of ethnical diversity. Dr. Latham, after commenting on the differences recognizable between the Esquimaux of the Atlantic and the Indians, adds: "It is not so with the Eskimos of Russian America and the parts that look upon the Pacific. These are so far from being separated by any broad and trenchant line of demarkation from the proper Indian, or the so-called Red race, that they pass gradually into it; and that in respect to their habits, manner, and appearance, equally. So far is this the case that he would be a bold man who should venture, in speaking of the southern tribes of Russian America, to say, Here the Eskimo area ends, and here a different area begins."* The diverse geographical conformation of the continent, which admits, on its western side, of frequent intercourse and consequent opportunities for intermixture of races, while, on its eastern side, the Esquimaux is entirely isolated, may account, in part, for the difference; but, in doing so, it also accounts for the amount of uniformity in the physical characteristics of tribes and nations separated by few geographical barriers, or well-defined limits, throughout the whole continent; but among whom, nevertheless, such marked cranial differences are found as the following table indicates. The mean of only four Mound crania is given, as they constitute in reality all of the authenticity of which I feel well assured; and, as their proportions are affected by artificial changes of form, the true characteristics of the ancient Mound-builders must be held as still depending on further evidence. The Cave crania, derived from an ancient cave at Steubenville, Ohio, and from the more celebrated Mammoth cave, Kentucky, are included in Table I.

TABLE X.—COMPARATIVE MEAN CRANIAL MEASUREMENTS.

		L. D.	P. D.	F. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
1	Mound Crania.....	6.57	5.90	4.20	5.55	15.60	4.40	14.00	19.83
2	Cave Crania.....	6.62	5.78	4.51	5.47	14.85	4.42	13.87	19.77
3	Peruvian B. C.....	6.32	5.62	4.06	5.18	14.96	4.12	13.27	19.10
4	Peruvian D. C.....	7.06	5.18	3.80	5.21	14.36	4.10	14.45	19.71
5	Mexican B. C.....	6.56	5.51	4.30	5.55	14.69	4.25	13.95	19.66
6	Mexican D. C.....	7.05	5.41	4.31	5.35	14.20	4.12	14.17	19.99
7	American B. C.....	6.62	5.45	4.24	5.30	14.63	4.25	13.85	19.44
8	American D. C.....	7.24	5.47	4.36	5.42	14.67	4.23	14.62	20.29
9	Iroquois.....	7.35	5.47	4.35	5.44	14.65	4.24	14.62	20.49
10	Algonquin.....	7.25	5.58	4.43	5.37	14.42	4.35	14.42	20.44
11	Algonquin-Lenapé.....	7.12	5.53	4.37	5.42	14.77	4.22	14.42	20.30
12	Esquimaux.....	7.28	5.22	4.31	5.46	14.48	4.18	14.82	20.42

The data from which the above results have been deduced are derived from the measurements of two hundred and eighty-nine skulls, along with the examination and comparison of a much larger number. A careful study of Peruvian

* *Varieties of Man*, p. 291.

crania seems to prove that both classes are small, indicating a people of inferior size and stature, and presenting essential differences, even in the brachycephalic class, from those of the mounds. Their small vertical diameter is specially noticeable. In this, as well as in other respects, the greater correspondence between the Mexican brachycephali and the Mound crania is suggestive, and calculated to increase our desire for the acquisition of a sufficient number of examples of both, whereby to test the evidence of physical correspondence between the elder races of Anahuac and the people who have left such remarkable evidences of a partially developed civilization in the Mississippi valley. The two extremes are the Peruvian brachycephali and the Esquimaux—

	Length.	Breadth.	Height.	O. F. arch.
Peruvian	6.32	5.62	5.18	13.27
Esquimaux	7.28	5.22	5.46	14.82

But between these the range of variations sufficiently illustrates the fallacy of the supposed uniform cranial type affirmed to prevail throughout the whole western hemisphere from the Arctic circle to Cape Horn.

If the data thus selected as examples of the different groups furnish any approximation to their relative cranial measurements, it seems scarcely possible to evade the conclusion that the ideal American typical head has no existence in nature, and that, if a line of separation between the Peruvian, or so-called Toltecian head, and other American forms is to be drawn, it cannot be introduced as heretofore to cut off the Esquimaux, and rank the remainder under varieties of one type, but must rather group the hyperborean American cranium in the same class with others derived from widely separated regions, extending into the tropics and beyond the equator. In reality, however, the results of such attempts at a comparative analysis of the cranial characteristics of the American races go far beyond this, and prove that the form of the human skull is just as little constant among the different tribes or races of the New World as of the Old; and that, so far from any simple subdivision into two or three groups sufficing for American craniology, there are abundant traces of a tendency of development into the extremes of brachycephalic and dolichocephalic or kumbecephalic forms, and again of the intermediate gradations by which the one passes into the other. A much larger number of examples would be required to illustrate all the intermediate forms, but sufficient data are furnished here to point in no unmi-takable manner to the conclusion indicated. If crania measuring upwards of two inches in excess in the longitudinal over the parietal and vertical diameters, or nearly approximating to such relative measurements—without further reference here to other variations of occipital conformation—may be affirmed, without challenge, to be of the same type as others where the longitudinal, parietal, and vertical diameters vary only by minute fractional differences; then the distinction between the brachycephalic and the dolichocephalic type of head is, for all purposes of science, at an end, and the labors of Blumenbach, Retzius, Nilsson, and all who have trod in their footsteps, have been wasted in pursuit of an idle fancy. If differences of cranial conformation of so strongly defined a character, as are thus shown to exist between various ancient and modern people of America, amount to no more than variations within the normal range of the common type, then all the important distinctions between the crania of ancient European barrows and those of living races amount to little, and the more delicate details, such as those, for example, which have been supposed to distinguish the Celtic from the Germanic cranium, the ancient Roman from the Etruscan or Greek, the Slave from the Magyar or Turk, or the Gothic Spaniard from the Basque or Morisco, must be utterly valueless. But the legitimate deduction from such a recognition, alike of extreme diversities of cranial form and of many intermediate gradations, characterizing the nations of the New World as well as of the Old, is not that cranial formation has no ethnic value,

but that the truths embodied in such physiological data are as little to be eliminated by ignoring or slighting all diversities from the predominant form, and assigning it as the sole normal type, as by neglecting the many intermediate gradations, and dwelling exclusively on the examples of extreme divergence from any prevailing type.

PART II.

DESIGNED AND UNDESIGNED SOURCES OF CHANGE IN CRANIAL FORMS.

Among the characteristics of the American typical cranium, as defined by the author of the *Crania Americana*, and deduced by others from the evidence accumulated in that valuable contribution to physical ethnology, considerable importance is attached to the flattened occiput, which was assumed by him to be a purely natural feature of the American race. While he recognizes the elongated type of head pertaining to certain tribes, as the Osages, Missouris, Mandans, and Blackfeet, he adds: "Even in these instances the characteristic truncature of the occiput is more or less obvious;" and in his latest definition of the specialties of the American skull, he remarks: "In fact, the flatness of the occipital portion of the cranium will probably be found to characterize a greater or less number of individuals in every existing tribe from Terra del Fuego to the Canadas." The celebrated Scioto Mound skull has already been described, and the artificial origin of its greatly flattened occiput referred to, which even Dr. Morton appears to have recognized as surpassing the limits of his supposed typical conformation. "Similar forms," he remarks, "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 nations." My own observations on American crania led me, at an early period, to adopt the opinion not only that such extreme examples of the vertical occiput as are seen in the Scioto Mound and the Barrie skulls, are the results of artificial pressure, but, as I remarked in 1857, when submitting my views on Dr. Morton's supposed American cranial type, to the ethnological section of the American Association for the Advancement of Science, it is 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.* The idea thus expressed received further confirmation from noticing the almost invariable accompaniment of such traces of artificial modification, with more or less inequality in the two sides of the head. In the extremely transformed skulls of the Flathead Indians, and of the Natchez, Peruvians, and other ancient nations by whom the same barbarous practice was encouraged, the extent of this deformity is frequently such as to excite surprise that it could have proved compatible with the healthful exercise of any vital functions. But now that the general subject of artificial compression of the human cranium begins to receive some degree of minute attention from craniologists, it becomes obvious that such changes wrought on the natural form of the head are by no means peculiar to the American continent, either in ancient or modern times. The Macrocephali were known to Hippocrates in the fifth century before the Christian era, as a people who elongated the heads of their infants by artificial means.

* Edin. Philosoph. Journal N. S., vol. vii, p. 24. Canadian Journal, vol. ii, p. 406.

Strabo, Pliny, and Pomponius Mela refer to various Asiatic localities where the same practice of moulding the head into favored abnormal forms was in use in their day; and repeated discoveries in modern times in the Crimea, in the Austrian valley of the Danube, and even in Switzerland, of similarly distorted crania, show how widely the practice had been followed in ancient times. The European examples have been generally referred to the Avarian Huns, but it affords a striking confirmation of the correspondence between the mode of practicing this barbarous process in the Old and the New World, that at the very time when the attention of Retzius and other European craniologists was specially directed to the subject, an American origin was assigned even to the European crania. Dr. Tschudi, guided by his extensive experience as a traveller, undertook to prove, in a memoir communicated to Müller's *Archiv für Anatomie*, that a skull found near Grafenegg, in Austria, and assigned by Professor Retzius to the Avars, was in reality an ancient Peruvian relic brought over in the sixteenth century, when the empire of Charles V. embraced both Austria and Peru in the same vast dominion. But repeated discoveries of similar artificially deformed crania, both on European and Asiatic sites, have placed beyond doubt that the very same processes of malformation practiced by the Peruvians, the Natchez, and by the barbarous tribes of Oregon, were in use among ancient European and Asiatic races. But the artificial changes of the human head are traceable to a variety of causes, all of which require to be maturely considered in order to rightly estimate the significance of national skull forms. These causes may be classified thus:

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 each of those causes I have directed some attention in different memoirs;* but I now propose to limit my remarks chiefly to one of the aspects of undesigned artificial compression in its relation to certain European skull forms. The influence of such causes in producing some peculiar features of the brachycephalic cranium found in ancient British barrows, was first suggested by me, in any accessible form, when pointing out the mistake into which Dr. Morton had fallen in supposing that the irregularity and unsymmetrical conformation observable in many skulls, but especially in those which have been subjected to any extreme amount of compression, is peculiar to American crania. The latter remark, I then observed, is too wide a generalization. I have repeatedly noted the like unsymmetrical characteristics in the brachycephalic crania of 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.† The idea thus expressed was founded on observations carried out for some years on the crania of Scottish tumuli in relation to the general archæology of the country, preparatory to the embodying of the whole in the "*Prehistoric Annals of Scotland*." Some of

* Edin. Philosoph. Journ. N. S., vol. vii, 24; xiv, 269. Canadian Journal, vol. ii, 406; vi, 414; viii, 76, 127. Athenæum, Sep. 20th, 1862. Prehistoric Man, vol. ii, 294.

† Canadian Journal, Nov., 1857.

the special views derived from the study of ancient Scottish crania, were submitted to the ethnological section of the British Association in 1850;* and the general facts and deductions in reference to their ethnical significance are embraced in one of the sections of the above-named work. The subject continued to occupy my attention so long as I remained in Scotland, and I availed myself of every opportunity for adding to the rare materials for its illustration. While thus engaged my attention was repeatedly drawn to the unsymmetrical proportions of ancient brachycephalic skulls, and to their peculiar truncated form, accompanied, as in the Mound skull of the Scioto valley, by an abrupt flattening of the occiput, which I soon began to suspect was due to artificial causes. Since then the facilities derived from repeated examinations of American collections have familiarized me not only with the extreme varieties of form of which the human head is susceptible under the influence of artificial compression, but also with the less-marked changes undesignedly resulting from such seemingly slight causes as the constant pressure of the Indian cradle-board. The examination and measurement of several hundred specimens of American crania, as well as of the living head in representatives of various Indian tribes, have also satisfied me not only of the existence of dolichocephalic and brachycephalic heads as tribal or national characteristics, but of the common occurrence of the same exaggerated brachycephalic form, accompanied with the vertical or obliquely flattened occiput, which had seemed to be characteristic of the crania of the Scottish tumuli. There are indeed ethnical differences apparent, as in the frontal and malar bones, but so far as the posterior region of the head is concerned, both appear to exhibit the same undesigned deformation resulting from the process of nursing still practiced among many Indian tribes.

The light thus thrown on the habits of the British mother of prehistoric times, by skull-forms found in ancient barrows, is replete with interest, from the suggestions it furnishes of ancient customs hitherto undreamt of. But it has also another and higher value to the craniologist, from its thus showing that some, at least, of the peculiar forms hitherto accepted as ethnical distinctions, may be more correctly traced to causes operating after birth.

The first example of this peculiar cranial conformation which attracted my attention, as possibly traceable to other causes than inherited characteristics, or natural deviations from the typical skull form of an extinct race, occurred on the opening of a stone cist at Juniper Green, near Edinburgh, on the 17th of May, 1851. A slight elevation probably marked the nearly levelled barrow which had long covered the catcomb and its enclosed memorials of a remote past, within sight of the Scottish capital. A shallow grave, formed of unhewn slabs of sandstone, enclosed a space measuring three feet eleven inches in length, by two feet one inch in breadth at the head, and one foot eleven 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 earth, as its site was higher than the surrounding 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 water-worn stone for its pillow; but from this it had fallen to the bottom of the cist, on its being detached by

* British Association Report, 1850, p. 142.

the decomposition of the fleshy 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. 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 many centuries before, and is now preserved along with the skull in the Scottish Museum of Antiquities.

As the peculiar forms of certain skulls, such as one described by Dr. Thurnam, from an Anglo-Saxon cemetery at Stone, in Buckinghamshire,* and another from an Indian cemetery at Montreal, in Lower Canada,† as well as those of numerous distorted crania, from the Roman site of Uriconium and other ancient cemeteries, have been ascribed to posthumous compression: the precise circumstances attendant on the discovery of the Juniper Green cist are important, from the proof they afford that the body originally deposited within it, had lain there undisturbed and entirely unaffected by any superincumbent pressure from the day of its interment. Two, if not three, classes of skulls have been recovered from early British graves. One with a predominant longitudinal diameter, in the most marked examples differs so essentially in its elongated and narrow forehead, and occiput from the modern dolichocephalic head, that I was early led to assign to it a separate class under the name of kumbecephalic or boat-shaped.‡ Another has the longitudinal diameter little in excess of the greatest parietal breadth. In its general proportions, its occipital formation, and even in some of its facial developments, it presents analogies to the American brachycephalic skull; though it lacks the characteristic flattened and receding forehead. This British brachycephalic skull occupies an intermediate place in its relative proportions among ancient British crania, and is no less strikingly distinguished from the prevailing modern head, whether of Celtic or Saxon aëas, by its shortness, than the other is by its length, when viewed either in profile or vertically. The Anglo-Saxon type of skull appears to be intermediate between those two forms, with a more symmetrical oval, such as is of common occurrence in modern English heads.

The significance of the skull-forms of ancient British graves has been studied with intelligent zeal in recent years; and the discovery of essentially distinct types, suggests the inquiry as to traces of the existence of older races in Britain than the Celtæ found in occupation of the islands at the period of Roman invasion. The result of my own observations on such examples of ancient British crania as were accessible to me, before the interruption of my researches in this department of craniology, by my removal to Canada, 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 characterized 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 truncated 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

* *Crania Britannica*, Dec. I. p. 38.

† *Edin. Philosoph. Journal*, N. S. XVI. p. 269.

‡ *Prehistoric Annals of Scotland*, pp. 169, 177.

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 archaeologist, 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 Antécédentaires* of M. Blancher 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 pre-glacial 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. Since then, however, the labors of intelligent students of science have been rewarded by large and valuable additions to the materials required for determining the questions dependent on craniological research; and special gratitude is due to Dr. J. Barnard Davis and Dr. Thurnam, who have accomplished in their admirable *Crania Britannica* the same accumulation of the requisite data for Britain which Dr. Morton had previously done for America.

With the materials thus furnished for application to the purposes of the ethnologist, the question has naturally been revived as to the true typical form of the Celtic cranium, and the possibility of reconciling the existence of such diverse forms as have already been referred to with the assumed aboriginal character of the Celtæ, and the assignment of all crania of an older date than the Roman period to that race. Besides the Saxon skull, with its tribal variations, including, as Dr. J. B. Davis conceives, the peculiar low and broad form to which he has given the name of platycephalic, there are, as already stated, two forms, the one as much shorter as the other is longer and higher than the average Saxon skull; both of which, on the theory of a primary Celtic aborigines, must be included among varieties of the same ethnical group.

If cranial conformation has any significance, it appears to me inconceivable that two such extreme forms can pertain to the same race; and the circumstances under which the most characteristic examples of the opposite types have been found, confirm me in the belief which I advocated when the evidence was much less conclusive, that the older dolichocephalic or kumbecephalic skull illustrates the physical characteristics of a race which preceded the advent of the Celæ in Britain, and gradually disappeared before their aggressions. As, however, the opposite opinion is maintained by so high an authority as Dr. J. Barnard Davis, the comparison of the following measurements, illustrative of the three types of head, will best exhibit the amount of deviation in opposite directions from the intermediate form. No. 1, like the majority of the same class, is derived from a megalithic chambered barrow, and has been selected by Dr. Davis as a characteristic example of the class to which it belongs;‡ though, according to him, that is one of aberrant deviation from the typical British form. No. 2, obtained from a barrow at Codford, in Wiltshire, has also been selected by Dr. Davis as

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

† *Archæology and Prehistoric Annals of Scotland.*

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

one of three typical British crania. It is of the same type as the Juniper Green skull, and its strongly marked characteristics are thus defined by him: "Its most interesting peculiarities are its small size, and its decidedly brachycephalic 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 expressed in so marked a manner."* No. 3 is a skull from an Anglo-Saxon cemetery near Litlington, Sussex, one of two of which Dr. Davis remarks: "There is a general indication of good form in these fine capacious skulls, which is apparent in every aspect. . . . On a review of the whole series of Anglo-Saxon crania which have come under our notice, we are led to conclude that this pleasing oval, rather dolichocephalic form, may best be deserving the epithet of typical among them."† All the three examples are male skulls. The measurements embrace the longitudinal frontal, parietal and occipital diameters, with the parietal height and the horizontal circumference:

	L. D.	F. D.	P. D.	O. D.	P. H.	H. C.
1. Uley chambered Barrow skull.....	8.1	4.7	5.7	5.	5.1	21.7
2. Codford skull.....	6.8	4.6	5.7	5.1	4.7	20.
3. Litlington skull.....	7.5	4.7	5.3	4.6	4.9	20.9

Each of the above examples presents the features of the type to which it belongs with more than usual prominence, so that if the mean of a large series were taken, the elements of difference between the three would be less strongly defined. The differences are, however, those on which their separate classification depends; and they thus illustrate the special points on which any craniological comparison for ethnological purposes must be based. Of the three skulls, the era and race of one of them (No. 3) are well determined. It is that of a Saxon, probably of the seventh or eighth century, of the race of the South Saxons, descended from Ælla and his followers, and recovered in a district where the permanency of the same ethnic type is illustrated by its predominance among the rural population at the present day. Another of the selected examples (No. 2) is assumed by Dr. Davis, perhaps on satisfactory grounds, to be an ancient British, *i. e.*, Celtic skull. It is, indeed, a difficulty, which has still to be satisfactorily explained, how it is that if this brachycephalic type be the true British head-form, no such prevalence of it on modern Celtic areas is to be found, as in the case of Saxon Sussex connects the race of its ancient Pagan and Christian cemeteries, by means of the characteristic ovoid skull, with the Anglo-Saxon population of the present day. The historical race and era with which Dr. Davis appears to connect the Barrow-builders of Wiltshire, is thus indicated in the *Crania Britannica*: "Region of the Belgæ, Temp. Ptolemæi, A.D. 120." The Belgæ of that era—then apparently comparatively recent intruders, and by some regarded as not Celtic but Germanic—were displaced, if not exterminated; but the modern Britons of Wales are undoubted descendants of British Celts of Ptolemy's age. Though doubtless mingling Saxon and Norman with pure British blood, they probably preserve the native British type as little modified by foreign admixture as is that of its supplanters in the most thoroughly Saxon or English districts of England. It is, therefore, a question of some importance how far the extreme brachycephalic proportions of the so-called British type may be traceable to other than inherited ethnical characteristics; whether, in fact, it is not entirely due to the undesigned flattening of the

* *Crania Britannica*, Dec. ii, pl. 14.

† *Crania Britannica*, Dec. iv, pls. 39, 40.

occiput, and lateral expansion of the brain and skull, consequent on the use of the cradle-board.

Meanwhile, turning from this supposed British skull of Roman times to the one derived from Uley chambered barrow, (No. 1,) the most ancient of the series, and assuming their chronological order to be undisputed, as it appears to be, we find no gradation from an abbreviated to an elongated form, but, on the contrary, an extreme brachycephalic type interposed between the ovoid dolichocephalic Anglo-Saxon or Christian era and the extreme dolichocephalic or kumbecephalic one belonging to a period seemingly so remote that Dr. Thurnam, when noting the recurrence of the same type in another chambered barrow at Littleton Drew, Wiltshire, remarked: "It is not necessary to admit the existence of any pre-Celtic race, as the skulls described may be those of Gaelic, as distinguished from Cymric, Celts; or the long headed builders of these long, chambered, stone barrows, may have been an intrusive people, who entered Britain from the southwest. Can they have been some ancient Iberian or Ibero Phœnician settlers?"*

By whatever theory the difference is ultimately accounted for, it is manifestly one of a nature well calculated to suggest Iberian, Phœnician, Finnic, or any other diverse origin for the older race, rather than to admit of the belief of Celtic affinities for it, if the brachycephalic be the true British form. The divergence from the intermediate form, it will be seen, exceeds that of the extreme varieties already referred to among American crania, even when the exceptional Esquimaux mean is included, as in the following comparative proportions:

	L. D.	F. D.	P. D.	V. D.	I. A.	I. L.	O. F. A.	H. C.
Scioto mound skull	6.50	4.50	60.0	6.20	16.00	4.50	13.80	19.80
Barrie skull	6.60	5.20	64.0	5.30	16.00	4.60	14.40	20.70
Huron mean	7.40	4.35	54.3	5.43	14.66	4.23	14.65	20.48
Esquimaux mean	7.28	4.31	52.2	5.46	14.48	4.18	14.82	20.43

If no artificial element were 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 to which, as has been shown, both appear to have been subjected, it is scarcely conceivable that any amount of artificial deformation could be employed to transform the long, narrow, and high Esquimaux cranium into either form. The markedly brachycephalic proportions of each are traceable in part to the parieto-occipital flattening; but the symmetrical uniformity which characterizes both proves that they are only modified examples of naturally short and broad crania. But the vertical or obliquely flattened occiput, which even Dr. Morton recognized as, in its extreme manifestations, traceable to artificial compression, is by no means peculiar to the New World; and the importance of determining whether it is to be regarded as an ethnical characteristic, or merely an artificial result of external influences applied designedly or in the practice of some common usage, will be apparent when its prevalence has been recognized. Meanwhile, the suggestion of Dr. Thurnam, that the long-headed race of the British isles may possibly be traceable to Iberian or Phœnician intruders, invites attention to whatever materials may be available for the determination of the skull-forms of those ancient races.

Among the rarer crania of the Morton collection is one to which a peculiar interest attaches, and which may possibly have some significance in reference to this inquiry. Its history is thus narrated in Dr. Henry S. Patterson's Memoir

* *Crania Britannica*, Dec. iii, pl. 24, (4.)

of Dr. Morton: During a visit of Mr. Gliddon to Paris, in 1846, he presented a copy of the *Crania Ægyptiaca* to the celebrated oriental scholar, M. Fresnel, and excited his interest in the labors of its author. Upwards of a year after he received, at Philadelphia, a box containing a skull, forwarded from Naples, but without any information relative to it. "It was handed over to Morton," says Dr. Patterson, "who at once perceived its dissimilarity to any in his possession. It was evidently very old, the animal matter having almost entirely disappeared. Day after day would Morton be found absorbed in its contemplation. At last he announced his conclusion. He had never seen a Phœnician skull, and he had no idea where this one came from; but it was what he conceived a Phœnician skull should be, and it could be no other."* Six months afterwards Mr. Gliddon received, along with other letters and papers forwarded to him from Naples, a slip of paper, in the handwriting of M. Fresnel, containing the history of the skull, which had been discovered by him during his exploration of an ancient tomb at Malta. Dr. Meigs refers to this in his catalogue of the collection, (No. 1352.) as an illustration of the "wonderful power of discrimination, the *tactus visus*, acquired by Dr. Morton in his long and critical study of craniology." Such was my own impression on first reading it; but I confess the longer I reflect on it the more am I puzzled to guess by what classical or other data, or process short of absolute intuition, the ideal type of the Phœnician head could be determined. I suspect, therefore, if we had the statement of Dr. Morton's own words, it would fall short of such an absolute craniological induction. The following is the sole entry made by him in his catalogue: "Ancient Phœnician? I received this highly interesting relic from M. S. Fresnel, the distinguished French archaeologist and traveller, with the following memorandum, A. D. 1847:—Crâne provenant des caves sépulchrales de Ben-Djemma, dans l'île de Malte. Ce crâne paraît avoir appartenu à un individu de la race qui, dans les temps les plus anciens, occupait la côté septentrionale de l'Afrique, et les îles adjacentes." The sepulchral caves of Ben-Djemma are a series of galleries with lateral chambers or catacombs hewn in the face of the cliffs on the southwest side of the island of Malta. Other traces besides the rock-hewn tombs indicate the existence of an ancient town there, although no record of its name or history survives. M. Frédérick Lacroix remarks, in his *Malte et le Goze*, "Whoever the inhabitants of this city may have been, it is manifest from what remains of their works that they were not strangers to the processes of art. The sepulchral caves, amounting to a hundred in number, receive light by means of little apertures, some of which are decorated like a finished doorway. In others, time and the action of the humid atmosphere have obliterated all traces of such ornaments, and left only the weathered rock. . . . The chambers set apart for sepulture are excavated at a considerable distance from the entrance, in the inmost recesses of the subterranean galleries. The tombs are of admirable design and style of art, and the details of their execution exhibit remarkable ingenuity and purity of taste. The author of the *Voyage Pittoresque de Sicile* does not hesitate to declare that they surpass in elegance any that he has seen executed on the same scale. What hand has hewn out these gloomy recesses in the rock? To that we can give no reply. The chronicles of Malta are silent on this point. Time has defaced the vestiges which might otherwise have helped to the solution of the problem."†

Other and very remarkable remains of antiquity abound in Malta and the neighboring island of Goza, including the cyclopean ruins styled *La tour des Géants*, which have also been assigned by some writers to a Phœnician or Punic origin, as a temple dedicated to Astarte; and the *Tadarnadur Iskira*, a megalithic structure for which a Pelasgic origin is assumed. But in drawing any comparison between the chambered galleries of Ben-Djemma and the megalithic

* Memoir of Samuel G. Morton, p. xl.

† *Malte et le Goze*, p. 21.

chambered barrows or cairns of the British Islands, we are at best reasoning from the little known to the less known indices of prehistoric races; between which the points in common may amount to no more than those which admit of a comparison being drawn between the Brachycephali of the British Stone-Period, and the corresponding physical form and rude arts of American grave-mounds.

Nevertheless the Ben-Djemma skull in the Mortonian collection is not improbably what it has been assumed it to be; and it is in many respects a remarkable one. A deep indentation at the nasal suture gives the idea of an overhanging forehead, but the superciliary ridges are not prominent, and the peculiar character of the frontal bone is most strikingly apparent in the vertical view, where it is seen to retreat on either side, almost in a straight line from the centre of the glabella to the external angular processes of the frontal bone. The contour of the coronal region is described by Dr. Meigs as "a long oval, which recalls to mind the kumbecephalic form of Wilson."* It is of more importance, perhaps, to note that the remarkable skull recovered by Dr. Schmerling, from the Engis Cavern, on the left bank of the Meuse, buried five feet in a breccia, along with the tooth of a rhinoceros and other fossil bones, appears to be of the same elongated dolichocephalic type. Its frontal development is long and narrow; and its greatest relative proportion, in length and breadth, are 7.7 by 5.25 inches, so that it closely corresponds in those respects to the most characteristic British kumbecephalic crania."†

Whatever be the final conclusion of ethnologists as to the evidence which led me to adopt that name to indicate the characteristics of a pre-Celtic British race, the necessity appears to be acknowledged for some term to distinguish this form from the ordinary dolichocephalic type. The Ben-Djemma skull is narrow throughout, with its greatest breadth a little behind the coronal suture, from whence it narrows gradually towards front and rear. The lower jaw is large and massive, but with less of the prognathous development than in the superior maxillary. The skull is apparently that of a woman. The nose has been prominent; but the zygomatic arches are delicate, and the whole face is long, narrow, and tapering towards the chin. The parietals meet at an angle, with a bulging of the sagittal suture, and a slight but distinctly defined pyramidal form, running into the frontal bone. The occiput is full, round, and projecting a little more on the left side than the right. The measurements are as follows:

Longitudinal diameter.....	7.4
Parietal diameter.....	5.1
Frontal diameter.....	4
Vertical diameter.....	5.3
Intermeatoid arch.....	12.3
Intermastoid arch.....	15 (?)
Intermastoid line.....	4.3(?)
Occipito-frontal arch.....	14.2
Horizontal circumference.....	20.2

I have been thus particular in describing this interesting skull, because it furnishes some points of comparison with British kumbecephalic crania, bearing on the inquiry whether we may not thus recover traces of the Phœnician explorers of the Cassiterides in the long-headed builders of the chambered barrows. When contrasting the wide and nearly virgin area with which Dr. Morton had to deal, with that embraced in the scheme of the *Crania Britannica*, I remarked in 1857:—Compared with such a wide field of investigation, the little island home of the Saxons may well seem narrow ground for exploration.

* Catalogue of Human Crania in the Academy of Nat. Sciences of Philadelphia, p. 29.

† Lyell's *Antiquity of Man*, p. 81.

But to the ethnologist it is not so. There, amid the rudest traces of primeval arts, he seeks, and probably not in vain, for the remains of primitive European allophylicæ. There it is not improbable that both Phœnicians and early Greek navigators have left behind them evidences of their presence, such as he alone can discriminate.* The Phœnicians stand, for northern Europe, as the oldest of all the ancient civilized nations of the world, to whom its seas, ports, and mineral treasures were known. Not unnaturally, therefore, there is a disposition to turn to them as a means of explaining all mysteries. Professor Nilsson, in the new edition of his *Skandinaviska Nordens Urinvånare*, ascribes to a supposed Phœnician occupation of the North the whole of the characteristic works of art of its Bronze period; and the temptation is still stronger for the British archæologist and craniologist to resort to a similar theory. The intercourse between Phœnicia and the ancient Cassiterides, by indirect, if not by direct, traffic, is undisputed. But the evidence of any Phœnician settlements in Britain rests on inferences from very vague allusions; and Sir George Cornwall Lewis has done his best to invalidate them. Summing up the results of his inquiry as to the nature of the classical evidence in favor of the Phœnicians having directly traded with Britain for its mineral wealth, and especially its tin, he remarks: "On the whole, the accounts preserved by the Greek and Latin writers lead to the inference that the tin supplied in early times to the nations in the east of the Mediterranean came by the overland route across Gaul, and that the Phœnician ships brought it from the mouth of the Rhone, without sailing as far as Britain."† British antiquaries will not willingly adopt such an opinion; but it serves at any rate to indicate how slight is the evidence on which to base any theory of a Phœnician origin for the ancient long-headed kumbecephali of the British Isles. Moreover, such a theory, in so far as it has any craniological basis, rests only on the recognition of the general analogy of form between certain British crania and the supposed Punic one brought from Malta; while it derives no confirmation from the discovery of works of art in the chambered barrows, or other sepulchres of the long-headed British race, such as can be ascribed to a Phœnician origin, or indicate any trace of Punic influence.

But there is another and more important aspect of the question. Before we can abandon ourselves to the temptations which the Punic theory offers, it has to be borne in remembrance that it is still disputed with reference to this class of British dolichocephalic crania. Are they examples of an essentially distinct type, preserving evidence of the characteristics of a different race, or are they mere exceptional aberrant deviations from the supposed brachycephalic Celtic or British type? Much stress is laid on the fact that the two forms of skull have occasionally been recovered from the same barrow; from which it may be inferred that the two races to which I conceive them to have belonged were, for a more or less limited period, contemporaneous. More than this I cannot regard as a legitimate induction from such premises, in relation to crania of such extremely diverse types. But this amounts to little, for the same is undoubtedly true of the ancient British and the modern Anglo-Saxon race; and the discovery of Celtic and Saxon skulls in a common barrow or tumulus of the 6th century is no proof that the latter race was not preceded by many centuries in the occupation of the country by the Britons, among whom they then mingled as conquerors and supplanted.

But the elongated skulls of the Uley barrow type are no rare and exceptional forms. They have been most frequently found in tombs of a peculiar character, designated chambered barrows, from the galleries and catacombs of large unhewn stones which they contain. To these tombs archæologists are unani-

* Canadian Journal, vol. ii, p. 445.

† Historical Survey of the Astronomy of the Ancients, p. 455.

mous in assigning great antiquity. The late Mr. Thomas Bateman, of Lomerdale House, Derbyshire, soon after the publication of my first views relative to the pre-Celtic era of the long-headed race, or kumbecephali of Scotland, stated that in the Derbyshire long barrows, explored by him, "the boat-shaped skull had uniformly been found, 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 confirmation; and, in his "Ten Years' Diggings in Celtic and Saxon Grave Hills," published in 1861, much additional evidence is produced. In describing some remarkable disclosures in Longlow barrow, he 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, inclosing 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 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."† In the majority of cases the like imperfection has prevented more than the deduction of such general correspondence. Nevertheless, the number already obtained in a sufficiently perfect state to admit of detailed measurement is remarkable, when their great age and the circumstances of their recovery are fully considered. Of this the following enumeration will afford satisfactory proof. Only two perfect crania from the chambered tumulus of Uley, in Gloucestershire, of which the proportions of one are cited above, have been preserved. But, in the later search of Mr. Freeman and Dr. Thurnam, in 1854, the fragments of eight or nine other skulls were recovered, and of these the latter remarks: "The fragments are interesting, as proving that the characters observed in the more perfect crania were common to the individuals interred in this tumulus. Three or four calvaria are sufficiently complete to show that in them likewise the length of the skulls had been great in proportion to the breadth."‡ Again, in the megalithic tumulus of Littleton Drew, North Wilts, at least twenty-six skeletons appear to have been found, from several of which imperfect crania were recovered, and of those Dr. Thurnam remarks: "Eight or nine crania were sufficiently perfect for comparison. With one exception, in which a lengthened oval form is not marked, they are of the dolichocephalic class."§ So also the four nearly perfect skulls from West Kennet are described as "more or less of the lengthened oval form, with the occiput expanded and projecting, and presenting a strong contrast to skulls from the circular barrows of Wilts and Dorset."|| To these may be added those of Stoney Littleton, Somersetshire, first pointed out by Sir R. C. Hoare;¶ and examples from barrows in Derby, Stafford, and Yorkshire, de-

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

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

‡ *Archæol. Journal*, vol. xi, p. 313. *Crania Britannica*, Dec. I, pl. 5, (5.)

§ *Crania Britannica*, Dec. III, pl. 24, (3.)

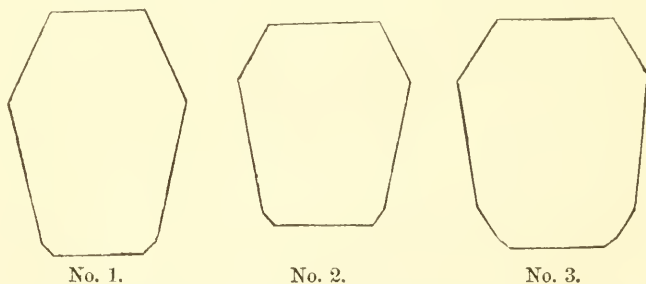
|| *Ibid.*, Dec. V, pl. 50, (4.)

¶ *Archæologia*, vol. xix, p. 47.

scribed by Mr. Thomas Bateman in his "Ten Years' Diggings in Celtic and Saxon Grave Hills;" including those from Bolehill, Longlow, and Ringham Low, Derbyshire; from the galleries of the tumulus on Five Wells Hill; and from the Yorkshire barrow, near Heslerton-on-the-Wolds. Several of the above contained a number of skulls, and, of the last, in which fifteen human skeletons lay heaped together, Mr. Bateman remarks: "The crania that have been preserved are all more or less mutilated, but about six remain sufficiently entire to indicate the prevailing conformation to be of the long or kumbecephalic type of Dr. Wilson."* The crania occurring in graves of this class, mentioned by Mr. Bateman alone, exceed fifty in number, of which the majority are either of the elongated type or too imperfect to be determined. The others include between thirty and forty well-determined examples, besides a greater number in too imperfect a state to supply more than indications of their correspondence to the same characteristic form. Alongside of some of these are also found brachycephalic crania; but, in the most ancient barrows, the elongated skull appears to be the predominant, and, in some cases, the sole type; and of the examples found in Scotland, several have been recovered from peat bogs, or others under circumstances more definitely marking their great antiquity.

The variations of cranial form are thus, it appears, no gradual transition, or partial modification, but an abrupt change from an extreme dolichocephalic to an extreme brachycephalic type; which, on the intrusion of the new and essentially distinct Anglo-Saxon race, gives place once more to a dolichocephalic form of medium proportions. The three forms may be represented, reduced to an abstract ideal of their essential diversities, by means of the following diagrams: No. 1, the kumbecephalic head of the chambered barrows; No. 2, the dolichocephalic, or supposed British type; and No. 3, the ovoid Anglo-Saxon head, still predominant.

Fig. 5.



Leaving, meanwhile, the consideration of the question of distinct races indicated by such evidence, it will be well to determine first if such variations of skull-form can be traced to other than a transmitted ethnical source. One of these, No. 2, presents many unmistakeable analogies to the most common American form; in so much so that, before I was familiar with the latter, otherwise than through the pages of the *Crania Americana*, I selected two of the most characteristic brachycephalic crania figured and described there, as the fittest for illustrating the typical characteristics of the Scottish skulls of short longitudinal diameter.† Of the same characteristic brachycephalic form the Barrie skull, (Fig. 6,) is a well defined example. 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 increasing the flattened occiput had long since been

* *Ten Years' Diggings in Celtic and Saxon Grave Hills*, p. 230.

† *Prehistoric Annals of Scotland*, p. 167.

pointed out by Dr. Morton: the peculiar contour of the Barrie skull excited no more notice than the recognition of it as 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.



Fig. 6.



Fig. 7.

Of this form the Juniper Green skull, previously referred to as discovered in the immediate vicinity of Edinburg, is a striking example. It has been engraved the full size in the *Crania Britannica*, and, as will be seen, it presents in profile the square and compact proportions characteristic of British brachycephalic crania. It also exhibits, in the vertical outline, the truncated wedge form of the type indicated in Fig. 5, No. 2. In the most strongly marked examples of this form, the vertical or flattened occiput is a prominent feature, accompanied generally with great parietal breadth, from which it abruptly narrows at the occiput. The proportions of this class of crania were already familiar to me before the discovery of the Juniper Green example, but it had not before occurred to me to ascribe any of their features to other than natural causes. But the circumstances attending its exhumation gave peculiar interest to whatever was characteristic in the skull and its accompanying relics, handled for the first time as evidences of the race and age of the freshly opened cist, discovered almost within sight of the Scottish capital, and yet pertaining to prehistoric times. This interesting skull was deposited in the Museum of the Scottish Antiquaries, along with the urn which had lain beside it in the rude cist, and I accompanied its presentation with the first expression of my suspicion—for it scarcely then amounted to more—that the flattened occiput was due to some artificial compression, by means of which the abbreviated form so common in crania of the Scottish tumuli had been exaggerated if not entirely produced.

Another skull in the same collection, found under somewhat similar circumstances in a cist at Lesmurdie, Banffshire, has the vertical occiput accompanied by an unusual parietal expansion and want of height, suggestive of the idea of a combined coronal and occipital compression.* A third Scottish skull, procured from one of a group of cists near Kinaldie, Aberdeenshire, also exhibits the posterior vertical flattening. But a more striking example than any of those appears in the one from Codford, South Wiltshire, selected here to illustrate this type. Dr. Davis remarks, in his description of it: "The zygomatic arches are

* Vide *Crania Britannica*, Dec. II plate 16.

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 entire parieto-occipital region presents in profile an abrupt vertical line; but, when viewed vertically, it tapers considerably more towards the occiput than is usual in crania of the same class.

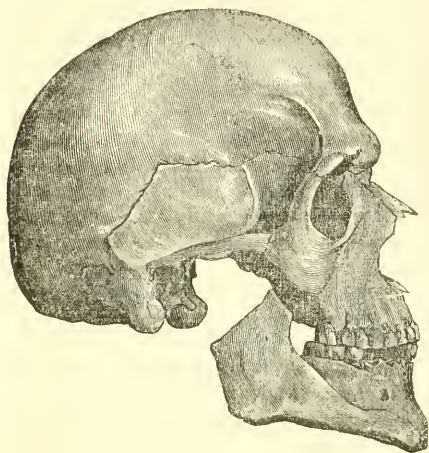


Fig. 8.

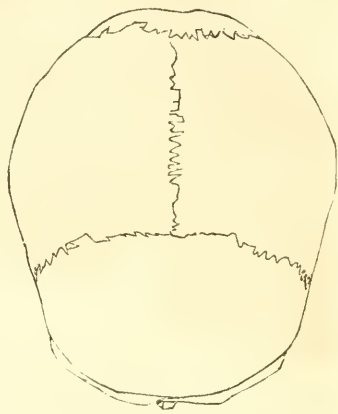


Fig. 9.

A comparison of this skull, recovered from an ancient British grave, with the one obtained in an Indian ossuary in Barrie, in Upper Canada, shows the squarer form of the British skull, when seen in profile, dependent in part on the more elevated and well arched frontal bone. But, in the vertical view, the Indian skull shows its extreme brachycephalic character; being at once shorter and broader than the British one, though the latter is one of the most strongly marked of its class. The vertical character of the occiput is also strikingly displayed. In other examples the flattening chiefly affects the parietal bones extending in an oblique line towards the coronal suture.

The origin of both, as artificial forms superinduced on a naturally short and broad type of skull, I feel no hesitation in believing to be traceable to the same kind of rigid cradle-board as is in constant use among many of the Indian tribes of America, and which produces precisely similar results. Its mode of operation, in effecting the various forms of oblique and vertical occiputs, will be best considered when describing some of the phenomena of compressed Indian crania; but another feature of the Juniper Green skull, which is even more obvious in that from Lesmurdie, in the same collection, is an irregularity amounting to a marked inequality in the development of the two sides. This occurs in skulls which have been altered by posthumous compression; but the recovery of both the examples referred to from stone cists precludes the idea of their having been affected by the latter cause; and since I was first led to suspect the modification of the occiput, and the exaggeration of the characteristic proportions of British brachycephalic crania by artificial means, familiarity with those of the Flathead Indians, as well as other ancient and modern artificially distorted American crania, has led me to recognize in them the constant occurrence of the same unsymmetrical inequality in opposite sides of the head.

The inequality in the development of the opposite sides of the above skulls belongs to the same class of deformations as the well-known distortions produced

on many American crania, both by the undesigned action of the cradle-board, and by protracted compression purposely applied with a view to change the form, merits the careful attention of craniologists. 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 frequent, 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 Flatheads, 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 in the same direction. It is surprising, indeed, to how great an extent such unsymmetrical irregularity is found to prevail, when once the attention has been drawn to it. The only example of the Greek head possessed by Dr. Morton was a cast presented to him by Dr. Retzius, and which, from its selection by the distinguished Swedish craniologist for such a purpose, might reasonably be assumed to illustrate the Greek type. It is accordingly described by Dr. J. Airken Meigs, in his "*Cranial Characteristics of the Race of Man*," as very much resembling that of Constantine Demetriades, a Greek native of Corfu, and long a teacher of the modern Greek language at Oxford, as engraved in Dr. Prichard's *Researches*. Its cranial characteristics are thus defined in the Catalogue of the Mortonian Collection, (No. 1354.) "The calvarial region is well developed, the frontal line expansive and prominent, the facial line departs but slightly from the perpendicular." On recently visiting Philadelphia for the purpose of renewed examination of its valuable collections, I was surprised to find this head—instead of being either oval, or, as Blumenback describes the example selected by him, sub-globular—presenting the truncated form, with extreme breadth at the parietal protuberances, and then abruptly passing to a flattened occiput. It measures 6.5 longitudinal diameter; 5.7 parietal diameter; and 19.2 horizontal circumference. But the most noticeable feature is the great inequality of the two sides. The right side is less tumid than the left, while it projects more to the rear, and the whole is fully as unsymmetrical as many American crania. Were it not that this feature appears to have wholly escaped Dr. Morton's attention, as he merely enters it in his catalogue as a "cast of the skull of a young Greek: Prof. Retzius," I should be tempted to suppose it had been purposely sent to him to illustrate the phenomena of unsymmetrical development, and of the influence of ill-contrived artificial causes on other crania besides those of the New World.

The strongly marked deformation of many flattened Indian skulls so clearly separates them as a class from all others, including those modified by partial or undesigned compression, as in the British examples referred to, that the very familiarity with the former is calculated to lead the American craniologist to overlook the artificial source of slighter changes. Nevertheless, Dr. Morton was not unobservant of such indications of the frequent dissimilarity between opposite sides of the skull, nor did he entertain any doubt as to its cause when occurring as the accompaniment of other artificial changes, though he entirely overlooked its more general prevalence. When first noticing the probable origin of the flattened occiput of certain British skulls, I drew attention to the fact that he had already recognized undesigned artificial compression as one source of abnormal cranial conformation, and that he accompanied its demonstration with a reference to the predominant unsymmetrical form in all such skulls. "This irregularity," he observes, "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, and, as I conceive, also in the Greek skull of Retzius. The study of the latter skull-form has tended to confirm my belief that the extreme abbreviated proportions of many naturally brachycephalic crania are due to artificial causes. Wherever a very noticeable inequality exists between the two sides of a skull, it may be ascribed with much probability to the indirect results of 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.

But besides the practices referred to, many minor causes tend to produce peculiar forms and irregularity of development in the human head. Among those, I have become familiar with a number of cases, where, owing to the inability of the mother to suckle her child at one breast, the constant pressure in one direction which this led to has produced a marked flattening on the corresponding side of the child's head, with tumid expansion on the other. The mere practice of the nurse constantly carrying the child on one arm, or systematically laying it to sleep on one side, must have a tendency to produce similar results; for the bones of the infant's head during the first year are exceedingly soft and pliable, and, as the processes pursued by the Flathead Indians show, may be moulded into almost any form by moderate pressure. 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 also renders the infant head liable to many undesigned changes of form. The obstetric practitioner is also familiar with the extreme deviations from the normal or congenital form of head produced at birth, where instruments have to be used; but which, from the plastic condition of the bones, speedily disappear, or are greatly modified by the growth of the brain.

In connexion with this branch of the subject the following 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 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 neighboring tribe characterized 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 favorite form was perpetuated by ordinary generation. To have rendered the observations complete, however, it would have been desirable to have had a further report on the shape of the infant's head some time after birth, so as to determine if it were entirely due to the inherited typical head-form of the mother's tribe, and not to an unusual amount of compression incident to the circumstances of its birth.

When the pressure is not, as in the processes operating at birth, temporary, but continuous or repeatedly applied in the same direction, at brief intervals, as in nursing entirely at one breast, a want of uniformity is certain to result. The dissimilarity in the two sides of the head is strongly marked in Flathead skulls which have been subjected to great compression. This 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 noticeable 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.

Irregular head-forms are so much concealed by the hair and head-dress that it is only in very marked cases they attract the attention of ordinary observers. But, as I have shown in former publications on this subject,† they are familiar to hat-makers, and frequently include extremely unsymmetrical developments and great inequality in opposite sides of the head. A modern skull in the collection of Dr. Struthers, of Edinburgh, exhibits an interesting combination of the proportions of the ancient brachycephalic type, with unsymmetrical conformation. It measures 7.5 longitudinal diameter, 6.5 parietal diameter, 21.4 horizontal circumference, and its greatest breadth is so near the occiput that the truncated form observable in the vertical view of many ancient British crania is produced in its most marked character by the abrupt flattening immediately behind the parietal protuberances, accompanied with inequality in the two sides of the head. It was obtained from a grave-digger in Dundee, who stated it to be that of a middle-aged female whom he had known during life. There was nothing particular about her mental development.

The novel forms thus occurring in modern heads, though chiefly traceable, as I believe, to artificial causes, are not the result of design. But the same is true of the prevalent vertical and obliquely flattened occiput of many ancient and modern American crania, as well as of the British brachycephalic class already described. Nor are such changes of the natural form necessarily limited to skulls of short longitudinal diameter, in which this typical characteristic is exaggerated by the pressure of the cradle-board in infancy. Now that this source of modification begins to receive general recognition among craniologists, its influence is assumed as a probable source of the most diverse aberrant forms. Dr. Thurnam, when referring to two skulls of different shapes, recovered from the same group of British barrows, of "a somewhat late though pre-Roman

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

† *Prehistoric Man*, vol. ii, p. 312; *Canadian Journal*, vol. vii, 414.

period," on Roundway hill, North Wiltshire, thus indicates their contrasting characteristics, and suggests the probable source of such divergence from the supposed British type: "The general form of the cranium (pl. 43) differs greatly from that from the adjoining barrow, (pl. 42.) That approaches an acrocephalic, this a platycephalic form; that is eminently brachycephalic, this more nearly of a dolichocephalic character. As the eye at once detects, the difference is much greater than would be inferred from a mere comparison of the measurements. The respective peculiarities of form in the two skulls may possibly be explained by supposing that both have been subject to artificial deformation, though of a different kind—the one appearing to have been flattened on the occiput, the other showing a depression immediately behind the coronal suture, over the parietal bones, which seems to indicate that this part of the skull was subject to some habitual pressure and constriction, perhaps from the use of a bandage or ligature tightly bound across the head and tied under the chin, such as to this day is employed in certain parts of the west of France, producing that form of distortion named, by Dr. Gosse, the *sincipital*, or *tête bilobée*."*

The gradual recognition of this secondary source of undesigned artificial changes in the form of the skull may be traced through various works, from the vague perception of its occasional influence on the occipital form of American crania, indicated by Dr. Morton, to the full appreciation of its varied effects in the production of the most diverse exaggerations of normal or abnormal shapes, in the later decades of the *Crania Britannica*. Dr. J. B. Davis devotes a chapter in the first decade to the subject of "Distortions of the human skull," in which he minutely discusses the influence of artificial causes in modifying and transforming its natural shape in a wonderful and frequently very fantastic manner. But the only class of changes which attracts his attention, in addition to those expressly resulting from design, are the examples of the fourth class, where the deformation is clearly traceable to posthumous compression. But during the progress of the work the attention of various observers was directed to the secondary sources of change of form, and especially to such as may be ascribed to the use of the cradle-board, or some corresponding nursing usage. In the fifth decade of the *Crania Britannica* accordingly may be traced very clearly the influence of the full recognition of such causes in modifying the views of its joint authors as to the significance of certain peculiar skull-forms. An extremely brachycephalic skull of a youth, obtained from a barrow on Ballard Down, Isle of Purbeck, is described as unsymmetrical, and as affording "tolerably clear evidence that this form, if not always produced, was at least liable to be exaggerated by an artificial flattening of the occiput, such as is practiced by many American and Polynesian tribes."† In the same decade another skull of the type, most dissimilar to this, is described and illustrated. It was recovered in fragments from the remarkable chambered barrow at West Kennet, Wiltshire; and its most characteristic features are thus defined by Dr. Thurnam: "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 at the vertex, but slopes 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

* *Crania Britannica*, Dec. v, pl. 43.

† *Crania Britannica*, Dec. v, pl. 45.

sutures." Its extreme length and breadth are 7.7 and 5.1, and an inequality in the development of the two sides is obvious in the vertical view. As the brachycephalic skull recalls certain American and Polynesian forms, so such examples of the opposite type suggest the narrow and elongated skulls of the Australians and Esquimaux; and he thus proceeds: "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 Macrocephali, 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 '*tête aplatie sur les côtés*.' It appears to have been practiced 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 Hamburg 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 practiced by certain primeval British tribes, particularly those who buried their distinguished dead in long chambered tumuli."

In connexion with this class of head-forms, as the result of compression, Dr. Thurnam draws attention to the obliteration of the sagittal suture in the elongated skull. I have noted this in many Flathead crania, and shall recur to the subject in referring to those in the Washington and Philadelphia collections. If the artificial forms result from compression, the flattened occiput and artificially abbreviated skull should show a tendency to ossification and obliteration of the coronal and the lambdoidal sutures; while in the elongated skull the sagittal suture will be the one affected, as is the case in one figured and described by Blumenbach, under the name of "Asiatic Macrocephali." But in all cases of an artificial change of form, the natural proportions necessarily exercise some influence on the result; and Dr. Thurnam, accordingly, when referring to the obliteration of the sagittal suture as a result of the artificial elongation of the West Kennet skull, expresses his belief that this "has been produced by pressure or manipulations of the sides of the head in infancy, by which it was sought to favor 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." It is perhaps worthy of note here, that a long narrow head has been observed as one of the characteristic features of Berber tribes of North Africa. Mr. J. Homer Dixon, who resided for some time at Algiers, and had repeated opportunities of visiting and closely observing the neighboring tribes, describes them to me as distinguished by their prominent, arched nose, with wide nostrils; large mouth but thin lips, and an unusual length of head. The constancy of the long head-form particularly struck him, but I could not learn from him of any nursing practice calculated to originate or increase such a development.

From the various authorities and illustrative examples referred to, it is obvious that a class of variations of the form of the human skull, which becomes more comprehensive as attention is directed to it, is wholly independent of congenital transmitted characteristics. Kumbocephalic, acrocephalic, and platycephalic, 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 which 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 British allophylian or Celtic 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. It is even not unworthy of notice that man is the only animal to whom a supine position is natural for repose; and with him, more than any other animal, the head, when recumbent, invariably assumes a position which throws the greatest pressure on the brain case, and not on the malar or maxillary bones.

It thus appears that the study of cranial forms for ethnological purposes is beset with many complex elements; and now that the operation of undesigned artificial influences begins to receive an adequate recognition, there is a danger that too much may be ascribed to them, and that the ethnical significance of congenital forms, and their traces even in the modified crania of different types, may be slighted or wholly ignored. 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 favorite 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."* It is obvious, however, that without 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 from one assumed typical form, it becomes an important point for the craniologist to determine, if possible, to what extent certain characteristic diversities may be relied upon as the inherited features of a tribe or race, or whether they are not the mere result of artificial causes originating in long perpetuated national customs and nursery usages. If the latter is indeed the case, then they pertain to the materials of archaeological rather than of ethnological deduction, and can no longer be employed as elements of ethnical classification.

The idea that the peculiar forms of certain ancient European skulls is traceable to the use of the cradle-board, or other nursing usages, is rapidly gaining ground, with extended observations. My own ideas, formed at an earlier date, were first published in 1857,† but it now appears that the same idea had occurred to Dr. L. A. Gosse, and received by him a wider application. In his "*Essai sur les Déformations artificielles du Crâne*," he has not only illustrated the

* Physical Type of the American Indian, p. 326.

† Edin. Philosoph. Jour., N. S., Vol. VII, p. 25; Canadian Journal, Vol. II, p. 426.

general subject of artificial causes as a means of accounting for abnormal cranial forms, but he thus 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 habitans de la Scandinavie et de la Calédonie devaient s'en servir. si l'on en juge par la forme de leurs crânes."* Dr. Gosse also adds: "Vésale (*Opera*, lib. I, cap. v, § 25) nous apprend que la déformation occipitale s'observait même chez les Germains de son époque: '*Germani vero compresso pterumque occipite et lato capite spectantur, quod pueri in cunis dorso semper incumbant, ac manibus fere citra fasciarum usum, cuniarum lateribus utrinque alligantur.*' De même qu'en Amérique, cette pratique, en Allemagne, devait être commune aux deux sexes."

More recently Dr. J. Barnard Davis has illustrated the same subject, both in the later decades of the *Crania Britannica* and in a memoir in the *Natural History Review* for July, 1862, entitled "Notes on the Distortions which present themselves in the Crania of the Ancient Britons."

Whilst the error of an undue estimate of the extent of such deforming and reforming influences must be guarded against, it is obvious that they will henceforth require to be taken into account in every attempt to determine ethnical classification by means of physical conformation. Every scheme of the craniologist for systematizing 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 form of cranium are constant within certain determinate limits, 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 the human skeleton, in the barrow; and by a similar crucial comparison the craniologist aims at classifying the crania of the ancient Briton, Roman, Saxon, and Scandinavian, apart from any aid derived from the evidence of accompanying works of art. But if it be no longer disputable that the human head is liable to modification from external causes, so that one skull may have been subjected to lateral compression, resulting in the elongation and narrowing of its form, while another under the influence of occipital pressure may exhibit a consequent abbreviation in its length, accompanied by parietal expansion, it becomes indispensable to determine some data whereby to eliminate this perturbing element before we can ascertain the actual significance of national skull-forms. If, for example, as appears to be the case, the crania from 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 mere result of a change of national customs following naturally on conquest, civilization, and the abandonment of Paganism for Christianity.

It is, in this respect, 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 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

* *Essai sur les Déformations artificielles du Crâne*, p. 74, Dr. L. A. Gosse, 1855.

the systematizing of such artificial forms, that they are of frequent occurrence, apart altogether from such configuration as is clearly referable to the application of mechanical pressure in infancy with that express object in view; or, again, as is no less obviously the result of posthumous compression. But, though the deforming processes designedly practiced among ancient and modern savage nations lie beyond the direct purpose of the present inquiry, they are calculated to throw important light on the approximate results of undesigned compression and arrested development.

Among the Flathead Indian tribes of Oregon and Columbia river, where malformation of the skull is purposely aimed at, the infant's head is tightly bound in a fixed position, and maintained under a continuous pressure for months. But it is a mistake to suppose that in the ordinary use of the cradle-board the Indian pappoose is subject to any such extreme restraint. The objects in view 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 or mat of moss or frayed bark, and is not further restrained in a fixed position than necessarily results from the posture in which the body is retained by the bandages securing it in the cradle. This fact I have satisfied myself of from repeated observations. 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 shown 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 *craniotubes* 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 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 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. Trifling as it may appear, it is not without interest to have the fact brought under our notice by the disclosures of ancient barrows and cists, that the same practice of nursing the child, and carrying it about bound to a flat cradle board, prevailed in Britain and the north of Europe long before the first notices of written history reveal the presence of man beyond the Baltic or the English channel, and that, in all probability, the same custom prevailed continuously from the shores of the German Ocean to Behring's Straits. All the effects of such a universally prevalent practice, operating to produce uniform results on the form of the skull and brain, are scarcely yet fully estimated; but that it has affected the form of the head wherever it has been practiced I entertain no doubt. One effect of the continuous pressure on the infant skull must be to bring the edges of the bones together, and thereby to retard or arrest the growth of the bone in certain directions. Where this leads to ossification at a very early period, its tendency must be to limit the direction in which the further expansion of the brain takes place, and so still further to affect the permanent shape of the head. The tendency of the pressure to produce some of the

* Schlossberger, Arch., f. phys. Heilk. Lehmann, Physiol. Chem., Vol. III, p. 28.

results here ascribed to it is proved by the premature ossification of sutures in many of the artificially deformed American crania.

Among the numerous objects of ethnological interest brought home by the United States Exploring Expedition, and now in the possession of the Smithsonian Institution, is a collection of thirty-four Flathead skulls. These I have examined with minute care. Some of them exhibit the most diverse forms of distortion, with the forehead sloping away at an abrupt angle from the eyebrow, or flattened into a disc, so as to present in front the appearance of a hydrocephalous head, and in profile the side of a narrow wedge. Many of them are also characterized by wormian bones and other abnormal formations at the sutures, and the distinct definition of a true supra-occipital bone is repeatedly apparent. In the majority of them the premature ossification, and the occasional entire obliteration of sutures, the gaping of others, and even traces of fracture, or false sutures, may be observed.

It is marvellous to see the extraordinary amount of distortion to which the skull and brain may be subjected without seemingly affecting either health or intellect. The coveted deformity is produced partly by actual compression, and partly by the growth of the brain and skull being thereby limited to certain directions. Hale, the ethnographer of the Exploring Expedition, after describing the process as practiced among the Chinooks, remarks: "The appearance of the child when just released from this confinement is truly hideous. The transverse diameter of the head above the ears is nearly twice as great as the longitudinal, from the forehead to the occiput. The eyes, which are naturally deep-set, become protruding and appear as if squeezed partially out of the head."* Mr. Paul Kane, in describing to me the same appearance, as witnessed by him on the Columbia river, compared the eyes to those of a mouse strangled in a trap. The appearance is little less singular for some time after the child has been freed from the constricting bandages, as shown in an engraving from one of Mr. Kane's sketches of a Chinook child seen by him at Fort Astoria.†

In after years the brain, as it increases, partially recovers its shape; and in some of the deformed adult skulls one suture gapes, while all the rest are ossified; and occasionally a fracture or false suture remains open. An adult skull of the same extremely deformed shape, among those brought home by the Exploring Expedition, illustrates the great extent to which the brain may be subjected to compression and malformation without affecting the intellect. It is that of a Nisqually chief, procured from his canoe-bier in Washington Territory. (No. 4549.) The internal capacity, and consequent volume of brain, is 95 cubic inches. The head is compressed into a flattened disc, with the forehead receding in a straight line from the nasal suture to the crown of the head, while the lambdoidal suture is on the same plane with the foramen magnum. The sutures are nearly all completely ossified, and the teeth ground quite flat, as is common with many of the tribes in the same region, and especially with the Walla-Walla Indians on the Columbia river, who live chiefly on salmon, dried in the sun, and invariably impregnated with the sand which abounds in the barren waste they occupy. I assume the unimpaired intellect of the Nisqually chief from his rank. The Flathead tribes are in the constant habit of making slaves of the Roundheaded Indians; but no slave is allowed to flatten or otherwise modify the form of her child's head, that being the badge of Flathead aristocracy. As this has been systematically pursued ever since the tribes of the Pacific coast were brought under the notice of Europeans, it is obvious that if such superinduced deformity developed any general tendency to cerebral disease, or materially affected the intellect, the result would be apparent in the degeneracy or extirpation of the Flathead tribes. But so far is this from being

* *Ethnography of the U. S. Exploring Expedition*, p. 216.

† *Prehistoric Man*, Vol. II, p. 320.

the case, that they are described by traders and voyagers as acute and intelligent. They are, moreover, an object of dread to neighboring tribes who retain the normal form of head, and they look on them with contempt as thus bearing the hereditary badge of slaves.

The child born to such strange honors is laid, soon after its birth, upon the cradle-board, an oblong piece of wood, sometimes slightly hollowed, and with a cross-board projecting beyond the head to protect it from injury. A small pad of leather, stuffed with moss or frayed cedar-bark, is placed on the forehead and tightly fastened on either side to the board; and this is rarely loosened until its final removal before the end of the first year. The skull has then received a form which is only slightly modified during the subsequent growth of the brain. But the very same kind of cradle is in use among all the Indian tribes. It is, indeed, varied as to its ornamental adjuncts and non-essential details, but practically it resolves itself, in every case, into a straight board to which the infant is bound; and as it is retained in a recumbent position, the pressure of its own weight during the period when, as has been shown, the occipital and parietal bones are peculiarly soft and compressible, is thus made to act constantly in one direction. This I assume to have been the cause of the vertical or otherwise flattened occiput in the ancient British brachycephalic crania. The same cause must tend to increase the characteristic shortness in the longitudinal diameter, to produce the premature ossification of certain sutures, and to shorten the zygoma, with probably, also, some tendency to make the arch bulge out in its effort at subsequent full growth, and so to widen the face.

Fashion regulates to some extent the special form of head aimed at among the various Flathead tribes. Some compress the whole brain into a flattened disc which presents an enormous forehead in full face; others run to the opposite extreme, and force it into an abrupt slope immediately above the eyebrows, so as to give an idiotic look to the seemingly brainless face. Individual caprice, and probably, also, clumsy manipulation, combine frequently to produce a shapeless deformity of skull, in which the opposite sides present no trace of correspondence, and every vestige of ethnical character is effaced. Among the Newatees, a tribe on the north end of Vancouver's island, the head is forced into a conical shape, by means of a cord of deer's-skin padded with the inner bark of the cedar tree, frayed into the consistency of soft tow. This forms a cord about the thickness of a man's thumb, which is wound round the infant's head, and gradually compresses it into a tapering cone. Commander Mayne, in his narrative of his visit to Columbia and Vancouver island, gives a sketch of an Indian girl, and adds in reference to it: "Those who have only seen certain tribes may be inclined to think the sketch exaggerated, but it was really drawn from measurement, and she was found to have eighteen inches of flesh from her eyes to the top of her head." From the extraordinary amount of deformity which I have seen produced by such means, it would be unwise to reject any narrative of an intelligent eye-witness relative to extreme examples of such abnormal heads. I should be inclined, however, to suspect that in the case of the girl drawn by Commander Mayne, he was deceived by her mode of dressing her hair. I have engraved in my "*Prehistoric Man*"* the head of a Newatee chief of the same conical form, and with the hair gathered into a knot on the top of the head. The latter practice is in constant use for increasing the apparent elevation of the favorite conoid head-form. In all such cases the volume of brain appears to remain little, if at all, affected, and the extreme proportions in length, breadth, or height of the skull must be limited by the capacity of the brain, whatever be the fantastic shape it is made to assume. In the case of the girl from Vancouver's island, part of the extreme

* *Prehistoric Man*, Vol. I, p. 317.

height of her singularly formed head was probably an artificial pad over which the hair was drawn.

Compared with such extreme deformation, the traces of artificial change on the forms of British skulls are trifling. They are, however, all the more important from their liability to be confounded with true congenital forms, as in the case of the flattened occiput. Dr. Davis has applied the term "parieto-occipital flatness," where the results of artificial compression in certain British skulls extend over the parietals with the upper portion of the occipital, and he appears to regard this as something essentially distinct from the vertical occiput.* But it is a form of common occurrence in Indian skulls, and is in reality the most inartificial of all the results of the undesigned pressure of the cradle-board. This will be understood by a very simple experiment. If the observer lie down on the floor, without a pillow, and then ascertain what part of the back of the head touches the ground, he will find that it is the portion of the occiput immediately above the lambdoidal suture, and not the occipital bone. When the Indian mother places a sufficiently high pillow for her infant, the tendency of the constant pressure will be to produce the vertical occiput; but where, as is more frequently the case, the board has a mere cover of moss or soft leather, then the result will be just such an oblique parietal flattening as is shown on a British skull from the remarkable tumulus near Littleton Drew, Wiltshire.†

But there are other sources of modification of the human skull in infancy, even more common than the cradle-board. More than one of the predominant head-forms in Normandy and Belgium are now traced to artificial bandaging; and 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 civilized nations, and in certain cases tend as much to exaggerate the naturally dolichocephalic skull as the Indian cradle-board increases 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.

The effect, as we have already seen, which a constant familiarity with the results of extreme artificial deformation on American crania produced on Dr. Morton's mind, was to lead him to ignore all distinctions of ethnical form, and to retract his earlier idea that the elongated Peruvian crania were artificial exaggerations of a head of great natural length. Originally he had adopted the conclusion that the long-headed Peruvians were a more ancient people than what he called the Inca tribes, and distinguished from them by their cranial configuration; but this he abandoned at a later period, and assumed that every skull found on the American continent, whatever might be the extreme variation in opposite directions from his assumed typical form, had been naturally a short globular skull, with low retreating forehead and vertical occiput. On the fallacy involved in such a conclusion it is unnecessary to make further comment, as the evidence which appears to confute it has already been produced. But the disclosures of the essentially diverse types of skull in the ancient cemeteries of Peru appear to me to present some highly interesting analogies to the discoveries made in British barrows. The repeated opportunities I have enjoyed of

* *Nat. Hist. Review*, July, 1862. *Athenæum*, Sept. 27. 1862, p. 402.

† *Crania Britannica*, Decade III, Plate 24.

examining the Mortonian and other American collections have satisfied me of the occurrence of both dolichocephalic and brachycephalic crania, not only as the characteristics of distinct tribes, but also among the contents of 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, and especially the disclosures of the remarkable class of chambered barrows, seem to point to an analogous condition of races. That the Uley and West Kennet skulls may have been laterally compressed, while the Codford barrow and other brachycephalic skulls have been affected in the opposite direction, appears equally probable. But such artificial influences only very partially account for the great diversity of type; and no such causes, even if brought to bear in infancy, could possibly convert the one into the other form.

But as the cranial forms, both of the Old and New World, betray evidences of modification by such artificial means, so also we 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 a 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 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 rare. 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 formed by him, and now in the Academy of Natural Sciences of Philadelphia, that the Egyptian crania are generally characterized 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 accompany the mode of nurture in infancy.

The heads of the Fiji Islanders supply a means of testing the same cause, operating on a brachycephalic form of cranium; as most of the islanders of the Fiji 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 disshevelment. 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 Fijians a great beauty. The bearing of this, however, in relation to the present argument, depends on whether or not the Fiji neck-pillow is used in infancy, of which I am uncertain. The necessity which suggests its use at a later period does not then exist; but the prevalent use of any special form of pillow for adults is likely to lead to its adoption from the first. In one male Fiji skull brought home by the United States Exploring Expedition (No. 4581) the occiput exhibits the characteristic full, rounded form, with a large and well-defined supra-occipital bone. But in another skull in the same collection—that of Vendovi, Chief of Kantavu, who was taken prisoner by the United States ship *Peacock*, in 1840, and died at New York in 1842—the occiput,

though full, is slightly vertical. The occipital development of the Fiji cranium is the more interesting as we are now familiar with the fact that an artificially flattened occiput is of common occurrence among the islanders of the Pacific ocean. "In the Malay race," says Dr. Pickering, "a more marked peculiarity, and one very generally observable, is the elevated occiput, and its slight projection beyond the line of the neck. 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 artificial flattening which the islander had stated to his medical attendants in the hospital, was habitually practiced in his family.† According to Dr. Davis, it is traceable to so simple a source as the Kanaka mother's habit of supporting the head of her nursing in the palm of her hand.‡ Whatever be the cause, the fact is now well established. The occipital flattening is clearly defined in at least three of the Kanaka skulls in the Mortonian collection: No. 1300, a male native of the Sandwich Islands, aged about forty; No. 1308, apparently that of a woman, from the same locality; and in No. 695, a girl of Oahu, of probably twelve years of age, which is markedly unsymmetrical, and with the flattening on the left side of the parietal and occipital bones. The Washington collection includes fourteen Kanaka skulls, besides others from various islands of the Pacific, among which several examples of the same artificial formation occur: *e. g.*, No. 4587, a large male skull, distorted and unsymmetrical; and No. 4367, (female?) from an ancient cemetery at Wailuka, Mani, in which the flattened occiput is very obvious.

The traces of purposed deformation of the head among the islanders of the Pacific have an additional interest in their relation to one possible source of South American population by oceanic migration, suggested by philological and other independent evidence. But for our present purpose the peculiar value of those modified skulls lies in the disclosures of influences operating alike undesignedly, and with a well-defined purpose, in producing the very same cranial conformation among races occupying the British Islands in ages long anterior to earliest history; and among the savage tribes of America and the simple islanders of the Pacific in the present day. They illustrate, with peculiar vividness, the primitive condition of social life out of which the civilization of modern Europe has been educed; and, while they pertain to more modern eras than the traces of human art contemporaneous with the extinct mammals of the drift, they revivify for us, with even clearer distinctness than the rude implements of flint and stone found in early graves, the condition of the British Islanders of prehistoric times.

PART III.

PHYSICAL ETHNOLOGY.

PRIMITIVE ART-TRACES.

The evidences of an assumed cranial and physical unity pervading the aborigines of the American continent disappear upon a careful scrutiny, and the

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

† Types of Mankind, p. 436.

‡ *Crania Britannica*, Dec. III, pl. 24, (4.)

like results follow when the same critical investigation is applied to other proofs adduced in support of this attractive but unsubstantial theory. Dr. Morton, after completing his elaborate and valuable illustrations of American craniology, introduces an engraving of a mummy of a Muysca Indian of New Granada, and adds: "As an additional evidence of the unity of race and species in the American nations, I shall now adduce the singular fact that, from Patagonia to Canada, and from ocean to ocean, and equally in the civilized and uncivilized tribes, a peculiar mode of placing the body in sepulture has been practiced from immemorial time. This peculiarity consists in the sitting posture."* The author accordingly proceeds to marshal his evidence in proof of the practice of such a mode of interment among many separate and independent tribes; nor is it difficult to do so, for it was a usage of greatly more extended recognition than his theory of "unity of race and species" implies. It was a prevailing, though by no means universal mode of sepulture among the tribes of the New World, as it was among many of those of the Old, recorded by the pen of Herodotus, and proved by sepulchral disclosures pertaining to still older eras. The British cromlechs show that the very same custom was followed by their builders in primitive times. The ancient barrows of Scandinavia reveal the like fact, and abundant evidence proves the existence of such sepulchral rites, in ancient or modern times, in every quarter of the globe; so that, if the prevalence of a peculiar mode of interment of the dead may be adduced as evidence of the unity of race and species, it can only operate by remitting the lost links which restore to the red man his common share in the genealogy of the sons of Adam. But ancient and modern discoveries also prove considerable diversity in the sepulchral rites of all nations. The skeleton has been found in a sitting posture in British cromlechs, barrows, and graves, of dates to all appearance long prior to the era of Roman invasion, and of others unquestionably subsequent to that of Saxon immigration; but evidences are found of cremation and urn-burial, in equally ancient times; of the recumbent skeleton under the cairn, and barrow, in the stone cist, and in the rude sarcophagus hewn out of the solid trunk of the oak; and in this, as in so many other respects, the British microcosm is but an epitome of the great world. Norway, Denmark, Germany, and France all supply similar evidences of varying rites; and ancient and modern customs of Asia and Africa confirm the universality of the same. In the Tonga and other islands of the Pacific, as well as in the newer world of Australia, the custom of burying the dead in a sitting posture has been repeatedly noted; but it is not universal even among them; nor was it so in America, though affirmed by Dr. Morton to be traceable throughout the northern and southern continents, and, by its universality, to afford "collateral evidence of the affiliation of all the American nations." So far is this from being the case that nearly every ancient and modern sepulchral rite appears to have had its counterpart in the New World; and in this, as in many other respects, its isolation from the older continents in affinities and corresponding characteristics, & not in actual intercourse, disappears on more extended research. To follow out all the varied indications of such analogy or parallelism would lead to a very extensive range of inquiry, which I shall not now enter upon. But one seemingly trifling analogy, traceable in the correspondence of the rude weapons and implements of flint and stone wrought and fashioned by the aborigines of America, with those recovered from the ancient barrows of northern Europe, connects the early traces of man in both hemispheres by means of arts which are acquiring a new and comprehensive significance.

The development of primitive archæology, by the labors of Thomsen and his Danish fellow-laborers, into a systematic science, laid the foundations for that novel and profoundly interesting inquiry which now tempts the ablest geologists

* *Crania Americana*, p. 244.

from the study of the palæozoic rocks to the recent sedimentary cave deposits and the superficial drift. The investigations of British archaeologists, following in the footsteps of their northern precursors, have now familiarized us with the character of that primitive art so widely diffused throughout those ages embraced within the European STONE PERIOD. That age of stone derives its special characteristic from the occurrence of numerous examples of arms and implements of flint or stone, many of which are wrought with considerable skill and finished with minute care. Others, however, are sufficiently rude and unshaped to illustrate the most artless efforts of primitive mechanical skill. These are formed from flint nodules and pieces of rock by mere blows from another stone, guided, in the case of the flint-workers, by a knowledge of the conoidal fracture of the flint and the consequent facility of its reduction to long and narrow splinters, readily convertible into wedges, chisels, knives, and lance or arrow heads. The simplest implements of this class are frequently water-worn stones, partially hewn, so as to reduce one end to a sharp or angular edge. But, while specimens of such rudimentary art are not uncommon, many more are chipped into symmetrical form with minute care and are ground to a fine edge, or even wrought into artistic forms and polished throughout the whole surface. To those it has been customary with many to apply the epithet *Celtic*, and so to assume their origin from that people who immediately preceded the Romans in the scenes of their latest European conquests. This, however, is rather an assumption than any well-grounded induction; and, though revived by M. Boucher de Perthes in his *Antiquités Celtique et Antédiluvienne*, (1849,) had been previously set aside by Thomsen, Worsaae, Nilsson, and other Scandinavian archaeologists, and, at the very time, was challenged in a communication submitted by me to the ethnological section of the British Association, entitled: *An Inquiry into the Evidence of Primitive Races in Scotland prior to the Celts*.* But that which was a bold surmise in 1850 seems an insignificant and self-evident truism in the light of the well-established facts, and cautious yet comprehensive inductions, relative to the flint implements found in the same drift of England and France alongside of bones of the *Elephas primigenius*, *Rhinoceros tichorhinus*, *Equus fossilis*, *Felis spelæa*, *Hyaena spelæa*, and numerous other extinct mammals.

The facts connected with the discovery of works of human art associated in undisturbed gravel with the fossil bones of extinct quadrupeds, or in corresponding diluvial strata both of France and England, are now too well known to need recapitulation. It is indeed a significant fact that some of them have been long familiar to British antiquaries, though the true bearings of their discovery are only now beginning to be recognized. So early as 1715, a weapon of flint, six and a half inches long, and rudely chipped into the form of a spear-head, was dug up at Black Mary's, near Gray's Inn Lane, London, along with an elephant's tooth, and apparently lying beside the entire skeleton of a fossil elephant.† This curious evidence of the remote presence of man in the most populous centre of his modern civic settlements lay unheeded in the collections of the British Museum for nearly a century and a half. Meanwhile, towards the close of the eighteenth century, another remarkable discovery of the same kind was made at Hoxne, in Suffolk, in gravel at a depth of twelve feet in a stratified soil, and immediately underneath a horizontal bed of sand mixed with shells of existing fresh-water and land mollusca. and with gigantic fossil bones. An account of this discovery was communicated by Mr. John Frere to the Society of Antiquaries of London in 1797,‡ and specimens of the flint implements were deposited in the society's museum, where they are still preserved.

It is interesting and highly satisfactory to know that not only had such facts

* British Association Report, 1850, p. 144.

† *Archæologia*, Vol. XXXVIII, p. 301.

‡ *Ibid*, Vol. XIII, p. 204.

been on record thus long before their significance was appreciated, but the rude implements of the drift have been exhibited in the collections of the British Museum and the Society of Antiquaries of London as the works of man; nor was it till the corresponding discoveries in the French drift, and the minute examination of the stratified gravel in which they were found, had led Rigollot, Prestwich, Lyell, and other competent authorities to deduce evidence of a lapse of many ages between the era of the fossil implements and that to which Romano-Gaulish relics belong, that any one dreamt of questioning their human origin. More recently similar implements have been found in the same diluvial gravel and clay in which remains of the gigantic fossil mammals abound, in Suffolk, Kent, Bedfordshire, and other post-pliocene deposits of the south of England;* and not only is their artificial character undoubted, but the correspondence between the drift implements of France and England is so close as to be at once recognized by the workmen employed in the excavations both at Hoxne and Abbeville.

Such discoveries have naturally led to many startling speculations relative to the apparent lapse of a vast period of time between the era of the drift race and the earliest dates of authentic history, and it has been specially noted that while the drift implements resemble in material those most frequently found in the graves of northern Europe's stone period, they present a striking contrast to the small and well-finished implements chiefly pertaining to such sepulchral deposits, and seem to be the memorials of an age of ruder strength and still more infantile skill. Such a conclusion, if fully borne out, is all the more important as it has otherwise been noted as a highly interesting fact, that so general a correspondence is traceable between the majority of the flint and stone weapons and implements found in ancient European graves and those still manufactured by the aborigines of the Pacific islands, and throughout the American continent, that they seem like the products of the same mechanical instinct, repeating itself under similar circumstances in the arts of savage man.

When Mr. Joseph Prestwich proceeded to Abbeville, in 1859, to investigate the discoveries reported by M. Boucher de Perthes, he was accompanied by Mr. John Evans, F. S. A., who has since communicated the results of their observations to the Society of Antiquaries.† He notes that, so far as hitherto observed, the implements found in the drift are formed exclusively of flint, and these he classifies, for convenience of further reference, under three heads :

1. Flint flakes, apparently intended for arrow-heads or knives.
2. Pointed weapons, some probably lance or spear heads.
3. Oval or almond-shaped implements presenting a cutting edge all round.

The objects first named most nearly resemble a numerous class found in ancient sepulchral deposits, but they are produced by so simple a process, and betray such partial traces of artificial modification, that even when their character as works of art is indisputable, they bear so much resemblance to similar simple natural forms as to be of little value as conclusive evidence of human design or workmanship. But the case is altogether different with the two other classes; and the opinion has been repeatedly expressed that they present little or no analogy in form to any of the works described by Danish, British, or other archæologists of Europe, as pertaining to the so-called Stone Period. Accordingly, after having described the repeated discovery of flint flakes in the drift, as in the sand and gravel near Abbeville, and in the corresponding formation at Menchecourt, where Mr. Prestwich witnessed their exhumation, Mr. Evans acknowledges the uncertainty pertaining to any argument based solely on such evidence; and still further specifies as an element rendering them valueless for

* Quarterly Journal of the Geological Society, Vol. XVII, p. 362.

† On the Occurrence of Flint Implements in Undisturbed Beds of Gravel, Sand, and Clay. By John Evans, F. S. A., F. G. S. *Archæologia*, Vol. XXXVIII, p. 280.

the purpose of those who are seeking for indications of man's presence in such localities at a period separated by vast ages from the earliest beginnings of history, that, "though closely resembling the flakes of flint which have been considered as affording evidence of man's existence when found in ossiferous caverns, this class is not of much importance in the inquiry, because, granting them to be of human work, *there is little by which to distinguish them from similar implements of more recent date.*" Of the artificial origin and peculiar characteristics of the two other classes of implements no such doubt can be entertained, and Mr. Evans accordingly proceeds to remark: "The case is different with the implements of the second class, those analogous in form to spear or lance heads. Of these there are two varieties: the one with a rounded cutting point, its general outline presenting a sort of parabolic curve,* the other acutely pointed, with the sides curved slightly inward.† These have received from the workmen of St. Acheul the name of '*lancues de chat*,' from their fancied resemblance to a cat's tongue. The sides of both kinds are brought to an edge by chipping, but are not so sharp as the point, and altogether these weapons seem better adapted for piercing than for cutting. In length they vary from about four inches to eight, or even nine inches. Both shapes are generally more convex on one side than on the other, the convexity in some cases almost amounting to a ridge. They are usually truncated at the base, and not unfrequently at that end show a portion of the original surface of the flint; in some specimens the butt end is left very thick, as if to add impetus to any blow given with the implement. The remarkable feature about them is their being adapted only to cut or pierce at the pointed end, whereas in the ordinary form of stone hatchet or celt the cutting edge is almost without exception at the broad end, while the more pointed end seems intended for insertion into the handle or socket, and the sides are generally rounded or flat, and not sharp.

"These spear-shaped weapons from the drift are, on the contrary, not at all adapted for insertion into a socket, but are better calculated to be tied to a shaft or handle, with a stop or bracket behind their truncated end. Many of them, indeed, seem to have been intended for use without any handle at all, the rounded end of the flints from which they were formed having been left unchipped, and presenting a sort of natural handle. It is nearly useless to speculate on the purposes to which they were applied, but, attached to poles, they would prove formidable weapons for encounter with man, or the larger animals, either in close conflict or thrown from a distance as darts.

"It has been suggested by M. de Perthes that some of them may have been used merely as wedges for splitting wood, or, again, they may have been employed in grubbing for esculent roots, or tilling the ground, assuming that the race who formed them was sufficiently advanced in civilization. *This much, I think, may be said of them with certainty, that they are not analogous in form with any of the ordinary implements of the so-called Stone Period.*

"The same remark holds good with regard to the third class into which I have divided these implements, viz., those with a cutting edge all round.‡ In general contour they are usually oval, with one end more sharply curved than the other, and occasionally coming to a sharp point, but there is a considerable variety in their form, arising probably from defects in the flints from which they were shaped; the ruling idea is, however, that of the oval, more or less pointed. They are generally almost equally convex on the two sides, and in length vary from two to eight or nine inches, though, for the most part, only about four or five inches long. The implements of this form appear to be most abundant in

*Archæologia, Vol. XXXVIII, pl. XV, No. 1.

†Ibid., pl. XV, No. 2.

‡Archæologia, Vol. XXXVIII, pl. XV, No. 3.

the neighborhood of Abbeville, while those of the spear-shape prevail near Amiens."

Mr. Evans then points out that, among the implements discovered in Kent's Hole Cavern, there were some identical in form with the oval flints from Abbeville; but he adds, "in character they do not resemble any of the ordinary stone implements with which I am acquainted."

It is obvious that a great, if not undue stress is laid on this dissimilarity between the flint implements of the Drift and those of the more recent Stone Period, with the assumed Celtic origin of its flint and stone manufactures. Nor is this wonderful when the vast interval is considered which the geologist now assumes to intervene between the production of the two classes of works. Sir Charles Lyell, when addressing the Geological Section of the British Association, remarked, with cautious yet suggestive force, in reference to the secular phenomena indicated by the fluviatile gravel of Abbeville and Amiens:

"To explain these changes, I should infer considerable oscillations in the level of the land in that part of France; slow movements of upheaval and subsidence, deranging, but not wholly displacing, the course of the ancient river. Lastly, the disappearance of the elephant, rhinoceros, and other genera of quadrupeds now foreign to Europe, implies, in like manner, a vast lapse of ages, separating the era in which the fossil implements were framed and that of the invasion of Gaul by the Romans."

If man's place in nature, and his true relation to the inferior orders of being be still undetermined, and the possibility of his development from the anthropoid apes or others of the lower animals be admitted, then the first indices of animal instinct passing into inventive mechanical skill will possess a peculiar significance. Whether, moreover, we accept or reject the unwelcome theory of the structural interval between the organization of man and the lower animals being the practical element of difference, and one sufficiently slight to require only an adequate lapse of time for its being bridged over by secondary causes in constant operation throughout the organic world; the comparison between the arts of ages so remote as those of the Drift Folk, and the British Celt of the Roman period, or the American Indian of the nineteenth century cannot be devoid of interest. But America also has her ancient, and possibly her drift flint-implements; and as the analogies between the works of her modern aborigines and those of the later European Stone Period are obvious and remarkable, though separated by at least two thousand years; a comparison of the oldest traces of human art on the two hemispheres may involve very significant disclosures in reference to the general question of the development of the mechanical and artistic faculties of man.

So impressed was my mind with the striking bearing of the supposed fact reiterated by Prestwich, Evans, Lyell, and others, of the uniformity of character, amounting to specific typical forms, and of the massive rudeness of the works of art of the drift, that it was with some sense of disappointment I received a flint instrument believed to have been recovered from the American drift, and found it fail in any correspondence with the post-pliocene manufactures of Europe. The characteristics assigned to the former, separate their era, to all appearance, by a diversity of the mental character expressed in them, as works of human art, from the nearly uniform flint and stone implements of the most ancient European stone period seemingly of historic times and existing savage nations. The confirmation it seems to lend to the idea of a condition of human intellect more rudimentary than that of the rudest savage hitherto known gives importance to the data on which such an influence rests. In the summer of 1852 I learned from Mr. William Hay, architect, of a flint implement recovered by a gold-digger from the drift near Pike's peak, Kansas Territory, and immediately instituted inquiries about it, not without some expectation of finding in it a repetition of one of the large typical forms of Abbeville or Amiens. In this, however, I was disappointed. The interesting object which

is now in my own possession is a broken knife or lance-head, measuring in its present imperfect condition only $2\frac{1}{4}$ inches. I was placed in communication with the discoverer by Mr. Hay, in whose employment he had formerly been; and on my applying to him for information as to the precise circumstances under which the flint implement had been discovered, he presented it to me, along with the desired statement. Mr. P. A. Scott is an intelligent Canadian, formerly in business as a carpenter at Cobourg, Upper Canada, who, in 1850, joined a party about to start on an expedition to the gold diggings; and while engaged in the search for gold at the Grinnell Leads, in Kansas Territory, he found the imperfect



Fig. 10.

flint implement, figured here, the size of the original, at a depth of upward of fourteen feet from the surface. The spot where this discovery was made is in the Blue Range of the Rocky mountains, in an alluvial bottom, and distant several hundred feet from a small stream called Clear creek. A shaft was sunk, passing through four feet of rich, black soil, and, below this, through upward of ten feet of gravel, reddish clay, and rounded quartz. Here the flint implement was found, and its unmistakable artificial form so impressed the finder that he secured it, and carefully noted the depth and the character of the strata under which it lay. Though the actual object corresponds more to the small and slighter productions of the modern Indian tool-maker than to the rude and massive drift implement which I had conjured up in fancy, it has no claims to more artistic skill. Under any circumstances it would be rash to build up comprehensive theories on a solitary case like this; but, though small, and otherwise dissimilar to the drift implements of France and England, there is nothing in the workmanship of the Grinnell Leads flint to suggest its origin at a later period; for it is only chipped into form with such rude skill as is fully equalled by that displayed in the former; and may, therefore, very well accord with the idea of the most rudimentary traces of art being alone discoverable in the manufactures of the Drift Period.

The growing favor with which this opinion is entertained is illustrated by the attempts made by Mr. Worsæ and other Danish antiquaries to separate that Stone Period of prehistoric times, which they have hitherto considered in connexion with the cromlechs, banta-steins, and other primitive monuments of Sweden and Denmark, from another and greatly more remote era, or Flint Period, to which the recently explored *kjockkenmøddinger*, or shell mounds and coast refuse-heaps, are assigned. In these, numerous flint wedges and other implements of the rudest workmanship have been found; but, along with them, some rare specimens of well wrought and highly finished flint tools or weapons have occurred. These, indeed, some would still regard as stray relics of a later date, like the Indian weapons and sepulchral remains superficially deposited in the ancient mounds of the Mississippi valley. But Professor Steenstrup, who has been associated with Professors Forchhammer and Worsæ since 1847, in the exploration of the *kjockkenmøddinger*, peat bogs, and other formations which enclose the ancient traces of man, entirely rejects the idea of any interval of separation between the *Kjockkenmødding* Period, and the earliest and rudest stage of the Danish Stone Age. If, therefore, the two constitute one era, the purely exceptional character of all but the coarsely-shaped flint implements in the *kjockkenmødding* tends to suggest the probability of further research leading to the discovery in the drift also of some of the more delicate and carefully finished flint tools.

In reality, however, the difference is more one of material than workmanship.

A certain class of flint axes are found, especially in Denmark, not only ground to an edge, but with the whole surface polished; but these are comparatively uncommon on the continent, and are only rarely found in Britain. The natural fracture of flint brings it nearly to the required shape for knives, arrow and lance heads, and axe-blades, without grinding. But it is otherwise with the amorphous trap, granite, and other hard rocks wrought into stone axes, &c. These had to be rubbed and ground into shape, and some of them are found polished with elaborate symmetry and finish. If stone implements should hereafter be recovered under circumstances indicative of a corresponding antiquity with the flint manufactures of the drift, the more intractable material will be found to have compelled the primitive workman to employ some amount of grinding and polishing on his rudest weapons.

The varied ethnological collections of the Smithsonian Institution, when completely arranged, will be found to illustrate many interesting points of comparative ethnic art. The examination of the Indian implements already displayed in its cabinets has now sufficed to recall to mind a flint implement in my own collection, the significance of which, as a possible relic of older races than the Red Indians of this continent, was overlooked by me at the time I acquired it. When passing, some years since, through the village of Lewiston, in the State of New York, I purchased from an itinerant vender of Indian bead-work some flint implements, chiefly arrow-heads, such as are constantly ploughed up on the sites of Indian settlements; but along with those was a large disc, or spear-head, of dark flint, $4\frac{3}{4}$ inches long by $3\frac{1}{2}$ broad, which I was informed had been procured in the neighborhood in the process of sinking a well. Regarding it merely as an unusually large specimen of an Indian flint spear-head, I deposited it among other relics of the same class without further inquiry. But my visit to Washington has afforded me an opportunity of examining some similar discs of flint or hornstone, found under circumstances which give a new interest to the Lewiston implement. In one of the cabinets of the Smithsonian collection two large flint implements are deposited, which attracted my eye from their apparent correspondence to the oval or almond-shaped implements of the drift, made with a fractured cutting edge all around. A label attached to one of them is as follows: "Thirty of these found at the depth of eight feet, under a peaty formation, near Racine, Wisconsin; deposited by P. R. Hoy." Dr. Hoy is a contributor to various departments of the Smithsonian collections; and his name also repeatedly occurs in Lapham's "Antiquities of Wisconsin, Surveyed and Described." At page eight of that work the following statement is made on his authority: "Some workmen, in digging a ditch through a peat swamp, near Racine, found a deposit of discs of hornstone, about thirty in number. They were immediately on the clay at the bottom of the peat, about two feet and a half below the surface. Some of the discs were quite regular. They vary from half a pound to a pound in weight." Notwithstanding the discrepancy between the two accounts of the depth at which the implements were found, both statements probably refer to the same discovery.* The larger of the two specimens measures $5\frac{1}{4}$ inches

* In answer to a letter addressed to Dr. Hoy, on this subject, Mr. Albert H. Hoy writes, January 25, 1863: "Dr. Hoy desires me to state that the flint discs were found in digging a ditch through the bottom of a ravine near this city, (Racine, Wisconsin,) formerly the bed of Root river, which enters the lake at this point. The doctor thinks these flints had been transported from some point and buried here by the Indians, as a sort of *caché*, in order that they might readily find them when they wished to construct arrow-heads, spear-points, and the like. From the nature of the peaty formation, the doctor thinks that the flints were deposited after the formation of the surrounding soil. It may be that the Indians purposely buried the flints in this moist situation that they might remain damp, as it is known that in this state flint is the easier worked or chipped. Some thirty more were found at one point, and had the appearance of being deposited in a pile." As no correction is made of the later depth assigned to their discovery, I presume it to be correct.

long by $3\frac{3}{4}$ broad, and the other is only a little smaller. The discovery of similar heaps of rudely formed discs of flint has been repeatedly made under circumstances much more obviously indicating their being placed for some specific purpose in the deposit from whence they were recovered; and the immense numbers of them occasionally heaped or systematically arranged on a single spot is a fact which may have some significance in illustration of the numerous flint implements recovered from the drift on very limited areas.

The researches of Messrs. Squier and Davis, in the mounds of Ohio, have revealed the fact that large deposits of such discs repeatedly occur in those ancient earthworks; and in a manuscript account of researches carried on more recently in the same locality, which I have had an opportunity of examining while at Washington, the following narrative occurs: "On the south side of the confluence of the Racoon and the south fork of the Licking river, at McMullen's inn, is a square earthwork, with a small circle attached to the west side. Some workmen, digging for clay in a brick-yard occupying part of the square, discovered a nest of 198 flint arrow-heads about two feet below the surface, all nicely set up on end, the smaller ones within and the larger without. Some were as large as a man's open hand, all neatly made, and of the same pattern." To this the explorer adds, as a singular fact: "All the arrow-heads I have obtained from out the mounds, or in similar deposits, are of this character or pattern."

Some uncertainty as to the occurrence of the modern forms of flint arrow-heads among the genuine deposits of the mound-builders of the Ohio valley is occasioned by the practice of interment, by the forest tribes, superficially in the ancient mounds. Certain it is, however, that in those mounds a class of largely and rudely formed discs, or spear-heads, of flint, quartz, and manganese garnet is common. Others are chipped into regular form with minute care, but are also of unusually large size, and, like the ruder discs, suggest the idea of their purposed use, without the addition of any shaft or handle. Messrs. Davis and Squier remark, when describing the contents of the altar mounds explored by them: "Some of the altar or sacrificial mounds have the deposits within them almost entirely made up of finished arrow and spear points, intermixed with masses of the manufactured material. From one altar were taken several bushels of finely worked lance-heads of milky quartz, nearly all of which had been broken up by the action of fire. In another mound, an excavation six feet long and four broad, disclosed upwards of 600 spear-heads or discs of hornstone, rudely blocked out, and the deposit extended indefinitely on every side. The originals are about six inches long and four broad, and weigh not far from two pounds each."* The accompanying wood-cut (Fig. 11) illustrates the original text, and will suffice to show the prevailing forms of the rude implements; but it fails to suggest to the mind their great size, and clumsy, ponderous character, so nearly approaching, in both respects, to those of the European drift.

Some of the specimens are described as nearly round, but most of them are rudely heart-shaped. With them were found also several large nodules of similar material, from which portions had been chipped off. Estimating the whole amount from the number exposed within the limits to which the explorer's excavations extended, they supposed there must have been nearly four thousand altogether, and possibly a still greater number, under the single mound.

The peculiar circumstances of the deposit at Racine, as described by Dr. Hoy, where many discs were found lying on the clay with the accumulated peat formation above them, would, in some localities, suggest an antiquity measurable by the slow formation of the peat above them; but the extensive traces of an ancient population, and especially the numerous earthworks in the State of Wisconsin, suggest the possibility of the collection of stone imple-

* *Ancient Monuments of the Mississippi valley*, p. 213.

ments having been buried where they were found. Of the purposed interment of those in the Ohio mounds no doubt can be entertained; and though a great antiquity has been ascribed to the mounds, in comparison with any works of the known races of the continent, no one will dream of assigning them to a period bearing any relation to that of the Drift Folk of Abbeville or Hoxne. Here, then, we find illustrations of one of the commonest types of the drift implements deposited in vast numbers under the earthworks of this remarkable prehistoric race of the New World, and found even in its regular sepulchral mounds. If one of the Racine discs in the Smithsonian collection be compared with the example from



Fig. 11.—LEWISTON FLINT IMPLEMENTS.

the valley of the Somme, selected by Mr. Evans to illustrate his third class of oval or almond-shaped implements,* they will be seen to correspond so closely that either might be selected as the illustration of the type.

* *Archæologia*, vol. xxxv.ii, pl. xv, fig 3

The Lewiston implement is more irregular and ruder in workmanship. It has been reduced to the required shape by comparatively few strokes, and appears to have been broken off at the one side by an ill-directed blow of the stone hammer by which it may be presumed to have been wrought. The opposite and only complete edge is chipped and fractured as if by frequent use. It is to be regretted that more minute information as to the precise locality and circumstances of this discovery has not been secured. But it may not yet be too late for the recovery of the desired data. As an undoubted relic of the American drift, it would afford startling evidence of a minute conformity between the most ancient traces of human art in both hemispheres. Even as, more probably, a stray relic of the ancient monuments of Wisconsin, or the Ohio valley, it possesses considerable interest to the American archaeologist, thus found so far from the ascertained seats of the extinct Mound-Builders. But it is probable that the implements of the modern Indians include those of the very same form. In the same cabinet of the Smithsonian collection, which includes the Wisconsin examples referred to, is a roughly shaped disc, figured here, (Fig. 12) brought with other remains from Texas. It measures $4\frac{1}{2}$ inches in length, and, as is shown by the accompanying illustration, it repeats one of the commonest types of the smaller drift implements, and also corresponds to them in its irregularly fractured edge and rough workmanship.

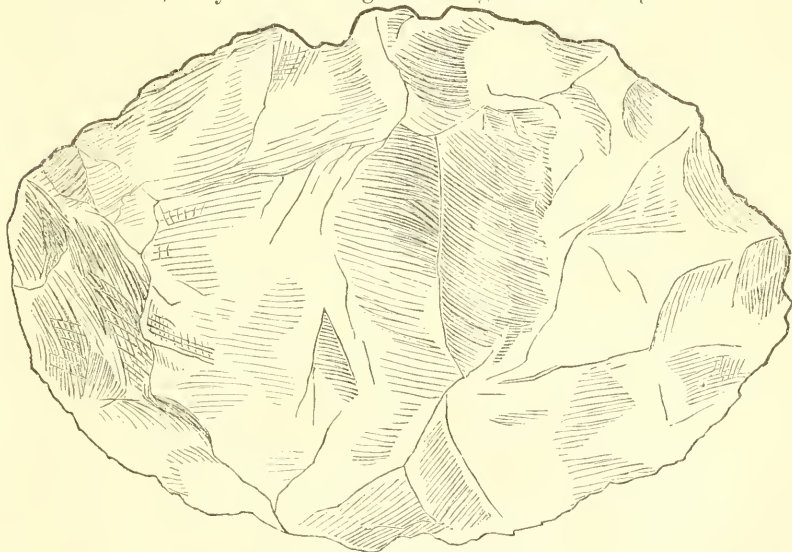


Fig. 12.—TEXAS FLINT IMPLEMENTS.

The subject selected for illustration here, from among many which I brought under the notice of my audience, though apparently trifling, has a certain significance which may justify its reproduction. A comparison of the ordinary flint and stone implements, and of the rude pottery still manufactured by the Red Indians of the American forests and prairies, with examples recovered from ancient sepulchres of Britain and the north of Europe, dating before the Christian era, proves a correspondence in many cases so striking as to admit of the one being substituted for the other without detection by the most experienced archaeologist. To prove, therefore, that in the drift underneath the Gaulish and Roman graves of Abbeville and Amiens, or the British and Saxon barrows of Suffolk, lie imbedded the rude flint implements of an elder period, essentially differing from both, furnishes indications as strikingly

suggestive of a different condition of life, and a diverse stage in the progress of the human race, as the bones of the mastodon or the *Ursus spelæus* which are imbedded in the same stratified gravel. That the flint-tools have certain characteristics in form and workmanship is unquestionable. Yet the difference between them and more modern implements of the same material has been exaggerated; and the results indicated by this comparison of flint implements of the New World with those of the European drift is to show, I think, that the diversity between the two is not of an essential or very important nature, and by no means such as would indicate any relative stages in a progressive development which, in the sober estimation of some of our most cautious geologists, embraces a period scarcely measurable by centuries. Their present speculations would render the interval between the Flint-worker of the British barrows of ante-Christian centuries and the modern Indian too insignificant to be taken into account, in relation to an age when man is assumed to have made his advent in Britain while it formed a part of the continent of Europe, and when the glaciers of the Scottish Grampians still contributed their Arctic floods to the valleys of southern England and France. But also some of the facts indicated here warn us that we have still to anticipate many new disclosures not less striking and unlooked for than those of the European drift; and among those is the possible discovery of America's drift-period, comprehending the traces of human art and the evidences of the presence of man in this New World, as it is called, at periods compared with which that of its Mound-Builders is modern, and even of its fancied Phœnician colonizers but of yesterday.