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The Antiquity Of Man In America Compared With Europe

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THE ANTIQUITY OF MAN IN AMERICA COMPARED WITH EUROPE

By Newton Horace Winchell.

I trust that no one will suppose that the age of Man in America can be expressed in years, with any degree of accuracy; nor that in this brief discussion any effort will be made to equate the biblical account of man with the facts of science. These two records may constitute two parallel series, but they were written by different authors, for different purposes and from different starting points.

For a few minutes it is the intention of this lecture to sketch only the scientific facts that bear on the age of Man in America, and more specially to review in a somewhat systematic and logical order some recent discoveries which have an important bearing on this question. Some of these scientific facts are not strictly recent discoveries, but have been known for twenty or more years, and the discovery consists rather in learning their significance when correctly aligned together and read as a whole; but others of these facts are new, and it is largely because of these late discoveries that we have been prompted to put into a systematic rearrangement some of the facts hitherto well known.

European Primitive Man.

As European remains of primitive man are the most remarkable and also the best known, they are to be taken as a standard for comparison with American. Hence it is proper at the outset to glance at the results of the latest discoveries in the eastern continent.

The finding of the Neanderthal skeleton, the Engis skull, the man of Spy, the skeleton of Mentone, followed in late years (1907) by the Mauer jawbone near Heidelberg, the skull of La Chapelle-aux-Saints (1908), the skull of Krapina in Croatia (1899), of Le Moustier in France (1908). Forbes

Quarry, Gibralter (Sollas, 1907), Galley Hill in England (1888-95), and of Piltdown, England (1912), as well as several others in France, Germany, and Italy, has served to put the former existence of a primitive type or types of man in the eastern continent beyond the realm of hypothesis, and to range it among the positive facts of science. These remarkable late discoveries have as yet not been apprehended generally, and a short synopsis of them will be presented here for the purpose of comparison as an introduction by contrast to a consideration of discoveries in America.

Eolithic Man.

There are some specimens whose extreme variation, from the average form of skull and jawbone of the human type, throws doubt on their exact relation to man. These are the Pithecanthropus erectus of Java, the Mauer jaw, found near Heidelberg, commonly called Homo heidelbergensis, and the Eoanthropus dawsoni, found lately near Piltdown in England.

Pithecanthropus erectus.

As to Pithecanthropus, it certainly is, in some respects at least, intermediate between man and the ape, as indicated by the name given to it by Dubois. In other words it is, in his opinion, the veritable "missing link." But authorities differ. While admitting that the fossils found by Dubois are related to both man and the ape, some authorities consider that the animal was essentially an ape, with some human characters, and others that it was a man with some of the characters of

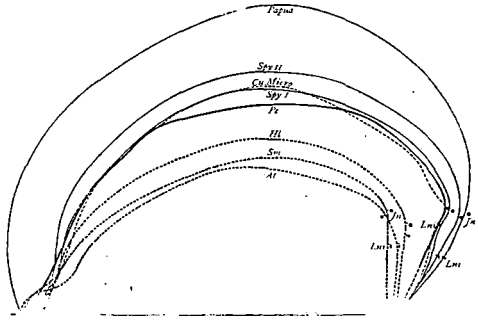

Fig. 1.

the quadrumana. Probably the following summary review and conclusion of Professor Sollas are as near the just result of the long discussion as we shall ever be able to attain.

Fig. 1. Outlines of skulls: Topmost, a New Guinea native; 2d and 3d, Paleolithic man, of Spy; 4th, Pithecanthropus; and the three lower are skulls of monkeys. (From Prehistoric Man, by W. L. H. Duckworth, 1912, page 5, after Dubois.)

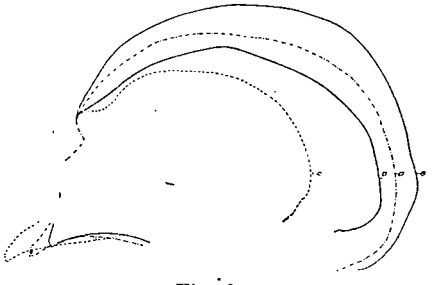

Fig. 2.

Fig. 2. Outlines of skulls: Topmost, a European; 2d, an Australian; 3rd, Pithecanthropus; 4th, lowest, a Chimpanzee. (From Ancient Hunters, by Prof. W. J. Sollas, 1911, page 36.)

1. The form of the skull has a nearer approach to the anthropoid ape than to man.

2. That particular fold in the frontal lobe of the skull which is in the region known as the "Broca area" and which controls the power of speech, is twice as great as in the anthropoid apes, and indicates that Pithecanthropus had acquired the power of articulate speech.

3. The size of the cranial cavity puts Pithecanthropus 110 cubic centimeters higher than midway between the lowest known capacity of human skulls and the highest ape, and in this character, which is the most distinctive, Pithecanthropus is well on the human side.

Pithecanthropus was found in beds which are near the top of the Pliocene or base of the Pleistocene, in a position in which both geologically and anthropologically such an intermediate form might theoretically be expected.

HOMO HEIDELBERGENSIS.

A most remarkable jawbone was discovered near Heidelberg in 1907. This bone was associated in the same stratum with several kinds of extinct species, such as Elephas antiquus, allied to the existing African elephant, rhinoceros etruscus, two species of bear, a lion not distinct from the existing African lion, a dog almost identical with the present wolf of the Pyrenees, a boar, horse, bison, and others. The entire group shows that the age of the jawbone was near the upper part of the Pliocene, or at the bottom of the Pleistocene.

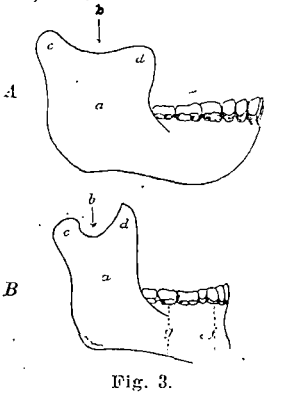

Fig. 3.

Fig. 3. A, outline of the Mauer jawbone; B, an unusually large jaw of an ancient Briton. (From Duckworth, page 11.)

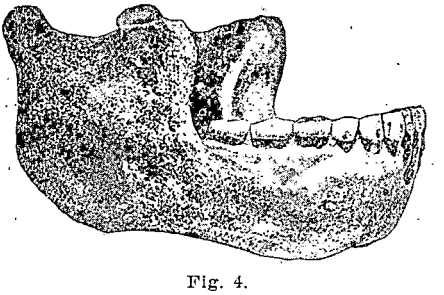

Fig. 4.

Fig. 4. Side view of the Mauer jaw. (From Origin and Antiquity of Man, by Prof. G. Frederick Wright, 1912, page 310.)

As compared with the lowest of present human beings, this jaw is seen to differ in the following particulars:

1. While the teeth are distinctly human, they are small in comparison with the jaw itself.

2. The ascending ramus is of enormous width compared with the same in existing man.

3. The sigmoid notch which characterizes the upper line of this ramus in nearly all human jaws, is a shallow gentle depression, in this approaching the lowest human types.

4. The uppermost rear point of the condyle is higher rather than lower than the coronoid process, the reverse from that shown in an unusually large jaw of an ancient Briton, illustrated by Duckworth, from specimens in the Cambridge museum; but the actual difference of level between these in the Mauer jaw is unusually small.

5. The lower margins of the jawbone, instead of running in a nearly level uniform plane, undulate upward midway from front to rear. There is also another similar undulation on the front margin.

6. The chin is rounded and retreating, instead of angular and projecting.

These contrasts are made evident by the following view which shows (from Sollas) the jawbone of Mauer, of an Australian native, and of a chimpanzee. The Mauer jaw is represented by the heavy continuous line, the Australian by the light continuous line, and the chimpanzee by the dotted line.

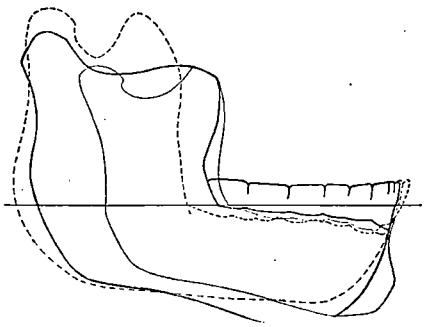

Fig. 5.

Fig. 5. Outlines of the Mauer jaw (thick line), the jaw

of an Australian (thin line), and of a chimpanzee (dotted line). (From Sollas, page 46.)

The Piltdown Skull.

The remarkable Piltdown skull was found only a few years ago, and a full description was pubilshed in 1913, in the Quarterly Journal of the Geological Society, of London, Vol. LXIX, where the fortunate discoverers (Dawson and Woodward) have given full descriptions and illustrations. In all respects, so far as the specimens can be interpreted, the Piltdown man and the Heidelberg man are nearly allied, almost identical. This similarity extends to the great width and strength of the ascending ramus, the shallowness of the sigmoid notch, and the undulating lower line of the horizontal ramus. Other resemblances might be noted, but it is sufficient to say that the Piltdown skull is placed unhesitatingly in the same group as the Heidelberg jaw, and that, as they appear, from the fossil associates, to have lived at practically the same date, they are representatives of a once wide-spreading type of the primates which hunted the elephant, the boar, the mastodon, the hippopotamus, and the beaver, over an extensive area in central Europe, and spread also westwardly into England. The channel which now separates the British Isles from the continent was not yet formed, and that gives a pre-Glacial date for the type. As these three specimens are so nearly allied, and are found at about the same geological date (upper Pliocene or near the base of the Pleistocene) they can be set aside easily into one group, and in a previsional way can be denominated Pliocene Man, but without any very definite limitation to the significance of the term. From southern Asia to western Europe a similar and almost identical type of early man or man's precursor was spread over the earth.

The Question of Eoliths.

Perhaps the most important part of the late discovery at Piltdown is yet to be mentioned. For several years the question of the true nature and origin of certain flints found in Europe has been discussed by European archeologists. They are called eoliths, and although they show signs of artificial

chipping they have not been accepted as of human origin, with any approach of unanimity. As remarked by Professor MacCurdy, the coincidence of these flints with the Piltdown skull at the same geological horizon seems to put a quietus on further doubt, and to reveal to us the status of the most primitive flint-chipping industry.

The very ancient type represented by these earliest of subhuman remains may be called therefore, very reasonably, Eolithic Man, since now they are proven to date from practically the same period of time, and inasmuch as the chipped flints found in the same situation as the Piltdown man had already been called "eolithic."

Paleolithic Man.

The remains of man, or of anthropoid man, which have been reviewed thus far, are to be distinguished from another set of remains, likewise found in Europe, which are recognized by European archeologists as of a higher type. They differ from the foregoing in the form and capacity of the skull, and in the shape of the jawbone and of the femur, and in the teeth. This race is supposed to have made its appearance somewhere in the course of the glacial epochs. The men were small of stature but of stout build. They are represented by the Neanderthal man, and the race has received the same distinctive name.

A large number of individual skeletons have been found. The forehead is low, and, in keeping with the great length of the head, extends far backward. At its front base the frontal torus, or the ridge above the eyes, is very large, and extends continuously over both eyes across the nose. The chin is receding and small, and the notch at the upper end of the ascending ramus of the lower jaw is more marked than in Eolithic man. The molars increase in size from front to rear; with us they diminish, the wisdom tooth sometimes being obsolescent or rudimentary. This produced a distinctly prognathous profile. The legbones, especially the femur, were so curved that it is supposed that the Neanderthal man walked with a stooping posture, being unable to straighten his legs completely at the knees. His feet and hands were dispropor-

tionately large. He was anything but a Beau Brummel. Still his industry, as manifested by the implements with which his bones are associated, was considerably in advance of that of the Eolithic race.

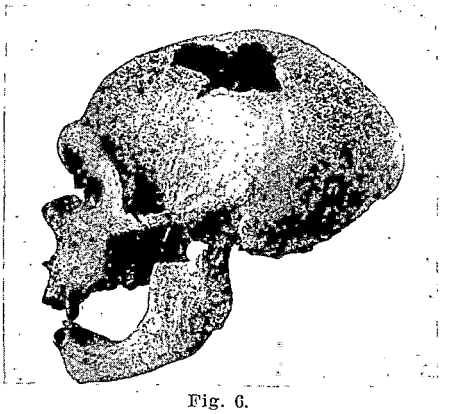

Fig. 6.

Fig. 6. Profile view of the skull from La-Chapelle-aux-Saints. (From Duckworth, page 33.)

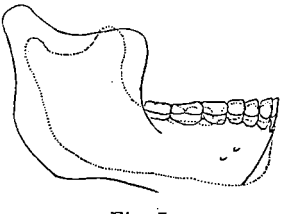

Fig. 7.

Fig. 7. Outlines of the Mauer jaw (continuous line), and the jaw of the Moustier skeleton (dotted line). (From Duckworth, page 41.)

The Paleolithic period, which followed after the period of the Heidelberg or Eolithic man, was probably very long. It was characterized by a fauna which has not yet been separated with definiteness from the period of the Heidelberg man. In some respects the fossil remains of man of this period are similar to those of the Heidelberg man, but the flint implements are distinctly paleolithic and of a higher type than the eoliths. The associated animal remains include Elephas an-

tiquus, the mammoth (Elephas primigenius), Rhinoceros tichorinus, and other species. They seem to be both tropical and arctic, and this character points to important fluctuations of the climate, perhaps to several glacial epochs during the Paleolithic time of Europe, such alternations being well known in America as episodes of the great Glacial period. The succession of physical changes in the Glacial period has not been worked out so satisfactorily in Europe as in America, nor so unanimously accepted; but, on the other hand, the succession of human types has been studied with greater thoroughness and established with greater completeness. The important problem remaining seems to be to find how the two continents may be co-ordinated.

According to Sollas (Ancient Hunters, p. 161), the Australians are the latest representatives of the Neanderthal race, a race which was co-extensive with the land of the eastern continent at a time when the lands of all the northern hemisphere, whether in Europe or in America, stood several hundred feet, and in some places apparently several thousands of feet, higher above the ocean than now, the continents themselves being united.

We next lose sight of man for a long period; and this long interval is filled with indications of momentous change in the earth's surface. The ocean encroaches upon the land, submerging the area of the North sea, the English channel, the Mediterranean, and the land routes to Greenland and to Alaska, separating the continents into distinct land masses.

It is in accordance with all glacial geologists who have investigated the ups and downs of the earth's crust in Europe and America in Pleistocene time to synchronize these momentous changes with the ice-epochs, and to synchronize those of Europe with those of America.

Neolithic Man.

If we examine the floors of European caves we find remains of Paleolithic man separated from those of Neolithic man by a layer of stalagmite, in which are no bones of any sort. The caves were deserted by man and beast during a long period, and that was in general the time of the Glacial period. Re-

mains of man later than the stalagmite layer are of Neolithic type, and the accompanying bones are of the well known domestic animals, and of the modern reindeer, the common deer, and the European bison; and in every respect the man of Neolithic time grades through the bronze and iron ages into the existing races of Europe and Asia.

SYNOPTICAL VIEW OF THE EUROPEAN SUCCESSION.

1. During the long Pliocene time and in the early Pleistocene, the land stood high. There was no English channel nor North sea, nor the Mediterranean. It was the age of the forerunners of man, Pithecanthropus, Homo heidelbergensis, and Eoanthropus dawsoni, which spread widely, i. e., from England to Java, and possibly to South America as claimed by Ameghino, anthropologist of Argentina. The artifacts are eolithic.

2. In the first glacial epoch, the Gunz epoch of Penck, the continental areas had their greatest elevation and widest expansion. Man and his associates were expelled from Europe or exterminated. There was great accumulation of stalagmite in caves, covering the remains of man and various extinct species.

3. A long period ensued, which embraced remarkable fluctuations both in climate and in fauna. It was the chief age of Paleolithic Man, including the Neanderthal man, the man of Spy, the remains found at Krapina in Croatia, at La-Chapelle-aux-Saints, at Le Moustier, and in numerous other places. This time embraces the Mindel and the Riss glacial epochs of Penck, with the associated interglacial epochs.

4. The Wurmian glaciation of Penck, including the formation of the present (i. e., the latest) valley gravels and the latest tills. Subsidence of the continental areas formed the British channel, the North sea, and the Mediterranean, and submerged northern Siberia, as well as much of the borders of Scandinavia.

5. Retirement of the latest ice-sheet; the Neolithic period, followed by the bronze and iron ages of existing man.

The foregoing condensed sketch overlooks numerous details and differences of opinion, for the purpose of affording a

generalized view of those principal events which are agreed on by both archeologists and geologists in Europe. It has been stated by Briart, and is probably true, that the real Quaternary era was made up chiefly of what have been called "inter-glacial epochs," and that the glacial epochs proper were only "brief episodes," interrupting a long period of comparatively mild climate.

Comparison with America.

We turn now to America, and what do we find? It is not questioned that in America there has been a similar succession of glacial epochs, separated by interglacial mild epochs. Nor is it questioned that the preceding Pliocene, as well as the Pleistocene interglacial American epochs, had faunas of animal life, and floras of plants, which were identical, or very similar, as to genera, with those of Europe at the same dates, and it is not supposed that these epochs in America were other than contemporary with the analogous epochs in Europe. Further, it is admitted by paleontologists of America that the successive grand changes in the European animals and plants from the Pliocene to the present time have their duplication in American geology. It is only in regard to the presence of man among these animals that American scientists are not in accord.

Let us begin with the Pliocene, which terminated upwardly, according to Cope, with Equus beds, and was followed in eastern North America by the Megalonyx beds. Cope at first declared the two were about co-temporary, but on account of some differences in the fauna he concluded that the Megalonyx beds were probably somewhat later than the Equus beds. The special fauna of the Megalonyx beds he enumerated.

Along with the present familiar species, such as the squirrel, wolf, woodchuck, skunk, horse, tapir, and porcupine, are found the bones of several extinct animals, the Megatherium, Megalonyx, Castoroides, Mastodon, and several others. Cope declared, without qualification, that these are of the later Pliocene, but latterly geologists are inclined to include them in the early Pleistocene. They have their parallels in Europe, and, according to Ameghino and others, also in South America.

Was man a part of this early Pleistocene fauna? As in Europe, the presence in America of human or subhuman remains in the latest Pliocene is not settled conclusively. If we accept the testimony of Whitney, Cope, and Williston, men who have given exact and also extensive investigation to this question in America, we must give an affirmative answer. In that case, if the anatomical details of his skeleton could be ascertained, we may reasonably predict that they would resemble those of Pithecanthropus and of the Heidelberg man, as well as the lately found Eoanthropus of Piltdown, England.

Probable Origin and Migration of Earliest Man.

If the earliest representatives of the human species in Europe were a part of the fauna of the later Pliocene (or earliest Pleistocene), they must have originated in the eastern continent, and they must have participated in the migratory movements which characterized that fauna. It may be recalled that the continental areas were then at much greater elevation and of much wider expansion than now, the altitude increasing toward the north. There was no sea expanse to prevent migration from Siberia to Alaska, nor from Europe to Greenland and thence to North America. It is one of the remarkable discoveries of our great American paleontologists that the large mammals have migrated during Tertiary time over the face of the earth from their various starting points, and that the origin of most of them plainly was in the eastern hemisphere. If man followed the same law, he moved in all directions from Asia. He found not only Australia but also America, and he had time enough to spread over the face of the globe, without setting his foot off dry land.

The late discoveries and conclusions of the Princeton Expeditions to Patagonia show that South America was united by a southern swing of the land area with Australia and Tasmania, separating the Atlantic entirely from the Pacific, and making the Atlantic ocean a veritable tropical "Mediterranean."

Either because of the great elevation of the land areas, or because of the decrease of carbonic acid gas in the atmosphere, consequent on the cessation of violence of volcanic ejection

near the close of the Tertiary era, or perhaps because of both, the Glacial period came on, inaugurating great physical changes which were world-wide, at last separating the land, as already stated, into continents, and restricting the animals to definite areas.

As there have been found in America no remains of man which can be compared with Pithecanthropus, we may dismiss further consideration of him and inquire whether anything has been found which may be compared with his successor, Paleolithic or Neanderthal man.

It is probable that we owe to Sir Charles Lyell, the eminent English geologist, the earliest mention of human remains that may be referred to this race. In 1846 he was on an extended visit to America, and he described the occurrence of a pelvic bone of man in a collection found at the base of a ravine near Natchez, in the state of Mississippi. This bone was associated with the bones of Mastodon, Megalonyx, Equus, Bos, and others. They were traced to "a clayey stratum," lying below the loess of the locality, which he considered Tertiary, but which is in the stratigraphic position of a layer of gravel and stratified sand which at Vicksburg he considered to be of the nature of glacial drift, since named Orange sand. He at first rejected the idea that man and the mastodon could have been co-temporary in the Mississippi valley, but that view he modified later when evidence of their contemporaneity had been increased greatly. The geological horizon in which these were found is just below the loess, but it is not established whether it is Pliocene or Pleistocene. In the light of later discoveries, however, it seems to be safe to assume that this bone was of the earliest of human remains found in the valley of the Mississippi and that it was parallel, in all essential respects, with Paleolithic man, or with the Equus beds.

The idea which was accepted at first by Lyell, that this bone had been precipitated into the ravine from some Indian burial at the surface, is ruled out by the following considerations:

1. It had the dark color and the same state of preservation as the bones with which it was associated.

2. The fissure, or ravine, in which it was found was formed by surface erosion since the earthquake of 1811-12, hence within a period of thirty-four years. If Indian burials in that time had been undermined by the little stream, that fact would have been observed, and it is probable that other remains of the Indians would have been found; such a fact would be likely to have had its influence on Dr. Dickeson who obtained and preserved the collection, and who considered it wholly as of the same date and origin.

3. Lyell himself in later discussion made allowance for the idea that the human bone may have been of the same date as those of the Mastodon and the Equus, and deduced 100,000 years for its possible age.

The Lansing Man.

Whether this bone belonged to the fauna of the Equus beds, or to a later date, may be left uncertain. There are some other discoveries to which we must give attention. According to Udden, the Megalonyx beds of the Kansas valley are "the last general deposits of the plains" of that region. At Lansing, in northeastern Kansas, were discovered some human bones in 1902, which lay below all the loess and in the geest formed by the decay of the Carboniferous limestone and shales. This discovery and its geologic relation to the loess were fully described by the present writer in the American Geologist (Volumes XXX and XXXI, 1902 and 1903). According to Professor Williston, these bones were in the Equus beds, although at the time of discovery and also later, during the discussion that followed, they were not assigned generally to the age of the Equus beds. If Williston's opinion is correct, it appears that the Equus beds extend from McPherson, Kansas, at least interruptedly under the soil of Kansas to the Missouri river; and this brings up the question as to how far northward from the Gulf of Mexico, and eastward from the latest Tertiary lakes of the interior of the continent, the Pliocene, in the latest phase of its sedimentation, may extend.

There is a terrace along the Kansas river, made up (so far as seen) of red clay, visible eastward as far as to where the region was glaciated by the Kansan glacial epoch, which was

formed by the outlet of a lake that covered western Kansas. The writer has suggested that this terrace dates from the time of the Equus beds, when the Kansas river connected the interior lakes of Pliocene time with the Missouri river. It lies in a deep gorge cut in the Carboniferous limestone, and that points to an early date for the gorge of the Missouri river at Lansing and southward. At the same time it rather indicates that the Megalonyx beds, in which Udden found traces of granitic gravel and pebbles, are later than some Glacial epoch, and hence that they belong in the Pleistocene.

The Lansing skull was associated with the lower jaw of an infant, which suggests that the adult skull was that of its mother, a suggestion not discordant with the idea that they may both have belonged to the same race as the Loess Man of Nebraska, of which I shall speak soon. When first found, this skull was declared to be that of a woman, especially by Prof. S. W. Williston, of the University of Chicago. Prof. Ales Hrdlicka, however, in his final discussion, states that it belonged to a man. Had the remains of the so-called "Nebraska man" then been known, it is likely that Dr. Hrdlicka would have seen the propriety of considering this as a female of the same race, and more especially as it is difficult to explain why in this entombment the infant should be associated with its father rather than its mother. None of the anatomical characters given preclude the feminine gender, and some of them seem to indicate it, namely, the small stature, 5.4 feet, the comparative slenderness of the bones of the upper extremities, the comparatively small brain cavity, and perhaps the absence of heavy supraorbital ridges. The last mentioned character would be in keeping with its supposed relation to the Nebraska skulls, which are unquestionably those of males.

The Nebraska Man.

It was not long after the discovery of the Lansing skeleton that a very important discovery was made (1904) by Robert F. Gilder in the west bluff of the Missouri river near Omaha, Nebraska, about 150 miles north of Lansing. Here, according to Prof. Erwin H. Barbour, state geologist of Nebraska, were at least five human skulls and many bones and fragments of bones entombed and scattered in the loess, but lying below

a series of other skulls and bones of a different type, the two series being separated by a continuous layer of burnt clay. The upper series can be referred easily to the modern mound-builder, but the lower series he considers much older, and quite certainly of the age of the deposit in which it lies. This loess lies on coarse drift of the Kansan epoch, in the same manner as the loess at Lansing. The skulls, subjected to careful examination, were found to approach the Neanderthal man in the essential differentiating characters. They attracted the attention of Prof. H. F. Osborn of the American Museum of Natural History, who made the statement that they are of a primitive type somewhat in advance of Neanderthal man, and probably more recent than that race.

An extended discussion of the discovery of these human remains in the loess of Nebraska, with notes of the additional descriptions of Barbour and the criticisms of Hrdlicka and Shimek, was published by Mr. Gilder in Records of the Past (Volume X, 1911).

According to Sollas, the modern Australian is a near relative of the European Neanderthal man, and perhaps his descendant, his ancestors having been expelled from Europe by another race who became known later as Neolothic man.

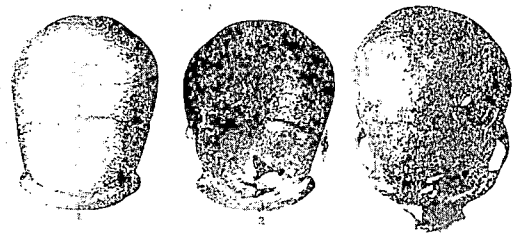

Fig. 8.

Fig. 8. Neanderthal skulls, seen from above. 1, Neanderthal; 2, Spy; 3, La-Chapelle-aux-Saints. (From Sollas, page 156.)

Fig. 9. Fig. 10.

Fig. 9. Man of the Arunta tribe, Central Australia. (From Sollas, page 171.)

Fig. 10. Elderly woman of the Kaitish tribe, Central Australia. (From Sollas, page 174.)

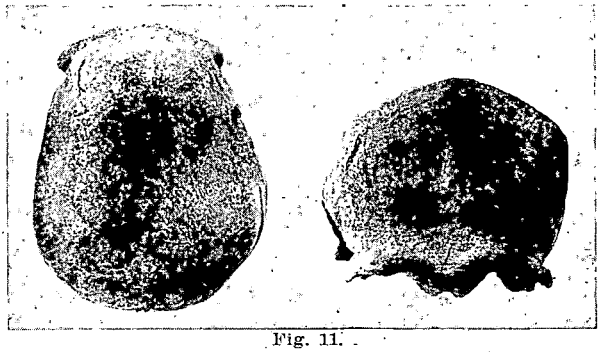

Fig. 11.

Fig. 11. The Nebraska man. (From Prof. E. H. Barbour.)

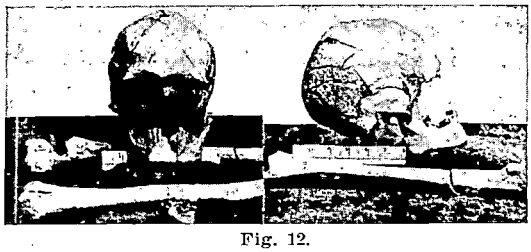

Fig. 12.

Fig. 12. The Lansing woman. (From Mr. M. C. Long.)

The most striking characters of the man of the Neander valley can be expressed summarily:

1. The massive and projecting supraorbital ridges, and the fossa which succeeds to them above.

2. The long low and receding brow. The actual brain cavity was as large as in modern man, whatever may have been the quality of the brain itself.

3. The eye orbits are large, but, sheltered below the massive supraorbital ridges, the eyes were not protruding.

4. The nasal opening is large and particularly broad, and the side bones pass with a somewhat even slope into the malar and temporal bones, indicating that the nose was larger and broader than in man of later types.

5. The average shape of the jaws was prognathous, but some specimens show an orthognathous profile.

6. The lower jaw is large and massive, and the chin is receding or almost wanting, in contrast with the chin of modern man which is projecting or rectangular.

7. The teeth are noticeably different, in that the molars increase in size from front to rear, whereas in present man they diminish from front to rear, the wisdom tooth sometimes not appearing at all. The incisors are small, but the canines are large.

8. The walls of the skull, especially in the frontal parts, are very thick.

So far as comparison can be made, it is apparent that in both the male and the female of the present Australian the skull characters are quite similar to the homologous characters of the Nebraska man, which puts these races about on the same parallel, as to rank, in the scale of human advancement. Hence, if the declaration of the most eminent European anthropologists, to the effect that the Australian is the nearest approach now living to the Neanderthal race, is correct, we are warranted to apply the algebraic formula, "things equal to the same thing are equal to each other," and to conclude that the Nebraska man is the equivalent or the near equal to the Neanderthal man. Corroborative to this syllogism is the fact of discovery, in many places, of the remains of

the same fauna that characterized the epoch of the man of the Neander valley, in the loess of the Mississippi valley, including the elephant, rhinoceros, Megaloynx, etc., a well known fauna which I have already enumerated.

Professor Osborn says in his work, "The Age of Mammals": "On Twelve Mile creek, a tributary of the Smoky Hill river in Kansas, in the blue-gray layers directly underneath the recent plains layers, are recorded remains of several species of mammals, one of them Bison occidentalis. The stratum containing the bison was about two feet in thickness and composed of fine silty material of bluish-gray color. The bone bed when cleared off was about ten feet square and contained the skeletons of five or six adult bison. The animals evidently all perished together. In removing the bones of the largest of these skeletons an arrow-head was discovered underneath the right scapula, imbedded in the silty matrix, but touching the bone itself. This evidence," Osborn continues, that "man was contemporaneous with the extinct species of bison, is of the greatest importance. At no great distance from this point bones of the elephant have been found in the same material, namely in the widespread upland marl which covered these skeletons." This account is abstracted from the more detailed description by Prof. S. W. Williston, published in the American Geologist (Nov., 1892). This discovery was made by Mr. T. Overton and Mr. H. T. Martin, assistants of Williston.

Paleolithic Implements of the Nebraska Man.

We discover further evidence of the Paleolithic age of the Nebraska man when we consider the stone implements of the region in which he lived. In the uplands of Kansas, beyond the reach of the loessian floods of the Iowan glacial-epoch, and outside of the moraine of the Kansan glacial epoch, have been found a great many rude stone implements which are like the paleolithic stone implements of Europe. I have treated these at considerable length in a recent publication of the Minnesota Historical Society (Volume XVI, Part I, 1913), "The Paleoliths of Kansas." They are mingled with stone implements of later date and of higher skill of manufacture, the product of a later people, but are distinguishable from them by the scale of weathering and a patination which the later implements do

not possess. I cannot take time here to go into details of this investigation, but will state one or two of the general conclusions to which the investigation led, and will show you some views of the implements mentioned, which can be referred with great reasonableness to the agency of the Nebraska man, or perhaps to a race that preceded the Loess man of Nebraska.

1. The Kansas artifacts are of at least three different and successive dates. The earlier, more rude implements were taken as a basis for the making of new implements.

2. Th oldest artifacts were older than the Kansan glacial epoch, and were the only ones that received this descriptive term, Paleoliths.

3. From the Paleolithic stage to the Early Neolithic, or Mesolithic, was a profound break in all the characters, marking a transition to a higher type.

4. This higher type continued through a long period, evidently through several minor fluctuations that produced glacial epochs.

5. The latest or Neolithic culture was an imperceptible outgrowth of the Early Neolithic.

Since the conclusion of this work on the Kansas specimens, partial examinations of stone artifacts from several other states have led to similar conclusions, which, however, have not been published.

Fig. 13.

Figures 13 to 19 are from "The Paleoliths of Kansas."

Fig. 13. Large paleolith from the Kansas valley. (Plate III.)

Fig. 14.

Fig. 14. Squarish paleolithic axes or knives. (Plate V.)

Fig. 15.

Fig. 15. Implements showing two paleolithic dates of chipping, the original forms being afterward partly reflaked. (Plate VIII.)

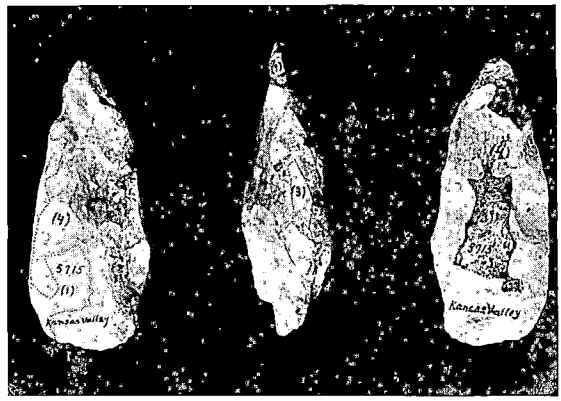

Fig. 16.

Fig. 16. Celt showing three dates of chipping by its differently weathered surfaces. (Plate XVIII.) This common and widely distributed implement type has been named a boucher by Sollas, in honor of Boucher de Perthes, the pioneer discoverer of paleoliths in France.

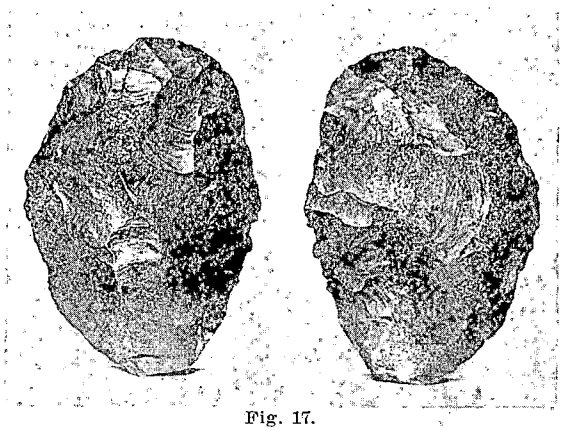

Fig. 17.

Fig. 17. A turtle-shaped paleolith found in Wisconsin. (Plate XV.)

If we take now a general view of the case, we observe at once that in every way in which we make a comparison the Nebraska man is a near repetition of the Paleolithic man of Australia, and of the Neanderthal race of Europe. This is true, for the Nebraska and Neanderthal races, as to the geo-

logical epoch in which they existed, the characteristics of their skulls, and the stone implements made and used by them. If we possessed information enough to enable us to compare them more minutely, we are warranted in the belief that they would correspond even more convincingly, however closely we might extend the investigation.

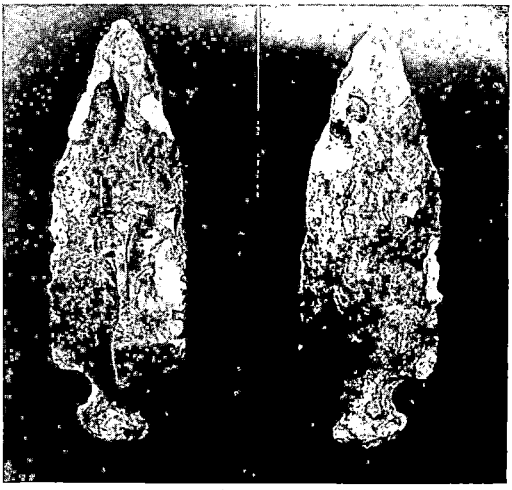

Fig. 18.

Fig. 18. An early neolith of Wisconsin, patinated and decayed. (Plate XVII.)

Fig. 19.

Fig. 19. Paleolithic boucher, found in a glacial gravel terrace at Newcomerstown, Ohio. (Plate XVI.)

Difficulties of This Interpretation.

It may be stated, probably with entire truthfulness, that no great scientific principle was ever established without meeting with obstacles. Sometimes such obstacles become sufficiently numerous and powerful to retard for a time the acceptance of the great principle, but with time and further research the great principle has risen again and again, sometimes from various sources, and perhaps where least expected, and has received such powerful presentation, with such frequent affirmation, that it has prevailed over all opposition, and the obstacles themselves have been turned into supporters instead of opponents.

So with the idea of paleolithic man in America, it has had opposition, and meets with obstacles such that sometimes it seems faint, and almost overwhelmed; but, though almost crushed to the earth, it has survived and risen again each time.

The opponents of this idea can be divided into two classes:

1. Those who are passive and hesitate because they are not convinced, or because they have high respect for those who are outspoken and active, as leaders in opposition, never having taken the trouble to make independent investigation. Sometimes such passive opponents attempt some little research, and I am sorry to say that it has happened that sometimes they have not been able to interpret the facts with any show of independence when such facts have leaned away from the dicta of their leaders, and in some cases they have smothered the correct interpretation under a flood of hesitation and doubt and of adverse suggestions.

2. Another class of objectors are such as have pronounced honestly in favor of some wrong idea, and who have now some individual hobbies to ride and cannot brook any objection. They are like Darius Green and his flying machine. They are ready to risk everything else for their hobbies.

The first class of obstacles are not of much importance, except only that they swell the numbers of the opposition and

give it more momentum. Of the second class there are two branches, namely, along the lines of anthropology and along the lines of geology.

Now I wish to consider briefly each of these lines, and at the outset I credit to all objectors the honesty of their convictions. Like Darius Green, they are so positive that they are ready to risk their lives in their defence.

Objections Along the Line of Anthropology.

The uncertainty of conclusions based on anthropological (i. e., cranial) characters is illustrated by the history of the discussions which have sprung up in Europe concerning the status in human rank of several lately discovered skulls. This uncertainty remains until a sufficiently large number of skulls have been found and accurately measured and described, so that a type of cranial form has been evolved from the mass, and, when so evolved, has been found to be continually consistent with its geological environments wherever found. It is scarcely necessary to state that even in Europe this has not been worked out completely. What we have, in the form of definite results in Europe, is meager and like the confused glimmering streaks of cloudy dawn which precede the full daylight, and is subject to future variation and correction. What I have given you embraces the only fixed conclusions. Among these conclusions is the establishment of the Heidelberg or Eolithic type of man, and of the Mousterian type, the latter alone, or at least predominantly, called Paleolithic man, otherwise known also as the Neanderthal man. I have given you his characteristics, and have compared him with the Nebraska Loess man, showing how nearly they are identical.

Now in the face of this general likeness between the two, it is objected by Professor Hrdlicka that quite a number of skulls of the same type as that of the Nebraska man have been found in the United States, and that some of them are from the mounds of the mound-builder. He also affirms that these characters are found sometimes in the existing Indian. In other words, he concludes that the somatological characters found in the man of the Neander valley, depended on as characteristic of European paleolithic man, are not reliable when

found in America, and must be set aside, because it has been found that several skulls of the same or similar type are in the National Museum, supposed, on the best evidence available, to be of modern date. That seems to bring Dr. Hrdlicka up against the current doctrine of European anthropologists. I would be excusable, probably, in leaving him and the European anthropologists to settle this difference in their own way, without any attempt to interfere. But I cannot refrain from adding a few words, which may serve to loosen the tight tangle in which they seem to be tied up.

1. In the early days many specimens were gathered rather loosely, labeled without sufficient exactness as to locality and surroundings, or not labeled at all till after some years, and were given to the representatives of the Smithsonian Institution for this national collection. It would be well to ascertain how many of the list given by Dr. Hrdlicka have indisputably correct records; for it is quite possible that some of them were derived from the loess, like those of Nebraska, which Hrdlicka insists on referring to the "Gilder mound."

2. I will call attention to the fact that the mound-builders were of two dynasties. I have distinguished them as the "Ohio" and the "Minnesota" dynasties. I have supposed that they were both post-Wisconsin as to geological date, but I have seen reason, I may say several reasons, to suspect that one of these dynasties was much older than the other, and even pre-Wisconsin in date; that is, that it preceded the closing part of the Ice age.

3. I would suggest an inquiry whether these supposedly Paleolithic skulls, found in America, may not be actually of the age of Paleolithic man. They prevail, so far as stated, in the non-glaciated parts of the United States. Skulls of Paleolithic date have been discovered in Europe in a tolerable state of preservation. There is therefore nothing unreasonable to expect them in America, had they ever existed in America. The wide area from which this type of skull is now reported points clearly to a people that were spread widely over the country. Is it not more easy for the average intelligence of American anthropologists to allow the verity of what that fact indicates than to confront the colossal task of disputing

with European anthropologists the correctness of their Paleolithic cranial type?

4. Would not the acceptance of a Paleolithic type cranium for America be in harmony with the existence here of many paleolithic stone implements, both being of pre-Wisconsin date?

Objections Along the Line of Geology.

Let us now consider briefly the geological difficulties. The "eolian hypothesis" is the hobby horse that carries all these objections, but this horse runs to the same goal as that already mentioned, and flaunts the same banner. The most daring rider is the professor of botany in the University of Iowa, Professor B. Shimek. I know of no geologist of America who mounts this horse and drives so recklessly.

I cannot here take the time to go into the details of this question. I can say only, in general, that there are two fundamental geological facts which are ignored, and apparently unknown, by the adherents of the eolian hypothesis of the origin of the loess, which, it seems to me, would convince a competent geologist of the aqueous origin of the loess of the Missouri valley. First, the loess is stratified as only water can do, from top to bottom; and second, the loess is a feature of the valleys, and not of the country at large. Neither of these features can be accounted for by the eolian hypothesis. If we look in detail at the objections that Professor Shimek has brought against Professor Barbour's interpretation of the facts connected with the locality of the "Nebraska man," we shall see vividly the untenableness of his criticisms.

The differences circle about the question, Is the material in which the bones of the Nebraska man were found "undisturbed loess," as claimed by Barbour, or is it that which would be produced by the excavation and refilling incident to a recent burial?

The descriptive facts stated by the two observers do not differ essentially, with the exception that Shimek makes no mention of a burnt and connected layer separating the mound-builder remains from those found in the loess-like material containing the skulls lying below that layer. The differences

therefore are mainly matters of interpretation and opinion, and the first thing to be noted, at this point, is the unbiased and judicial attitude of Barbour who had never committed himself, so far as I know, on the question of the age of man in America, nor on the origin and age of the loess.

The first objection brought forward by Shimek consists of the admitted association of human bones, drift pebbles (of granite), flint chips, fresh water and land shells; and he affirms that "no such combination of materials is known in clearly undisturbed loess in this country, and none has been found, excepting in connection with mounds, which are clearly the comparatively recent work of man."

That is a sweeping statement, and the reader hardly knows how to accept it in the light of the numerous records that have been published of the finding of these articles in the loess. It amounts to the arraignment of the veracity, as well as the competency, of a large number of observers from Lyell in 1846 down to the latest publications, including the date of the Nebraska man himself. The association of these articles, two or more of them, with the undisturbed loess in the valley of the Mississippi has been affirmed so frequently that it is necessary to assume either that Professor Shimek does not understand the term in the same sense as most geologists, or that he is unable to apprehend the facts so frequently asserted. He simply denies them. The effort to repeat them and to convince him of error would be a task almost impossible to achieve. I will say, only, that all those articles were found by the Concannon farmers in the excavation of the tunnel near Lansing in 1902 when the scattered remains of the Lansing skeletons were taken from the undisturbed loess, in a tunnel 70 feet long.

Shimek next objects that a darker layer is found in what Barbour considers undisturbed loess, at the depth of 7½ to 8½ feet from the surface, and he considers this as "additional convincing evidence of the correctness of his conclusions." We have to admit that it is equally convincing. In order to show its force distinctly, I herewith reproduce Professor Shimek's own photograph, and for the purpose of comparison it is put alongside of one by Mr. Gilder, published in Records of the

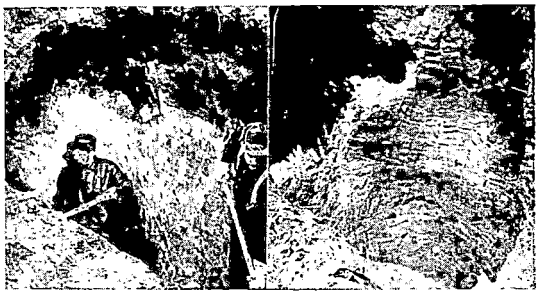

Fig. 20.

Past. The purpose of Mr. Gilder's picture is to show the contrast between the material of the burial mound on the top of the hill and the underlying loess. The dark portion shows a section of the true mound. The lighter portion, behind the man lower down, is the loess in which the primitive bones were found. The purpose of Shimek's picture is to show the dark layer which is outlined by the six markers. He states that the lowest marker (the seventh) is on the only true loess exposed in the pit, all the rest, including the dark layer, having been penetrated by the presumed burial excavation, at a depth of 12 feet below the present surface, by Indians.

But the picture reveals several other features. It shows distinctly the fundamental and universal stratification of the loess. This stratification can be produced in the loess sheet only by sedimentation from water. A tumblerful of unfiltered Missouri river water will deposit in the tumbler a stratified sediment of identically the same structure and composition. As shown in Shimek's photograph, it pervades not only that part which he considers true loess but also that which he calls disturbed loess, and even appears in the dark stratum which he considers to have been an old soil. This common feature links the three parts into a common history, whatever that may have been. Into that history came a force which gave a darker color to a thin stratum. Shimek would assume that here was an ancient soil, and he makes the statement that in it he found a flint chip and a few shells of Succinea ovalis, as if these required a different set of conditions. On the other hand it may be asserted, from the occurrence of these quite widely in the loess, that their occurrence here is convincing

evidence, along with the common stratification, that the supposed soil is only a part of the common loess accidentally given a darker color, either by being more moist or by the distribution in the sedimentation of some coloring matter. In the Carboniferous formation along that portion of the Missouri bluffs is a considerable dark shale, so black and carbonaceous that it has led locally to search for coal. To me the most likely explanation of a dark sheet parallel with the stratification of the loess at this place is the erosive action of the river, or wash from its banks by some tributary stream, at the proper time, upon this mass of Carboniferous shale. If it were an old soil, it would show roots of old vegetation, and if they were to be seen Professor Shimek would certainly have mentioned them. But, admitting that this dark layer is actually an old soil, it seems as reasonable to suppose that, in the valley of the great river, it might be buried by water as by wind.

Thirdly, Professor Shimek produces "additional convincing evidence" from a comparison of the loess lying below the "soil" layer with that above it. This lower loess is somewhat discolored toward the top, "close-grained, easily cut through, compact, yellow, with bluish-gray lines and streaks, especially in its lower part, fossiliferous, with occasional iron tubules, and showing the characteristic laminated structure when broken vertically. Unlike the upper, disturbed, layer, it contains few but larger and round nodules of calcium carbonate. The shells are all terrestial and chiefly Succinea ovalis." Barbour reported the finding of scattered fragments of bone in this lowest loess, but Shimek found none. It is not difficult to see that the points of difference between this and the upper stratum are nothing more than could be seen anywhere in the great loess sheet, and amount to nothing as evidence indicating differences in origin or in structure or in date.

It is, however, noteworthy that Professor Shimek took notice of the horizontally laminated structure, and calls it "characteristic" of the loess. It is necessary to say only that there are other deposits which geologists find characteristically stratified and laminated, namely, all the sedimentary rocks of the earth's crust, amounting to several miles when they are placed one on the other: limestones, sandstones, shale, coal,

and their variations; also drift sands and clays, particularly the clays from which brick and pottery are manufactured.

If this structure is "characteristic" of eolian deposits, it is necessary to dispense with the agency of the ocean and of lakes, and of alluvial deposition by river, and to let the winds loose from the four corners of the earth, and to call upon them to illustrate how they produced all this lamination. If the idea that lamination is "characteristic" of eolian deposits be accepted, the cornerstone of geology, as set forth by Hutton and followed to the present day, is knocked out, and there is no further use for present-day geologists. The science must be consigned to the limbo of myth and nonsense; and in the fall of geology will fall the collateral sciences which are based on geology.

In short, the eolian hypothesis is radically anarchistic, revolutionary, and destructive. It is apparent that no geologist can accept it without having his eyes blinded by ignorance or by prejudice. Two thorough and competent researches into the nature and origin of the loess have been conducted by geologists of the United States Geological Survey, and they both terminated in the rejection of the eolian hypothesis and in the establishment of its aqueous deposition. Before this conclusion is overturned, it will be necessary that a competent geologist shall go thoroughly into a new investigation and shall conclude by the affirmation of the eolian hypothesis.

Now, in conclusion, having shown you that the two lines of objection to the Nebraska man are based either on partial knowledge or on mistaken opinions, we are at perfect liberty to affirm that every method of comparison that is open to us leads us to accept the evidence of Paleolithic man in America.

END.