The remote antiquity of man not proven : primeval man not a savage / by B.C.Y.

Remote Antiquity of Man Not Proven.

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by Benjamin Charles Young

THE

REMOTE ANTIQUITY OF MAN

NOT PROVEN:

PRIMEVAL MAN NOT A SAVAGE.

BY

B. C. Y.

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PREFACE.

THIS work is an argument based on scientific facts, and supported by scientific opinions; in which the writer, in condensed form and plain style, has endeavoured to prove that the appearance of man on the earth was not at a remote age in the past, and that primeval man was not a savage.

It may be thought presumptuous for one, who is outside the fellowship of scientific societies, to dispute conclusions arrived at by a large array of scientific celebrities; but that man is of remote antiquity is not a scientific fact, but a theory deduced from certain premises; and reasoning out a conclusion from given facts is not a monopoly of scientific discoverers, nor do they make any such claim. 'I have contented myself with giving you the facts,' said Mr. Pengelly to his audience, in his lecture at Manchester on 'Kent's Cavern;' 'you are as capable of drawing the inferences as I am.' Drawing inferences, working out conclusions, is just what the writer has been doing; and the logical outcome of his reasoning is that the premises from which the remote antiquity of man is deduced will not give the conclusion.

Moreover, the facts on which this theory is based are often carious or incomplete, and their evidence rendered worthless by more recent discoveries. In a notice of Dr.

James Geikie's late work, the Professor in Owen's College says: 'The condition of Europe outside the reach of history, and the changes by which it has come to be what it is, the appearance of man and his culture, combine to form a subject which cannot in our opinion be treated satisfactorily in the present state of knowledge. New facts are being daily brought to light. The speculations of yesterday are being tested by the discoveries of to-day, and the accumulation of materials necessary to form a sound judgment even in any one department, such for instance as that of archæology, is so great that it may well daunt the courage of the boldest writer who knows the nature of the task before him.'*

The theory of man's antiquity has been peculiarly ill-fated in this respect. There has been quite a furor in the past for building up theories about man's occupation of the earth long ages back; but the speculations of one day were dissipated by the discoveries of the morrow. Two or three generations back our fathers were startled by the announcement that the Chinese chronology reached back through a period of more than two million years; and the astronomical calculations of the Hindoos, they were informed, showed the existence of man in India at a like remote time. Later inquiries, however, showed that these long dates were fabulous inventions. Then came an Egyptian scare. Some French savants claimed to have deciphered the hieroglyphics traced on two modern temples, and relegated them to a period many years before Egypt was in existence.

Later on the antiquity of man was said to be proved by the discovery of the fossil men of Guadaloupe and Denise; by the supposed fossil bones found in the coral formation of Florida; and the perforated shark's teeth found in the

* *Nature*, Feb., 1881.

crag formation in England. But these, like the earlier speculations, have all come to grief.

The geological discoveries of the present time have revived the theorizing spirit, and from caves and river-gravels, from clays and peat-bogs, and tumuli, have been collected the relics which have been regarded as giving proof that man for long ages had been a denizen of the earth. But as these relics and their surroundings are being more carefully examined, and new discoveries are being made, the evidence for this antiquity is giving way.

'I have no doubt whatever,' says Mr. Mello, 'that as it has ever been in the past, the more we know of the works of the great Creator the more reason shall we have to see one and the same Divine hand in the word inscribed on the face of nature, and that in the sacred documents of our religion.' To this the writer heartily subscribes. True scientific facts, 'unassailable as rocks of granite,' will never be out of harmony with the writings of the Divine hand in the sacred documents of our religion. But suppose the writing is not traced by the Divine hand, is not inscribed on the face of nature, but is the mere conception of a human mind, in other words a theory, deduced it may be from some deposits embedded in the earth; must that conception be in agreement with the Divine word in the sacred documents? Take, for instance, the remote antiquity of man, and early man a savage. They are not inscribed on the face of nature, nor found buried under the crust of the earth, nor written on the page of history, but are conclusions, drawn not unfrequently from unsound or deficient premises, discredited by new discoveries, and rejected by some of the most cultured and logical minds in Europe and America. Yet we often hear of waiting for a reconciliation between these inferential theories and the sacred documents which relate the creation of man, and

even of waiting for the reconciliation of the documents to the theories.

That some interpretations of the writings which record the creation of man need correction, and that the mode by which his creation has been made known to us has been misconceived, is probably true; but that these sacred documents and science sifted down to unassailable truths should be at variance, is inconceivable.

The writer does not by these remarks deprecate scientific discoveries; rather, he rejoices in the advance which has been made in the attainment of scientific knowledge. The public are under deep obligation to those earnest workers who have prosecuted scientific inquiries. By their discoveries society has been greatly benefited, and the devout have found more to admire and praise in the wonderful working of the great Artificer.

BIRMINGHAM, 1882.

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'I think our work for the present should be rather to accumulate facts without being too careful to form theories upon the few we have.'—Rev. J. M. Mello, M.A., F.G.S.

'If men of science would follow truth wherever it led them without fear of consequences, and if they would tell us clearly and courageously the difference between ascertained truth by the laws of induction and mere hypotheses which flourished to-day and were overthrown to-morrow, we should be prepared to accept any truth which came so proved, and must submit by the law of our intellectual being when we came into contact with truths as unassailable as rocks of granite.'—The Bishop of Manchester.

'There is little that I need give you in the way of inference; you are as capable of drawing the inferences as I am. . . . I will only say as a parting word to my young friend: Be careful in scientific inquiries that you get a sufficient number of perfectly trustworthy facts, and that you interpret them with the aid of a vigorous logic.'—W. Pengelly, Esq., F.R.S., F.G.S.

REMOTE ANTIQUITY OF MAN.

CHAPTER I.

CAVES.

'The value of a layer of stalagmite in measuring the antiquity of deposits below it, is comparatively little. The layers, for instance, of Kent's Hole, which are generally considered to have required a considerable lapse of time, may possibly have been formed at the rate of a quarter of an inch per annum—at which rate twenty feet may have been formed in a thousand years.'—W. Boyd Dawkins, M.A., F.R.S., F.G.S., F.S.A.

The caves with which we are concerned in this inquiry are mostly excavations in limestone rock, due in part to the action of water, by which fissures in the rock are supposed to have been enlarged and formed into chambers and galleries. In these caves have been found layers or beds of gravel, earth, sand, clay, and stalagmite, mingled with fragments and blocks of limestone. They contain also flint, stone, and metals wrought into implements, weapons, ornaments, and articles for domestic use; together with remains of extinct and other mammalia.

Some of these deposits are adduced as evidence to show that man was living on the earth at a remote period in the past.

Prominent amongst these depositories of the relics of past ages is

Kent's Cavern,

or Kent's Hole, situated near Torquay, Devonshire. The earliest discoveries in this cave were made by the Rev.

John MacEnery, a Roman Catholic priest, who visited it more from curiosity than from any expectation of finding relics; but, being dissatisfied with the way in which one of his cave-hunting companions went to work, he retired to a small recess to dig alone, and was startled by the discovery of bones and teeth. 'They were,' he says, 'the first fossil teeth I had ever seen, and as I laid my hand upon these relics of extinct races and witnesses of an order of things which passed away with them, I shrank back involuntarily. Though not insensible to the excitement attending new discoveries, I am not ashamed to own that in the presence of these remains I felt more of awe than of joy.'[1]

These discoveries, and more that followed, led in 1864 to the formation of a committee for the exploration of the cavern, composed of a number of prominent scientists.

It has been explored under the superintendence principally of W. Pengelly, Esq., F.R.S., F.G.S., who, all for love, has spent many years of the prime of his life in a systematic and almost daily investigation and collection of its deposits. In addition to these untiring labours, he has given a yearly report at the meetings of the British Association, has lectured in various large towns and cities in the kingdom; and probably it would not be too much to say, that Kent's Cavern with its discoveries, and diligent exponent, has done more to build up the theory of man's remote antiquity than any other locality in Europe.

Contents of the Cave.

First, in descending order, is a layer or bed of black mould, from three to twelve inches in depth, consisting largely of decayed vegetable matter, and containing teeth and bones, flint flakes, bone tools, and combs; bronze articles, copper, and potsherds, including fragments of Samian ware.

Next to this is an upper bed of stalagmite, called the granular stalagmite, varying in thickness from less than an inch to five feet.

Below this, in part only, is the cave earth, described as a light red loam, mixed with which were about fifty per cent. of angular pieces of limestone; and for about the space of one

[1] Manuscript of MacEnery, op. cit., p. 210.

hundred square feet, lying on this, was a black patch, called the black band, about four inches thick, consisting mainly of charcoal, which seems to have been the fireplace of those who visited the cave. The contents of these three layers are taken together. They contain remans of cave hyæna, horse (*equus caballus*), *Rhinoceros tichorhinus* (woolly rhinoceros), gigantic Irish deer (*cervus megaceros*), *Bos primigenius* (ursus), *Bison priscus* (red deer), mammoth (*elephas primigenius*), cave bear, wolf, fox, grisly bear (ursus ferox), reindeer (*cervus tarandus*), cave lion (*felis spelæa*), glutton (*gulo biscus*), *Machairodus latidens* (sabre-toothed lion), and man—the last being a part of a jaw, with teeth in the granular stalagmite; implements made of flint and chert, flint flakes, chips and 'cones,' whetstones, a hammer-stone, 'dead' shells of pecton, bits of charcoal, and bone tools, including a needle or bodkin having a well-formed eye; a pin, an awl, three harpoons, and a perforated tooth of badger. After these beds, and in some parts of the cave, under them, is a second layer of stalagmite, named the crystalline stalagmite. It was commonly thicker than the granular floor, and in one instance but little short of twelve feet thick. In this deposit was found nothing but the bones of bear. Below the whole occurred the breccia, composed of sub-angular and rounded pieces of dark-red grit, embedded in a sandy paste of the same colour, and containing rude flint nodules, remains of bear and fox; and in the material excavated by Mr. MacEnery, and left in the bear's den, remains of mammoth, hyæna, horse, fox, and deer, and a few bits of coarse pottery.[2]

The argument drawn from these deposits may be thus stated. In, and under, these several beds of cave earths and stalagmite, are found implements, weapons, and other objects which bear the marks of contrivance, and man's handiwork; these stalagmitic and other beds or layers in which these relics are found have required an immense time for their formation; the men, therefore, whose works are found in these formations, especially in the lower beds, must have been of remote antiquity.

Moreover, these works of man are found in association

[2] Mr. Pengelly's Presidential Address at Brit. Asso., 1877. Rep. Brit. Asso., 1877. Mr. Pengelly's Lect. at Glasgow, 1876.

with remains of mammalia now extinct which belonged to a remote age; he was, therefore, contemporary with them, and must have been living on the earth many long ages ago.

The argument from the association of man's work with remains of extinct animals will be considered in another chapter. Our present inquiry is then reduced to the simple question of the time required for the deposition of the beds in which the works of man were found. Were the layers of cave-earths and the stalagmitic floors formed so slowly as to require an enormous time for their deposition? and have the implements and other articles fashioned by the hand of man been found so situated in relation to these beds, as to prove that a vast time has elapsed since man made them? A few years back, the date of man's presence on earth was reckoned by geologists and archæologists at from a hundred thousand years to a million and upwards; they now generally prefer to speak of the date of his appearance as belonging to a very long, but indefinite time in the past. There are still those, however, who calculate that his time has not been less than from two hundred thousand to half a million of years.

In testing the calculations of time said to be required for the formation of the several layers deposited in Kent's Cavern, it is requisite that we should ascertain the

Order and Position of the Beds.

They do not lie one on the other in vertical succession, but mostly side by side, so that two or more would have been forming at the same time.

'The black mould, which is the first bed in descending order, is found only in those parts of the cavern into which the *entrances* (which are all in the east) immediately open, and such as are prolongations of them;'[3] but was not found in the remote parts of the cavern.[4]

'The black band occupied an area of about one hundred square feet, not more than thirty-two feet from one of the *entrances* of the cavern.'

The cave earth was of unknown depth near the *entrances*, but in the remoter parts of the cavern thinned out entirely.[5]

Below the cave earth, adds Mr. Pengelly, as we get away

[3] Glasgow Lect., 1877, p. 8.
[4] President. Address, *Nature*, 1877, p. 320.
[5] *Ibid.*

south-westerly, is another stalagmite, viz. the crystalline, and '*where* the upper one' (the granular) was five feet, the lower was twelve feet.[6]

In the report of the cave for 1869, we read: 'In proceeding *westward*, the cave earth thinned out entirely, and disappeared, so that the stalagmites, where was its proper place (*i.e.* between them) rested one immediately on the other.'[7] The upper stalagmite varies in thickness from a mere film to nearly five feet; its average thickness being from sixteen to twenty inches.'[8] 'The lower stalagmite is commonly thicker than the upper, and in *one instance* nearly twelve feet.'[9] (The italics are mine.)

The position of the beds, it will be seen, is as follows: The black mould and cave earth with the black band, which is a mere patch of charcoal with a surface of one hundred square feet, lie on the eastern side of the cave near the *entrances;* while the bulk of the stalagmites lies *westwardly* in the parts of the cavern remote from the *entrances.* As a rule, too, the cave earth thins out as it extends in a westward or south-westward direction, and the stalagmites thin out or are wanting towards the eastern part of the cave; so that they lie, for the most part, in opposite divisions of the cavern; and where they meet they have thinned down to an inconsiderable thickness. *Where*, too, the cave earth is wanting, the upper stalagmite rests on the lower; and *where* the stalagmite is wanting, the cave earth and the breccia (the lowest bed) are in immediate contact.[10]

It is evident that the black mould, the cave earth with the black band, and the beds of stalagmite, do not lie in vertical succession, which will greatly alter the estimate of time required for their accumulation. For if some of the beds were forming in the eastern division of the cave, while others were forming in the remote or westward portion, and if, where they met or lapped, both had thinned, the time needed for their formation would be greatly lessened.

Having ascertained what has to be measured, we shall endeavour to show that neither the cave earths on one side

[6] President. Address. *Nature*, 1877, Glasgow Lect., 1876, p. 15.
[7] Rep. Brit. Asso., 1869, p. 193.
[8] Mr. Pengelly's Manchester Lect., 1872.
[9] *Nature*, 1877, p. 320.
[10] *Ibid.*

of the cave, the stalagmites on the other, nor the two together where they lap, have required any great length of time for their deposition.

Stalagmite

is produced by the action of water charged with carbonic acid, which percolating through the roof of the cave dissolves the carbonate of lime in the limestone through which it passes, and dripping from the ceiling of the roof forms bosses, or spreads out as a pavement on the floor of the cave.

This stalagmite is the principal time-gauge used to show that the deposits of Kent's Cavern have required a prodigious time for their formation.

An extract from one of Mr. Pengelly's lectures will give the calculation by which this conclusion is reached. He is lecturing in the Hulme Town Hall, Manchester, at the end of 1873. He has popularized his subject, and has evidently an attentive audience. 'Well, I have told you,' he says, 'that we have found Romano-British and Pre-Roman objects in the black mould. We feel perfectly satisfied that this deposit is worth as a minimum 2,000 years. Now comes the question, how much time does the granular stalagmite represent? A stalagmitic floor cannot be formed faster than the limestone overhead is dissolved, and the rate at which that is dissolved depends on the amount of carbonic acid in the water. We feel perfectly satisfied it must be very slow work. On a boss there is the following inscription: "Robert Hedges, Feb. 20th, 1688." That is 185 years ago. There is another inscription which had not been noticed till last June, which is earlier still, dated 1604, that is 269 years old. Let us say 250—we can afford to be liberal. Now how much carbonate of lime has accreted on those ancient inscriptions made 250 years ago? Not more than the twentieth of an inch in thickness in a part of the cavern where the stalagmite has been formed with unusual rapidity. Judging from these bosses, you perceive clearly enough that it would take twenty times that amount of time at that rate to represent an inch, that is 5,000 years, and we have fully five feet to account for in the granular stalagmite only. Now, ladies and gentlemen, are you

prepared for that amount of time? Five thousand years for an inch, and sixty inches—sixty times 5,000 years! What then? After you have got below the cave earth you have another stalagmite little short of twelve feet in thickness, and you have that to account for in addition.'[11] We must not omit to say that, cautioned by the rapid accumulation of stalagmite in a cave in Yorkshire, the lecturer added: 'I am not prepared to insist on your receiving this rate of increase as a chronometer. I am willing to admit that it may have been faster for anything I know to the contrary; but supposing it were fifty times as fast—and that I take to be a very high estimate indeed—were our fathers prepared for the reception of the time thus obtained?' Yet Mr. Pengelly repeats his calculation in his lectures at Glasgow in 1876 and 1877;[12] and at the close of his presidential address at the meeting of the British Association in 1877, says that the state of the evidence from Kent's Cavern compelled him to believe that the earliest men of Kent's Hole were interglacial, if not preglacial.[13]

We do not question the statement that the accumulation of stalagmite on the boss was one-twentieth of an inch in the 250 years; it is, however, very difficult to conceive that through that long time the drip was continuous; but if so, that rate of increase was not the measure of accumulation where the stalagmite was five and twelve feet thick. The increase, Mr. Pengelly informs us, is not the same in different parts of the cave. Of the granular stalagmite, which 'varies in thickness from five feet to a mere film,' he says, 'that wherever the drip in wet weather is very copious, there the stalagmite is of great thickness; and wherever there is very little drip, the stalagmite is thin.'[14]

He tells us, too, of such an abundant supply of stalagmite, as not only surmounted and completely encased the crystalline portion of a boss forty-three feet in basal circumference and thirteen feet in height, but 'flowing in vast sheets formed the thick granular floor, spreading far without a break in every direction.'[15] This occurred in that part of the cave where the two beds of stalagmite were in contact,

[11] Pp. 129-131.
[12] Pp. 31, 10.
[13] *Nature*, 1877, p. 320.
[14] Glas. Lect., 1876, p. 15.
[15] Rep. Brit. Asso., 1874, p. 9.

and where the stalagmite was the thickest, for there was no intervening cave earth.' And this stream of calcareous matter formed the 'thick' floor of the granular or upper stalagmite, and where the upper one was five feet the lower one was little short of twelve feet.[16] Was this stalagmite which surmounted and completely encased this huge boss, and formed the thick granular floor by its outspreading stream, supplied by drops at the rate of an inch in 5,000 years?

There would be no difficulty in conceiving that during some of those wet seasons when the calcareous matter flowed so freely, that an inch might have been formed in five months instead of 5,000 years. In the early history of the cave too, when the rainfall was more abundant than in later years, and the forest growths furnished large supplies of *decayed* vegetable matter which would yield the needed carbonic acid, the formation of stalagmite would be far more rapid than in modern times.

We find then, from the evidence of the cave itself, that the accumulation of stalagmite is not slow. But we have other evidence which shows that instead of increasing slowly, stalagmite accumulates rapidly. Professor Boyd Dawkins, one of the committee appointed for the exploration of this cavern, in his late work on 'Early Man in Britain,' states that 'in the Ingleborough Cave, in Yorkshire, the growth of stalagmite has been so swift that between 1845 and 1873 a stalagmite boss known as the Jockey Cap has grown at the rate of ·2941 inch per annum.'[17] And at the meeting of the British Association at Swansea in 1880, he added that the series of observations by which that result was obtained, were made through those years by Professor Phillips, Mr. Farrer and himself; that the rate of accumulation of stalagmite is variable; sometimes it is slow, and sometimes very swift, as in the Ingleborough Cave. 'It is obvious, therefore,' he says, 'that all speculation as to the deposits in caves which is based on the view that the accumulation is very slow, is without value.'[18] This increase on the Jockey Cap is at the rate of about

[16] Glas. Lect., 1876, p. 15. [17] Page 24.
[18] *English Mechanic and World of Science*, Sept. 1880.

eight inches in twenty-eight years; while eight inches, according to Mr. Pengelly's calculation from the inscription boss, would require for their accumulation 40,000 years. And, instead of being 'fifty times as fast,' it is more than 1,400 times as fast.

Mr. John Curry reports that at Bottsburn, in Durham, three-quarters of an inch of stalagmite formed on some narrowish deals that were set *edgewise* in fifteen years.[19] This, though a diminished rate of increase as compared with that of the Ingleborough Cavern, is strangely divergent in its result from that of the Kent's Cavern calculation. It is twenty years for an inch against 5,000. And the drip fell on deals which were set edgewise, which would afford but a narrow surface for its retention.

Mr. Bruce Clark[20] writes to say that he visited a cave at Poole's Hall, near Buxton, where some gas-pipes had been laid down six months before, and that one-eighth of an inch of stalagmite had formed there in that time. This is at the rate of one inch in four years, in place of 5,000.

Of the same cave it is stated in the *Archæological Journal*, that a large piece of stalagmite was found which has been supposed to be several thousand years old. The man in charge of the cave has excavated the floor at the entrance, and at the depth of six feet found fragments of Samian ware, a perfect fibula, and a denarius of Domitian.[21]

Professor Alexander Winchell, of the Michigan University, in a letter received from him by Dr. Southall, stated that in one of the lead caves near Dubuque, Iowa, stalactites three feet long have formed in three years.[22]

Captain Brome, in his excavations in Martin's Cave, Gibraltar, found two iron swords, with articles of flint and silver; and close under the south side of the cave he discovered a copper plate, lying under eighteen inches of hard stalagmite. 'The plate,' states the writer, 'is said to be of Limoges' work, and of the same period as the swords.' The date is probably at the end of the twelfth or thirteenth century. If the whole time since its deposition were reckoned, the formation of this bed would be at the rate

[19] *Nature*, Dec. 1873.
[20] *Ibid.*, Jan. 1874.
[21] *Ibid.*, March, 1875, p. 127.
[22] 'Epoch of the Mammoth,' p. 93.

of about forty years for an inch; but there has to be deducted the time for the accumulation in a cave of six feet of earth *on* the stalagmite.[23]

A closing quotation on the rate of increase of stalagmite we make from Professor Dawkins's work on Cave-hunting.[24] 'If,' says Mr. Dawkins, 'the Jockey Cap be taken as a measure of the rate of growth of these deposits, all the stalagmites and stalactites in the cave may not date farther back than the time of Edward III.;' and 'it is evident from this instance of rapid accumulation, that the value of a layer of stalagmite in measuring the antiquity of deposits below it is comparatively little. The layers, for instance, in Kent's Hole, which are generally believed to have required a considerable lapse of time, may possibly have been formed at the rate of a quarter of an inch per annum. It may fairly be concluded that the thickness of layers of stalagmite cannot be used as an argument in support of the remote age of the strata below. At the rate of a quarter of an inch per annum, twenty feet of stalagmite might be formed in a thousand years.'

In Kent's Cavern, as we have seen, *where the two layers of stalagmite were five feet and twelve feet respectively, they were in contact;* the granular bed lay immediately on the crystalline.[25] The cave earth, where was its place, thinned out before it reached the place of contact. The black mould occupied the entire eastern division with the exception of a small chamber in its south-western end only, but was not found in the other remote parts of the cavern. The measurement, then, of stalagmite in a vertical line at its greatest depth is seventeen feet, which, at the rate of increase on the Jockey Cap at Ingleborough, would require a trifle over 800 years for its accumulation.

Considering the rapid deposition of this calcareous matter which has occurred at some seasons, this rate of increase has not improbably occurred at Kent's Cavern; but as it does not accumulate at one uniform rate, it will be safer to give a wider range for its increase, from 2,000 to 3,000 years would be a very liberal *guess.*

[23] Internat. Cong. Prehist. Archæl., 1868, pp. 135, 136.
[24] Cave Hunting, pp. 39-41.
[25] Lect., 1876, p. 24.

The layers of

Cave Earths,

we might assume, were deposited in about the same time as the stalagmitic beds which formed at their sides; but it may be more satisfactory to take a measurement through them, and no spot seems more suitable for the purpose than one described by Mr. Pengelly in one of his Glasgow lectures. 'In the fourth foot-level of the cave earth,' he says, 'the greatest depth to which it had been excavated, there were found a well-formed bone pin and the unworn crown of a molar tooth of a rhinoceros. Vertically over them there lay, in ascending order, four feet of cave earth with the black band. Over this lay the granular stalagmite, twenty inches thick, surmounted by the black mould; and the whole was crowned with large blocks of limestone, cemented into a firm mass with carbonate of lime, which reached to the roof.' At this spot, it will be seen, the cave was filled from the fourth foot-level of the cave earth up through the black band and the black mould to the place where the limestone blocks touch the roof. How much time was required for the deposition of this succession of layers?

The black mould contains Romano-British and Pre-Roman articles, such as bronze rings, spoons, etc., smelted copper, combs, pottery distinctly Roman in character, including fragments of Samian ware. From the presence of these Roman relics, Mr. Pengelly claims for the formation of the black mould at least 2,000 years. But this assumes that Roman pottery found its way directly from the place where it was wrought by the potters to the place where it was deposited, and that Samian ware reached our island straight from the manufacturers, was at once broken into 'fragments,' and thrown into the Devonshire Cave. It is difficult, too, to understand how, under ordinary circumstances, Roman pottery, including Samian ware—'the combs of the misses and the combs of the maid,' as Mr. Pengelly facetiously calls them—with a number of ladies' trinkets, should find their way to the cave. Surely people who possessed articles of value, and who kept servants or slaves, would not elect to dwell in the dens and caves of the earth, and carry thither articles of value and ornament. Mr. Mello thinks that the Roman relics found in the Cresswell Cave were

carried thither when, on the withdrawal of the Roman legions, the Britons were left a prey to the numberless hordes of invaders; and the same invasion will probably account for the relics named being found in the Devonshire Cave. But whether it was so or not, it is a mere assumption that the Roman and other articles were deposited in the cave 2,000 years ago. Four or five centuries might be discounted from this estimate.

No definite estimate can be made of the time required for the formation of the cave earth; but an examination of its position in relation to the stalagmite, and the means for supplying the material of which it is composed, favour the conclusion that the required term was not a protracted one. Mr. Pengelly thinks that the cave earth with the black band, which he says may be taken as one, represents a vast period of time. His principal argument is, that the cave earth (which he distinguishes from the blocks and other material with which it is mingled) was introduced in minute quantities, with long intervals of time. The bed is described as of light-red clay containing angular pieces and blocks of limestone; and he asks how the cave earth could be supplied in a short time. A small portion of it, he thinks, may be the earthy residuum of the carbonate of lime which is dissolved, but principally it was washed in day by day in very small instalments,[26] through the openings by which the cavern is now entered. The bed usually contained fifty per cent. of small pieces of *limestone*, rather numerous blocks of limestone from an ounce to a hundred tons weight, like those lying in the black mould, which in that deposit had fallen from the roof, and doubtless in this also. Such immense stones, we conceive, could not fall from the roof without bringing down with them much of the dislodged *debris*. There were, moreover, stones of distant derivation, such as pieces of granite from Dartmoor. Surely fifty per cent. of pieces of limestone, rather numerous, blocks of limestone weighing some of them a hundred tons, the *debris* from dislodgment of stones from the roof, stones of distant derivation, and the large harvest of relics found in the bed, would leave small room for what is distinguished as cave earth to supply beyond filling up the interstices between

[26] *Nature*, 1877, p. 320.

the several objects. And this the instalments carried in at the entrances and supplied by the residuum and *débris* from the roof, would furnish without the lapse of a long period of time. Further, in support of this long period, we are told that certain objects, as stones or bones, are found in the cave earth invested with films of stalagmite. They were exposed to the drip, which left on them this film of calcareous matter. Then followed the introduction of a thin layer of cave earth, and just above it is found another stone or bone under the same conditions; and this is repeated thrqugh the entire thickness of the cave of earth. This, it is thought, shows that the cave earth was introduced very slowly, and must represent a very long time. Yes, no doubt if the drip fell on the layer of cave earth at the rate of one-twentieth of an inch in 250 years; even a film of stalagmite at that rate would keep the lamina of cave earth a long time waiting for its coating: but if the drip was very copious, in wet seasons, as we are told it was—and not many seasons would pass in Devonshire without wet weather—the investing of a stone or bone on the surface of every layer of cave earth, would show that it was supplied in such measure as not to allow time for more than a film of stalagmite to be deposited before it was again covered with the incoming cave earth; and thus that a mere film of this calcareous matter found investing the objects on which it fell would prove the very reverse of what it has been adduced to show.

There are no data that will enable us to fix on a term of years required for the formation of the cave earth; but the supply of the material of which it is formed, and its side-long position in relation to the stalagmite, indicate rather a short than a lengthened period for it, together with the black mould, to fill up the space beside the stalagmites.

We come now to the breccia, on which in some portions of the cavern the crystalline stalagmite rests, and with which in other portions the cave earth is in immediate contact.

This is the chief battle-field of the question of man's remote antiquity, so far as this cave is concerned. In this bottom bed are found certain rude pieces of flint and chert, said to have been the tools of men who visited the cave many hundreds of thousands of years ago. Indeed, these men, we are told, were savages of the lowest type, shown

to be such by the rude tools they used, and which with the position of their implements under layers of stalagmite and cave-earth, that are supposed to have taken an immense time for their deposition, prove that an enormous time must have elapsed since these early men in Britain chipped their lumps of flint and chert, which 'were no better for chipping,' they were such lumpish fellows.

We have nothing to do in this inquiry with the time when this bottom floor of the cave was excavated, doubtless by the action of water; nor with the time when the sandy paste, the red grit, and blocks of limestone found a lodgment there; but only with those objects which indicate the presence of man, and the time when his works were deposited. How many years have elapsed since so-called early man resorted to this lowest bed of the cave, we shall not attempt to show. In the absence of historical dates that would be impossible, but if 3,000 years or thereabout were given as a *moot number*, neither formations of stalagmite, nor the deposition of cave earths, nor remains of man found in them, nor the association of those remains with the bones of extinct animals, could be shown to require a longer term.

The association of human remains with those of extinct animals, and the bearing of 'tools' made from nodules of flint and chert on the social condition of early man, will be considered in future chapters, but human and animal remains found in this lowest bed of the cave, belong to the question immediately before us.

In this deposit were found remains of bear, lion, and fox; and in the bears' den excavated by Mr. MacEnery were found 'one tooth of horse, one of fox, two teeth of deer, four of hyæna, four of mammoth, and a few bits of coarse pottery.'[27] The evidence that these relics belonged to this lowest bed amounts to a demonstration, and unquestionably shows that they were not deposited many long ages ago. Mr. MacEnery's description of the 'find' is carefully written. He says that the lower sheet (of stalagmite) extended over the outer area of the whole den. The removal of the superincumbent bed of rubble (cave earth) which partially covered it, displayed the entire surface of

[27] *Nature*, 1877, p. 320; and Rep. Brit. Asso., 1877, pp. 2-4.

the lower sheet, which exhibited a most singular appearance. Over the whole area it was cracked into large slabs, resembling flags in a pavement. The average thickness of the cracked sheet was about two feet, and possessed the hardness of rock; and but for the division into insulated flags, it would have been almost impossible to pierce it. 'Mr. MacEnery,' says the reporter of the committee, 'had left, as was his wont, the materials where he found them;' but they were kept separate from other specimens, and were carefully collected by the committee. Here we find remains of horse, fox, deer, hyæna, mammoth, bear, and a few bits of coarse pottery, locked up in the bears' den, which were under the lower stalagmite two feet thick, harder than rock, and which, but for cracks which divided it into flags, it would have been almost impossible to pierce.

These particulars of the discovery were carefully written down by an educated man, and the whole of the deposits, left in the place where they were found, were carefully collected by the committee. The report, drawn up and approved by them, was presented at the annual meeting of the British Association, and appears in their published report. Now here is a startling fact, which, if true, disposes of the remote antiquity theory, so far as this lower bed of Kent's Cavern is concerned.

But we must hear what the committee say in their report on this discovery, which shall be given in their own words. (The italics will be mine). 'It cannot be doubted,' they say, 'that cracks such as MacEnery describes, *if* at all approaching in width to that still existing in the stalagmite boss, must be a possible, and indeed probable, *source of uncertainty* respecting the position and relative chronology of *some of the objects* found in the underlying deposit, especially if, as he states, this deposit shared in the disturbance; for it must be supposed that portions of the overlying cave earth, with bones and coprolites such as he found in it, would pass down the cracks, and be lodged *on*, and *perhaps in*, the underlying breccia.'[28]

If the bears' den had shared in the disturbance of the lower bed, it evidently had not done more than crack the

[28] Rep. Brit. Asso., 1877.

stalagmite; for Mr. MacEnery found the sheet extended over the outer area of the whole den. The committee say *if* the cracks described by MacEnery at all approached that existing in the stalagmitic boss, then there might be some uncertainty respecting the position and chronology of some of the objects found in the underlying deposit. The crack that passes through *the boss* is from one quarter of an inch to two inches and one-twentieth of an inch. But MacEnery made no allusion to the boss; he was speaking of *the sheet of stalagmite that covered the area of the den.* The width of the crack in the north-east corner, which runs from wall to wall, the committee say is half an inch. Is it conceivable that these objects should fall just in the cracks that divided large slabs of stalagmite, and that bulky teeth of the mammoth and horse, and pieces of coarse pottery (not described as 'fragments,' the word commonly used when the pieces are small) should find their way through two feet of stalagmite by cracks half an inch wide, or the width of the boss crack even, so as to rest *on* or *in* the underlying breccia? 'In' it must have been, not 'on,' for Mr. MacEnery had to break up the stalagmitic pavement to reach them.

The committee seem to have little or no faith in their own way of accounting for the position of these objects. They can only say that *if* the cracks at all approach in width that of the boss (whose maximum width was two inches and one-twentieth), to which approach Mr. MacEnery makes not the slightest allusion, then indeed there must be not a probability, not even a possibility of these objects finding their way through the cracks, but a possible, and indeed probable, *source of uncertainty* respecting the position and relative chronology of these objects. Now, if there is any uncertainty about the position of these objects, sealed down as they were by two feet of stalagmitic pavement simply cracked, and of such solidity notwithstanding as to be with difficulty broken up, then there is no certainty respecting the position of any object in the British caves.

If, then, these relics belonged to the breccia, the lowest bed of the cave, the horse (*equus caballus*), the fox, the lion lived when these deposits were made; and there were potters in those days, men who had not reached the style and finish of Roman pottery, but who had moulded the

clay into the shape of the utensils they had purposed to form, and archæologists will know what that means.

But assuming that these objects did pass down through these cracks and lodge in the breccia (not admitting it), we ask what was the position of these remains before they found their way through the cracks? Mr. MacEnery says there were beds of cave earth (rubble, he calls it), that were lying on the stalagmite, and on the removal of these beds *the entire surface* of the stalagmite was displayed, and the area presented the appearance of being cracked into large slabs. They, therefore, must have fallen from the beds of cave earth, and from their lower level it may be presumed (unless, indeed, they accomplished the notable feat of getting through the foot-thick bed of granular stalagmite, which Mr. MacEnery says was over it, and then through the cave earth). In that case, the men who made the pottery lived at or before the 'palæolithic' times, and the potters were (according to the Kent's Cave classification) both palæoliths and savages of the second grade. But we are trenching upon a question which will come before us in another chapter.

There is yet another argument drawn from Kent's Cave by which Mr. Pengelly endeavours to support the theory of the remote antiquity of man, which he bases on the absence of the hyæna from the lowest bed. The two races of Troglodytes (savages) represented in the cave-earth and breccia, are separated, he says, by a wide interval. 'But perhaps,' he adds, 'the fact which most emphatically indicates the chronological value of this interval is the difference in the faunas. In the *cave-earth* the remains of the hyæna greatly exceed in number those of any other mammal. In short, Kent's Hole was one of his *homes*. When, however, we turn to *the breccia*, a very different spectacle awaits us. We meet with no trace whatever of his presence, not a relic of his skeleton, not a bone on which he has operated. *Can it be doubted that had he then occupied our country he would have taken up his abode in our cavern?* Need we hesitate to regard this entire absence of all traces of so decided a cave-dweller as a proof that he had not yet made his advent in Britain? Are we not compelled to believe that man formed part of the Devonshire fauna long before the hyæna did? Is there

any method of escaping the conclusion that between the era of the breccia and that of the cave earth it was possible for the hyæna to reach Britain? In other words, that the last continental state of our country occurred during that interval? I confess that *in the present state of the evidence* I see no escape, and that the conclusion thus forced on me compels me to believe also that the earliest men of Kent's Hole were *interglacial*, if not *preglacial*.'[29] (Italics mine, except the last two words.) If I understand this earnest peroration, it means that at the time some nodules were being deposited in the breccia supposed to be chipped by man, the hyæna had not reached Devonshire from the continent, but that while the stalagmite was forming, an upheaval of the land occurred, or a sinking of the waters, by which our island was joined to the continent, so that the hyæna could cross from thence and find his way to Devonshire and Kent's Hole, and consequently the men who chipped the nodules of the lowest bed were here before there was a highway for the hyænas, which must have been at a very early date. This conclusion that the hyæna could not have been in this country at the time when these nodules were deposited, it will be observed, is made to depend on the fact that he did not come to Kent's Hole. '*Can it be doubted*,' it is asked, '*that had he then occupied our country, he would have taken up his abode in our cavern?*' No doubt the hyæna was a silly animal to be in Britain and not have found his way to Devonshire and Kent's Hole, where afterwards he seems to have been master of the situation, and have revelled in the midst of an abundant supply of dainty food—but so it was. In turning over the pages of the 'Transactions of the Manchester Geological Society,'[30] we alighted upon a discussion on a paper read by Mr. Mello on the Creswell Caves,[31] at which Professor Dawkins called attention to some animal remains from Mother Grundy's Parlour. 'I have here on the table,' said the professor, 'a few of the specimens which have been alluded to this afternoon. I would just ask your attention to the very remarkable series of remains of the hyæna, which were found in the lower bed along with the remains

[29] President. Address, Brit. Asso., 1877. *Nature*, 1877, pp. 322, 323.
[30] Vol. xv., p. 298.
[31] Rev. S. M. Mello, pp. 296, 297.

of the hippopotamus. The result of the exploration of these (Creswell) caves, so far as they bear on the history of man, may be summed up as follows. In the two lower stages, *b* and *c*, the hunters are identical with those of the river drift. . . . The exploration, however, of a fourth cave, termed Mother Grundy's Parlour, by the Rev. J. M. Mello and myself, in November, 1878, has revealed an earlier chapter in the history of the caves of Creswell Crags. Underneath the lower red sand, *c*, the lowest ossiferous layer in the other caverns, was a layer of red clay, varying in thickness from six inches to three feet, and resting on a ferruginous yellow sand a foot thick. In both these the remains of hyænas were very abundant. No implements were found at this horizon, and there is therefore no proof that the palæolithic hunter was a contemporary of these animals in this district.'[32]

Here we find that in the two lower stages, *b* and *c*, in the first-named caves, the hunters, as they are termed, were identical with the drift-men. In Kent's Hole the hyænas were not found, says Mr. Pengelly, in the lowest bed, but only remains of man. In one of the Creswell Caves the order was reversed, and the hyæna and the hippopotamus were in the lowest bed, and man in the higher. Unknown to him, the hyænas were in Britain in large numbers when Mr. Pengelly was constructing his argument to prove that man was '*interglacial* if not *preglacial*;' but they preferred Derbyshire to Devonshire, and Mother Grundy's snug Parlour to the dark sandy paste and red grit of Kent's Hole. And at the same time in the lowest bed of his own cave, where he thought there was no trace of its existence, four teeth of the hyæna were lying in the bears' den, where Mr. MacEnery left them.

Mr. Alfred R. Wallace, F.Z.S., has lent the weight of his name to the remote antiquity theory, as proved by the long time required for the formation of the several beds of Kent's Cavern. And it is to be regretted that he has not made himself acquainted with the facts on which he has based his calculation.

'The granular stalagmite,' he says, 'varies in thickness

[32] 'Early Man in Britain,' pp. 186, 187.

from sixteen inches to five feet; below this is another, much older stalagmite, in *some parts* of the cave twelve feet in thickness. More than two centuries ago names were cut into the stalagmite, which are still visible, and in that length of time the drip has not deposited more than about an eighth of an inch, or say one-hundredth of a foot, which gives a foot in 20,000 years. 'A fair estimate,' he adds, 'will therefore give 100,000 years for the upper stalagmite, and about 250,000 for the deeper layer; and allowing 150,000 for the deposit of the cave earth *between* (my italics) the stalagmite floorings, we arrive at the sum of half a million as representing the years that have probably elapsed since flints of human workmanship were buried in the lowest deposits of Kent's Cavern.'[33]

There are several inaccuracies here. The calcareous matter deposited was not one-eighth, but, according to Mr. Pengelly, one-twentieth of an inch. The report of the British Association, *from which Mr. Wallace made his quotations*, does not say that the deposit on the inscription was not more than about the eighth of an inch, but that *the incisions made in cutting the names* were not more than the eighth of an inch, and that the calcareous matter precipitated in that time had not been sufficient to obliterate them. The thickness of the granular stalagmite was *not* from sixteen inches to five feet, but from less than an inch to five feet, and *on an average from sixteen to twenty inches.* The description of the lower stalagmite, as given in Mr. Pengelly's presidential address, is, that it was commonly thicker than the granular floor, and in *one instance* (not in 'some *parts* of the cave') but little short of twelve feet. These errors, so far, do not materially affect the calculation; a few scores of thousands of years are not of much importance either way when the estimate is half a million, but they impair confidence in its correctness. There is another error of a more serious character, which so alters his estimate as altogether to invalidate his calculation. He puts down 100,000 years for five feet of granular stalagmite, 250,000 for the lower stalagmite, and reckons an additional 150,000 for the formation of the cave earth which he places '*between*' the two stalagmites, and measures the

[33] *Nature*, 1873, pp. 462, 463.

three as lying in vertical succession in the following order: Upper stalagmite, five feet; lower stalagmite, twelve feet; layer of cave earth *between the two.* Whereas there is no cave earth between five and twelve feet of stalagmite. No such succession of beds exists. A slight attention to the report of the British Association for 1869,[34] from which Mr. Wallace quotes, will give the correction of these mistakes, as the following quotation from that report will show.

'In proceeding westward,' it reads (that is from the *entrances* where the thickest part of the cave earth is found), 'the cave earth *thinned out and entirely disappeared*, so that the two stalagmites, where was the cave earth's proper place, rested one immediately on the other. At two feet beyond the point where the cave earth was lost, it once more appeared between the stalagmites, but it was a mere patch running along the northern wall eleven feet long, six and a half feet wide in the widest part, and thirty-two inches deep, and was sealed up with the overlying floor of stalagmite *never quite a foot thick.* We are not told what was the thickness of the lower stalagmite at this point, but it was not the place where it was twelve feet; as where the upper one was five feet, the lower one was twelve feet,[35] and the upper one here was not quite one foot. 'Across the chamber the sections of stalagmite ran towards the southern wall' (from the northern), 'and uniformly showed that they contained no cave earth.'

From this report we learn that the cave earth, as it runs westward, where the stalagmite becomes thick, thins out entirely, and with the exception of the thinned portion, and the small patch running along the northern wall, it is nowhere between the stalagmites, and where the stalagmite overlay the small patch, it was never a foot thick. Where, then, are two floors of stalagmite five and twelve feet thick, with a bed of cave earth or any quantity of cave earth between them?

The bulk of the cave earth was evidently forming in the eastern part of the cave, while the thick portions of the stalagmites were forming in the western.

[34] Rep. Brit. Asso., 1869, p. 193.
[35] Glas. Lect., 1876, p. 15.

It is not necessary that we should repeat here what has been written a few pages back to show that stalagmites have not required long periods for their formation. We have adduced Mr. Wallace's calculations to show that they contain no new evidence in proof of man's antiquity, and how important it is that leaders of thought should give accurately the facts on which they base their conclusions. Here are four or five mistakes in the facts on which a gentleman of culture and great influence builds up an estimate of half a million years which have been required, he says, for the formation of the several deposits of Kent's Cave, one of which amounts to a difference of 150,000 years; an estimate which has been quoted by almost every writer who has attempted to prove the high antiquity of man, and has doubtless been accepted by many hundred thousands of persons both in Europe and America.

CHAPTER II.

CAVES—continued.

'The supposed human fibula (found in the Victoria Cave) might be the bone of almost any animal. All ideas of the habits of the cave-dwellers founded upon it were therefore mere fictions.'—Dr. Murie.

'The clay above the bone-bearing strata at, and within, the entrance (of the cave) is not proved to be boulder clay, because there are no boulders in it; nor is it proved to be glacial clay, because clay of that kind is now being deposited.'—Prof. Boyd Dawkins, F.R.S.

Brexham Cave.

This cave was discovered in 1858, and at the time created considerable interest in scientific circles, but of late years has been overshadowed by Kent's Cavern, near to which it lies. The beds, as given by Sir C. Lyell and Professor Dawkins—which the latter, in his work on 'Cave-Hunting,' has marked in descending order, as A, B, and C—are thus described: (A) has a layer of stalagmite on the floor, containing bones of several of the extinct mammalia. (B) a reddish cave earth, with fragments and blocks of limestone, and relics of extinct and living animals, containing also flint tools. (C) at the bottom of the cave earth was a deposit of gravel, principally of rounded pebbles, brought in by tributary streams. In this were found remains of four mammalian animals, and some flint tools.

We can find no proof from this cave that man lived and made tools at a period far back in the past; neither the position of the 'tools' nor their association with remains of extinct animals will give such a conclusion.

Probably the most satisfactory mode of ascertaining the evidence deducible from the cave on this question will be to pass down through the several deposits, and take the evidence of each in succession.

Mr. Pengelly, who superintended the exploration of the

cave, has distributed it out into four beds, and five deposits; and his order we propose to follow in our inquiry.

The first, or uppermost deposit, consists of a floor of stalagmite, from a few inches to a foot thick, continuous over considerable areas, but not throughout the entire cavern. The mammals represented were: bear, reindeer, *rhinoceros tichorhinus*, mammoth, and cave-lion. There were no remains of man.

The second deposit, or first bed, consisted of a mass of small angular fragments of limestone cemented into a firm concrete with carbonate of lime, which extended from the principal entrance only thirty-four feet. It yielded only bear and fox. No trace of man was found here.

The third deposit, or second bed, was a layer of blackish matter, about twelve feet long, and nowhere more than a foot thick. No remains of any kind are assigned to this bed.

These three deposits, two of which are mere patches of thirty-four and twelve feet long, at the entrance-side of the cave, constitute bed A in Professor Dawkins's section. Bed three is a red loam, with limestone, varying from small bits to blocks a ton weight. The mammalia represented are: mammoth, *rhinoceros tichorhinus*, horse, *Bos primigenius*, *B. longifrons*, red deer, reindeer, roebuck, cave-lion, cave-hyæna, cave-bear, grisly bear, brown bear, fox, hare, rabbit, *lagomys spelæus*, water-vale, polecat, and weasel. With these were eleven pieces of flint, 'which show evidence of having been artificially worked.' 'Two of these lying apart proved to be parts of one and the same nodule tool.'[1] Mr. Pengelly had little or no doubt that it had been washed out of the fourth or lower bed and re-deposited in the third. Of that re-deposition, however, there is no proof. It was found in the higher bed, and from anything that appears to the contrary, had been there from the time of its deposition. Admitting that these pieces of flint were 'undoubted tools,' there is here no evidence to show that they were used by man at a very remote period in the past. The *position of the bed* supplies no proof of the kind, for, excepting a small space at the principal entrance to the cave, there was nothing above this

[1] *Nature*, 1877, pp. 319, 320.

bed but a thin layer of stalagmite, from a few inches to a foot thick.

The remains of extinct animals will not show man's antiquity. The remains of some of the earliest of them, as the mammoth, reindeer, and *rhinoceros tichorhinus*, were found in the stalagmite, the highest deposit, and both these tools made by man, and the remains of extinct animals were found associated with the bones of modern animals, as the brown bear, fox (*canis vulpes*), rabbit, etc.

We have used the evidence as it here stands in the cave itself; but in another chapter shall be able to show that the association of man's works with remains of extinct animals is nowhere, under any circumstances, a proof of man's remote antiquity.

The fourth bed is a deposit of gravel, principally of rounded pebbles, '*brought in by tributary streams.*' The only mammalian remains met with in this lowest bed were bear, horse, ox, and mammoth. 'The human remains' were four 'worked' flints, one a hammer-stone, found in the upper portion of the bed.[2]

A hammer-stone is a lump of unworked stone, which, in the absence of a better tool, has been used for hammering purposes, the great bulk of which have never been touched by man. This hammer-stone was a quartzite pebble, which 'bore,' it is said, 'distinct marks of the use to which it had been applied.' It is, however, a venturesome thing to conclude that man lived on the earth, and used tools at a remote date, because there are marks of collision on a rude stone found in the lower bed of a cave, especially when the bed in which it is found consisted principally of 'rounded pebbles,' '*washed in by tributary streams*,' in which *mêlée* they would be driven one against another. We say this, however, as a protest against building up theories upon uncertain data; for so far as man is concerned, this bed gives no proof of his high antiquity. It is of no importance in this case, whether this quartzite pebble and other pieces of flint were 'tools,' or were not; their *position* gives no proof that they were deposited long ages ago; and their association with remains of *domestic animals* shows that they were not. The tools of man, lying in a cave-bed,

[2] *Nature*, 1877, p. 321.

together with the bones of the horse (*equus caballus*) and ox, could not prove that he was a denizen of Britain at a remote period of the past.

Caves of Creswell Crags.

These caves, situate on the north-east border of Derbyshire, have been explored by the Rev. J. M. Mello, M.A., F.G.S., and Professor Dawkins. They are four in number, bearing the not very euphonious names of The Pinhole, Robin Hood's Cave, Church Hole, and Mother Grundy's Parlour. There is no necessity to describe The Pinhole Cave, as the more important results have been derived from the larger caves. There is, too, a close similarity between the deposits of the Robin Hood and Church Hole Caves. The exploration of Mother Grundy's Parlour was not commenced till the end of 1878. The beds of Robin Hood's Cave, comprising Church Hole, in descending order, are thus described by Mr. Mello:

1st. Surface soil a few inches thick.

2nd. Stalagmite breccia, varying in thickness from a mere film to three feet.

3rd. Cave earth from three to four feet.

4th. Red sand and clay, about three feet.

5th. Light sand, forming the original decomposed rocky floor of the caves.[3]

Professor Dawkins adds, 'It may may be concluded that while the breccia was being formed by calcareous infiltration in one part of the cavern, the upper part of the cave earth was being accumulated in another, and that therefore in point of time the breccia and the upper portion of the cave earth must be viewed as contemporaneous deposits.'[4]

As amended the beds will stand as follows:

1st. A few inches of surface soil.

2nd. Breccia and cave earth; the breccia, where deposited, contemporaneous with the upper part of the cave earth, and in point of time one. Thickness from three to four feet.

3rd. Red sand and clay, about three feet.

4th. Light sand forming the original floor of the cave.

No tools of man, no trace of man, is found in the lowest

[3] Trans. Manchester Geol. Soc., Part XIII., Sessions 1879, 1880.

[4] 'Early Man in Britain,' p. 179.

bed of *any of the caves*, so that with the exception of the few inches of surface soil in the Robin Hood's and the Church Hole Caves, there are only two beds on the deposits of which the argument for the antiquity of man can be based, viz., the highest, and the next below or second in descending order. The contents of these beds are principally of two kinds. There are the works of man, ranging from a rudely made 'implement' and coarse pottery, up to skilfully wrought tools, and tasteful drawings of animal life, with bones and teeth of mammalia, from the huge mammoth and terrible sabre-toothed lion, to the fox and dog and sheep of the present day. And some of these remains are found in abundance, but none of them will prove that the works of man were deposited in these caves many long ages back. In a paper read before the Geological Society Mr. Mello states that in the surface layer of Robin Hood's Cave he found several molars of *Rhinoceros tichorhinus*, and some hyæna teeth; and that in the upper part of the floor were found a small piece of Samian ware, some pieces of coarse earthen pottery, and a few recent bones of sheep.[5] And the professor, speaking of the same cave, says, 'The floor was covered with a dark layer of earth, some five or six inches in thickness, containing fragments of Roman and mediæval pottery, and other remains of historic age.'[6]

'In the breccia and cave earth immediately under this surface floor of the Robin Hood's Cave, the tools of man, *of all kinds*, number over 1,000, and the mammalian remains to considerably over 2,000 teeth and bones.'

'The rudely fashioned implements of quartzite in *these beds*,' says Mr. Mello, 'were so many as to suggest a manufactory of them,'[7] and 'the remains of extinct animals, such as hyæna, *machairodus latidens*, mammoth, lion, reindeer, Irish elk, woolly rhinoceros, leopard, etc., *in the breccia and cave earth* of the Robin Hood's Cave, amount to over 1,700. *With* these quartzite implements, and *under them*, were the artificially trimmed flake, the delicate flint boring-tool, a bone awl and needle, and the engraving of a horse's head. The great bulk of the quartzite "implements" were

[5] Quart. Journ. Geol. Soc., 1875, p. 683.
[6] 'Early Man in Britain,' p. 178.
[7] Quart. Journ. Geol. Soc., 1877, p. 582.

in the *higher bed*, while in the lower bed, immediately *under*, they numbered only five, and three splinters or flakes of the same material.' 'Mother Grundy's Parlour,' says Professor Dawkins, 'has revealed an earlier chapter in the history of the caves of Creswell Crags. Underneath the lower sand (*c*), the lowest ossiferous layer in the other caverns, was a layer of red clay, varying in thickness from six inches to three feet, and resting on a ferrugineous yellow sand, a foot thick.'

'In both these the remains of hyænas were very abundant; bisons were present; and the molar-teeth tusks and other remains proved that at least three hippopotami had fallen victims to the hyænas as well as several rhinoceroses of the small-nosed, or leptorhine, species of Owen. No implements were found at this horizon; and there is no proof that the palæolithic hunter was a contemporary of these last two animals.'[8]

'No trace of man was met with in the deposit of ferrugineous sand and clay, which doubtless represents the earliest period of which any remains now exist.'[9]

'Amongst the more recent animals, the remains of which are found in the upper portions of the floor of Mother Grundy's Parlour, were the wild cat, dog, fox, stag, roe, the pig, hare or rabbit.'[10]

The remote antiquity of man, deduced from the evidence of these cases, is thought to be proved: by the association of 'implements' made by man, with remains of extinct animals; by the position of these 'implements' in the layers or beds of the caves; and by their rude construction.

The quartzite pebbles, which were the sign and proof, we are told, of the presence of the old palæolithic savage, were in the lower bed of Robin Hood's Cave; and in this stratum were remains of reindeer, bison, mammoth, and other animals.[11] The next layer above is the highest bed in this cave, unless the few inches of surface soil may be so designated. This is the great bone and implement bed. In place of five rude pebbles found in the lower bed, there was

[8] 'Early Man in Britain,' pp. 186, 187.
[9] Mr. Mello. Trans. Manchester Geol. Soc., vol. xv., p. 296.
[10] *Ibid.*, p. 296.
[11] *Ibid.*

here a multitude of them; and the mammalian bones were over 2,000. Here were represented the hyæna, machairodus, mammoth, Irish elk, and *woolly rhinoceros;* and with these early mammals were the bones of modern and domestic animals, such as the wolf, the common fox (*canis vulpes*), and the horse (*equus caballus*).[12] The upper part of the floor yielded a small piece of Samian ware, some pieces of coarse earthern pottery, and a few recent bones of sheep; and in the surface layer were found several molars of *rhinoceros tichorhinus* and some hyæna teeth.[13]

In these caves we find, in the several beds, implements said to be the work of man in association with remains of extinct animals; but we also find both in association with modern and domestic animals. If the association of these 'tools' with extinct mammalia would prove that they belong to a remote age, their association with modern animals will show that they belong to a recent age. Indeed, the argument from this association for the remote date is worthless, as these early mammalia cannot be proved to have become extinct at an early date, while some of these modern and domestic animals were not found in Britain at a remote date. And as the association of these rude implements with remains of extinct mammalia will not prove their high antiquity, so will not their position in the beds.

The lowest bed in which these tools were deposited was the red sand of Robin Hood's and Church Hole Caves, and the superincumbent layers on this stratum were not of sufficient thickness to show that their deposition occurred at a remote period. They were covered only with the cave earth and stalagmitic breccia (which in point of time are one bed), and the few inches of surface soil. Moreover, these rude quartzites, whose position in the red sand is thought to prove their early date, are found in the *higher bed* of cave earth and breccia; and in Mother Grundy's Parlour, the implements were in the higher bed with only the surface soil above them.

Equally evident is it that the rude style or make of the 'implements' will not prove that the men who made them were uncultured savages. As we have seen, these rude

[12] Quart. Journ. Geol. Soc., 1876, p. 247.
[13] *Ibid.* 1875, p. 688.

quartzites found in the lower bed were found also in the cave earth, and breccia in contact with the surface layer which contained Roman and mediæval pottery. And if these men of the lower bed were proved to be savages of the lowest type *because* they made these rude 'tools,' the men who left the same rude tools in cave earth and breccia must have been low savages also. And, according to this mode of reasoning, would have been roving about Derbyshire not far from the time when Samian ware and mediæval pottery found their way to the Creswell Caves.

With and under these quartzites in the breccia and cave earth, men esteemed of better culture have left tools more skilfully wrought. 'Little by little,' says one of the explorers, 'a certain progress in the art of implement-making is observed; flint, roughly chipped, gradually supersedes the more clumsy quartzite pebble; and as we rise from the lower beds of the caves to the outlying cave earth and breccia, this advance in primitive culture becomes strikingly manifest; the artificially trimmed flake, the spear or arrow-head, the delicate flint-boring tool, and other implements and weapons, supersede the quartzite hammer, and rough flakes or splinters of the first inhabitants of the cave.' 'And yet' as we rise from the lower bed, 'where some half-dozen or thereabout of these' more clumsy quartzite pebbles were found, to 'the outlying cave earth and breccia,' where we find the artificially trimmed flake, the spear or arrow head, and the delicate flint-boring tool, which are adduced as proof of a striking advance in primitive culture, we come again upon the same rude quartzite pebbles in such numbers 'as to suggest a manufactory.' But were they manufactured? and if so, what class of men manufactured them? If as tools they were '*superseded*' by better-made implements, for what purpose were they manufactured? If they had no use for them, why did they make them in such numbers? The only reasonable conclusion is, either that they were not manufactured at all, or that they were made for some special work for which other tools were not so suitable. The most reasonable conclusion seems to be, that if they were tools, they were used for rough work. These same rude quartzites are now being used for certain purposes by civilized people, in preference even to metal.

'The Shoshones of north-western Wyoming,' writes Captain Jones, 'though mostly provided with tools of iron and steel, are still to be seen employing a scraper in the dressing of skins, a mere "teshoa," consisting of a small worn boulder, thinner at one end, and split through the middle in such a manner as to furnish a rough cutting edge on one side.' 'There seems to be a considerable advantage,' he adds, 'in this over any other form of knife or other tool which has yet reached them from without, and it is probable that it will be retained as long as their present method of preparing hides is in vogue."[14]

This statement is referred to by Professor Dawkins, who speaks of these boulders as quartzite implements manufactured out of pebbles, and adds that probably some of those made by the men of the caves were intended for the preparations of skins like those in use among the Shoshones.'[15] If these men made rough tools for skin-dressing, they doubtless had better-prepared tools for other purposes; and if they were skin-dressers, they would employ themselves in other useful labours, and would not be savages.

The Victoria Cave, near Settle, Yorkshire.

This cave Professor Dawkins, in his valuable work on 'Cave Hunting,' written in 1874, terms the most important historic cave in the country. Not improbably he included in that estimate the discoveries which were then exciting the scientific world. But independently of these discoveries, its history is very interesting. The cave had evidently been occupied after the Roman invasion, and was probably a place of refuge for the Britons whose homes were invaded by hordes of adventurers who harassed and despoiled the citizens after the Romans had left the country. Certainly the explorers found a large number of Roman and Romano-British articles. Roman pottery, including Samian ware, Roman coins, bronze brooches, finger-rings, amulets, bracelets, buckles, studs, etc., rewarded the perseverance of the explorers, to which may be added bone implements, and

[14] Reconnaissance of North-Western Wyoming, 1873, p. 261.
[15] 'Early Man in Britain,' pp. 180, 181.

the bones of animals on which the people are supposed to have fed.

Mr. Dawkins thought it was inhabited by man in the neolithic period, and ventures upon an approximate date of occupation, but confesses that the attempt to fix a date cannot lay claim to any scientific precision.

These discoveries were all eclipsed by an announcement that a human bone had been found at the cave under clay which the excavator stated to be glacial clay.

Mr. Tiddeman, secretary of the committee appointed for the exploration of the cave, made a report of the discovery at the meeting of the British Association held at Belfast in 1874. The bone was sent for examination to Professor Busk, a prominent osteologist, who, after some hesitation, decided that it was human, and at a meeting of the Anthropological Institute, read a paper on the human fibula, in which he stated that there was nothing in the condition of the bone opposed to its belonging to the most remote antiquity, nor to its owner having been coëval with the extinct mammalia. The committee, says Mr. Tiddeman, was decided by this in its course of work for the year. The question was one of such importance, that they felt the first thing to be done was to develop all the evidence that could be procured on the question. 'This communication' (viz., of the finding of the bone) 'was of the greatest interest, for it had some time before been pointed out that there was much chance of the beds in which this bone occurred being preglacial, or at any rate of an age preceding that time when Scotland, a great part of Ireland, and the north of England were slumbering beneath a great ice-sheet.'[16]

T. Rupert Jones, F.R.S., F.G.S., in his lecture on 'The Antiquity of Man,' gives an illustration of a section of the cave, in which he has marked the spot where the bone lay, and in his description of the cave, says the upper cave earth contained bones of fox, badger, brown bear, grisly bear, reindeer, red deer, horse, pig, and goat (or sheep); and some of the bones had been *hacked* by man. 'Next below,' he adds, 'is a peculiar laminated clay, of excessively fine grain, from seven to twelve feet thick, and overlying a

[16] Rep. of Brit. Asso., 1874.

lower cave earth of unknown depth, which is rich here and there with bones of hyæna, fox, brown bear, *elephas antiquus*, *rhinoceros*, *leptorhinus*, *hippopotamus*, *Bos primigenius*, bison, etc. ; and amongst these, besides two superficially cut or hacked bones of the goat, *one bone* of man has been found.'[17]

Professor Dawkins accepted the decision (with some misgiving, which afterwards ripened into a serious doubt). In his volume on 'Cave Hunting' he says : 'Pre-glacial deposits in a cavern would be protected from the grinding of the ice-sheet. . . . By this test the pleistocene strata in the Victoria Cave may be considered pre-glacial. If this is allowed, the small fragment of human bone found by the Settle Exploration Committee, in 1872, establishes the fact that man lived in Yorkshire before the glacial period. The man to whom it belonged was probably devoured by the hyænas, which dragged into their den the woolly rhinoceros, reindeer, and other creatures, whose gnawed bones were strewn on the floor.'[18]

Mr. Tiddeman said : 'The craven savage who lived before the great ice-sheet, and before the great submergence, may form another of the many strong ties which bind together the sciences of geology and anthropology ;'[19] and Dr. James Geikie, author of 'The Great Ice Age,' remarks : 'The interest of this discovery consists in the fact that the deposit from which the bone was obtained is overlaid, as Mr. Tiddeman has shown, by "a bed of stiff glacial clay containing ice-scratched boulders." Here then is a direct proof that man lived in England *prior to the last interglacial period.*'[20]

[17] Lect. on 'Antiquity of Man,' T. R. Jones, p. 38.

[18] 'Cave Hunting,' p. 411.

[19] Rep. of Brit. Asso., 1875, p. 173.

[20] 'Great Ice-Age,' 1st edit., p. 510. The interest felt in this discovery was probably increased by the fact that in every direction there had been heard the pressing inquiry — Why, in the deposits said to belong to a remote prehistoric time, human bones had not been found? Hundreds of implements, said to be made by man, were sealed up with thousands of the bones of extinct animals in the lowest beds of the caves, and the lowest strata of the river gravels, but not one human bone had been discovered. Early man is said to have hunted large wild animas now extinct, to have shared the caves alternately with hyænas, those devourers of flesh which

Here, then, according to Messrs. Tiddeman and Geikie, was an unquestionable proof of the remote antiquity of man. The bone was human, and it was found under undisturbed glacial clay.

Unfortunately for the theory, but fortunately for the truth, it was discovered that neither of these conclusions could be sustained. The bone was not human, and the clay was not undisturbed. From some doubts which haunted him, Professor Dawkins was led to re-examine the bone and the evidence, and at a conference of the Anthropological Institute, held in 1877, gave his reasons for believing that the so-called human bone was not human, but ursine; in other words, it was a portion of the bone of a bear.

To this conclusion Professor Busk, who seems also to have doubted, gave his assent, and had the moral courage to say, 'I was wrong,' three words which Dr. Johnson said were the hardest to pronounce in the English language. On further inquiry, too, it was discovered that the clay under which the bone was found was not glacial clay. At a meeting, reported in the Quarterly Journal of the Geological Society of London,[22] Mr. Dawkins read a paper in which he observes: 'In the Victoria Cave quoted by Mr. Tiddeman, Mr. James Geikie, and others, as decisive of the pre- or inter-glacial age of the cave fauna below the clay, the whole question turns on the age of the clay above the bone-bearing strata at and within the entrance; and this is not proved to be boulder clay, because there are no boulders in it. Nor is it proved to be glacial clay, because clay of that kind is now being deposited in that very cave.'

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dragged into their dens huge beasts of early time. And why, then, had not the bones of these 'hunters' and cave-dwellers been found? and to this reasonable and repeated inquiry no satisfactory answer has been given.

Sir Charles Lyell left it for the future to solve. He had no doubt that such bones would be found. Another proposed solution of the difficulty is that they will be found in other regions when explored. And Professor Dawkins, in reply to the question whether, if hyænas could drag into the caves huge animals, it was not probable they would drag in human beings, and why, then, were not human bones found? said that these bones might have been entirely devoured by the hyænas.[21]

[21] Discussion on Paper by Mr. Mello, at Manchester.

[22] For 1877, p. 607.

In a discussion which followed, Dr. John Evans said he was glad to find that the determination of the supposed human fibula from the Victoria Cave was so doubtful that it may be safely rejected; and Dr. Murie thought the supposed human fibula might be bone of almost any animal, and all ideas of the habits of the cave-dwellers founded upon it were therefore mere fictions.[23]

Another occurrence in this cave which affects the question of the age of the deposits has created a difficulty and given rise to a difference of opinion. There had been found in the cave two bones which had the appearance of having been cut by the hand of man. One, Mr. Tiddeman reported, was a small humerus having very evident tool-marks. It occurred at a depth from the original surface of fifteen feet. The marks were very clear cuts, as if made by a sharp instrument, so sharp, indeed, as almost to suggest that they had been cut with a metal tool. The bone was sent to Mr. Wm. Davis, of the British Museum, who pronounced it to be the humerus of a small goat. The question was beset with difficulties.

The bone was found fifteen feet below the surface, in association with bones and teeth of the hyæna, bear and rhinoceros, and within six inches of the heel of a milk-tooth of elephas antiquus, which animals, it has been assumed, have been long extinct; while the sheep and goat, says Professor Dawkins, were unknown in Europe before the neolithic age.[24]

Moreover, if these cuts were made with a bronze or iron tool, the bone was not cut till the metal age. The professor thinks the bone dropped into the place where it was found by one of those slips that took place while the work of exploring the cave was going on; but the reporter says the mode of working precluded that supposition, as the upper beds had been worked away some time before the bones were uncovered.

Here then, according to the decision of a number of the leading geologists and osteologists, the direct and unquestionable evidence from the bone found in the Victoria Cave collapses. It was not human, but a bit of a bear. Had it

[23] For 1877, p. 612.
[24] 'Early Man in Britain,' p. 187, note.

not been, however, for the caution and candour of Professor Dawkins, who called together his *confrères* to reconsider the conclusion to which they had previously come, the scientific world might have settled down upon the conclusion that man was living in the north of England in pre- or inter-glacial times. The bone would have gone to some depository, stamped with the imprimatur of eminent scientists; the examination of the matrix in which it was found might have become disturbed, or have been neglected, and the 'find' might have been esteemed a settled proof of the remote antiquity of man.

No doubt mistakes may be made, and especially in deciding to what animal a small piece of bone dug out of a cave belonged. But this mistake ought not to have been made. The question was deemed to be of great importance. The bone was esteemed to be somewhat too large to be human, and might, Professor Murie said, be bone of almost any animal. The glacial clay was not proved to be undisturbed, and there was doubt upon more than one mind. To say the least, the decision was premature. It has, however, now been reversed, and the Victoria Cave, like the others that have been examined, affords no proof of man's remote antiquity.

This is another of those premature conclusions to which we have referred, and which, together with Kent's Cave, has largely influenced the writers and readers of our modern literature in favour of the theory of man's remote antiquity. In an article, for instance, in one of our influential quarterlies, read largely by leaders of thought in religious circles, the writer says: 'Under the careful supervision of Mr. Pengelly, flint implements were discovered underneath stalagmite, and in association with the remains of the hyæna, and woolly rhinoceros, and mammoth, in undisturbed red loam. This singularly opportune discovery destroyed for ever the doubts that had overhung the question of the antiquity of man.' . . . 'There is no physical evidence to forbid the view that man inhabited Kent's Hole before the period of intense cold had set in. . . . Nor are we without some few traces of the sojourn of man in Europe in pre-glacial times. Professor Busk has identified a fragment of bone from the Victoria Cave, near Settle, as

an abnormal human fibula. A second case is afforded by the discovery of a flint flake in the fluviatile deposit, at Crayford in Kent, by the Rev. Osman Fisher, which is considered by some of the highest authorities to contain a pre-glacial fauna.'

Since the discovery made by Mr. Pengelly, discoveries elsewhere have shown that the stalagmite which overlay the flints in Kent's Cavern might have been deposited in less than 1,000 years. The extinct animals, whose remains were found in Kent's Hole and at Crayford, are considered by some of the highest authorities, and proved by numerous facts, to have lived on to comparatively recent times (*see* next chapter). The flint gravel, out of which the flint flake found by the Rev. Osman Fisher was 'picked,' was neither pre-glacial nor glacial. At a meeting held to discuss the question of man's antiquity, at which there were present John Evans, F.R.S., Professor Rolleston, Professor Huxley, Professor Prestwich, Professor Busk, Professor Dawkins, Professor McK. Hughes, Rev. Professor Sayce, and many other scientific celebrities, 'The almost unanimous conclusion of the meeting,' says the editor of *Nature*, 'was that the fossil mammalia of the pleistocene tell nothing of the relation of man to the glacial period. The general impression left on our mind is that in Britain there is no evidence of any palæolithic man either in caves or the river-deposits of an age older than post-glacial.' (*See* Chapter VII.) The bone found in the Victoria Cave, which was considered a 'trace of the sojourn of man in Europe in pre-glacial times,' was, as we have seen, not a human fibula but a portion of the bone of a bear, and the clay under which it was discovered was not glacial clay.

So have we been misled by hasty premature conclusions.

CHAPTER III.

REMAINS OF EXTINCT MAMMALIA ASSOCIATED WITH REMAINS OF MAN.

'I do not, for my part, see any geological reason why the extinct mammalia should not have lived down to comparatively recent times.'—PROF. PRESTWICH.

'The present evidence does not necessitate the carrying back the date of man in past time, so much as bringing the extinct post-glacial animals towards our own time.'—PROF. OWEN.

VERY frequently in his researches, the geologist discovers the bones and teeth of extinct animals which have lived at a remote geological period, associated with remains which bear the impress of the handiwork of man, and it is fairly concluded that mostly the animals thus represented were contemporary with the men whose tools and weapons were found mingled with their bones. But it is further concluded that as these animals lived at an early period in the past, the men whose works are associated with their remains lived at a remote period also.

This association seems to be considered one of the strongest arguments adduced in proof of man's remote antiquity, as the following quotations will show: 'That the advent of man took place very much earlier than our fathers thought, is a point about which there can be no question whatever. Though we cannot yet make out clearly the relation of man to the glacial period . . . this we do know, that man lived in this country and throughout Europe with the lion and hairy elephant, the hyæna and the woolly rhinoceros.'[1]

'Implements of human workmanship were found in intimate association with the mammalian bones, and it is the connection of man with the fauna of that period, and

[1] 'Geology of England,' by H. B. Woodward, p. 432.

the evidence furnished regarding the early stages of human culture, that has given the discoveries we have been able to make (in Creswell Caves) their great importance.'[2]

'The discovery of the most importance as bearing on the subject of the present work, is the occurrence in a new discovered cave of the remains of two species of rhinoceros, *R. tichorhinus*, and *R. hemitœchus* Falconer, in an undisturbed deposit, in the lower part of which were some well-shaped flint knives, evidently of human workmanship. It is clear from their position that man was coëval with these two species.'[3]

'Whilst a geologist would hesitate to pronounce a deposit of palæolithic age merely because he had found a solitary unpolished flint implement, his hesitation would vanish in a moment if he also detected a relic of the cave-lion, or woolly rhinoceros, or any other extinct animal.'[4]

It is difficult to account for the confidence of scientists in this argument for the antiquity of man, for it is one of the feeblest adduced in its support. There can be no doubt that many of these extinct animals belonged to a very early age; but in this inquiry the question is not, how early did they live? but how early did they die out? The bones of these mammalia who roamed the earth at a remote time have been found mingled with implements and weapons formed by the hand of man; but for the decision of the time when man became a denizen of the earth, the early appearance of these mammalia is of no importance whatever. They may have lived in the pleistocene, the pliocene, the miocene, or the eocene age, but if they lived on to recent times, their bones and man's work may lie together in the cave or river-gravel as contemporary relics, without affording the slightest proof that man lived at a remote period. Those who plead this contemporaneity as a proof of man's antiquity, should be able to show that these extinct animals died out fifty, or a hundred, or five hundred thousand years ago; but there is no proof that the earliest of them, either cave-lion, cave-bear, mammoth, or

[2] Rev. J. M. Mello; Trans. Manchester Geol. Soc., 1879, part xiii.
[3] Sir C. Lyell's 'Antiquity of Man,' 4th edit., p. 410.
[4] W. Pengelly, Esq., 'Flint and Chert Implements in Kent's Cavern.'

rhinoceros, had become extinct three thousand years ago, and no one doubts that man was living then.

Rather the evidence goes to show that they lived down into modern times.

'I do not for my part,' says Professor Prestwich, 'see any geological reason why the extinct mammalia should not have lived down to comparatively recent times.' And on a later occasion he adds: 'I am confirmed in the opinion I expressed in 1859, that the evidence, as it stood, seemed to me as much to necessitate the bringing forward of the great extinct animals towards our own time as the carrying back of man in geological time.'[5]

'The present evidence,' states Professor Owen, 'does not necessitate the carrying back the date of man in *past time*, *so much* as bringing the extinct post-glacial animals towards our own time.'[6]

This bringing the extinct animals towards our own time is what we propose to do, and the evidence by which it can be done is more than we can use.

The cave-bear, by some modern scientists considered to be the oldest of the palæolithic animals, is proved to have lived on to recent times by the association of its remains with modern objects. Dr. Fraas found in the cavern of Hohlefels, near Blaubeuren, Wurtemberg, flint knives, instruments in bone, and fragments of pottery, with cave-bear (*ursus priscus*), reindeer, horse, rhinoceros, mammoth, lion, fox, and heron.'[7]

In the Grotto all' Onda, at the foot of Mount Matanna, M. Regnoli (who has explored a large number of caverns in the mountains of Northern Italy) found instruments in bone, barbed arrowheads of stone, polished stone implements, two axes—one of diorate and one of jade—a polisher of serpentine, and bones and teeth of the cave-bear, bearing traces of human work, and unworked bones of the cave-bear belonging to at least four individuals. The other animal remains were stag, hare, wild boar, badger, *ox*, *sheep* or *goat*, etc.

In the Grotto of the Goths, Mountain of Colle Maggiore,

[5] 'Proceedings of the Royal Institute, 1864,' p. 227.
[6] 'Palæontology,' 2nd edit., p. 441.
[7] 'Matériaux,' Août et Septembre, 1872, p. 404.

were found bones of the cave-bear, the worked tooth of a cave-bear, a bodkin made of the cubitus of a bear, and bones of the stag, marmot and ox; with arrowheads of stone, pottery, and charcoal. The objects manufactured into implements are said to belong to the 'neolithic age.'[8] At the caverns of Velo, Province of Verona, M. Lioz found a complete skull of a cave-bear, and among the bones of the animal he dug up a very fine polished axe of porphyry, and another of serpentine.[9]

The cave at the Grotto of Minerva, in France, 'contained only bones of the great bear, mingled with those of *horse*, *goat*, *sheep*, etc.[10]

Remains of the cave-bear are found in association with pottery, with polished stone implements, and other objects of neolithic times; and with remains of modern and domestic animals, such as the horse, short-horned ox, sheep or goat.[11]

'*The cave-lion*,' says Professor Dawkins, 'is only a variety of the existing lion; there is not one solitary character by which it can be distinguished from the living lion.' 'It inhabited,' he adds, 'the mountains of southern Thrace in the days of Herodotus and Aristotle, and became extinct in Europe between 330 B.C., and A.D. 100.'[12]

The hyæna. This fierce animal, that preyed upon the largest mammalia, was very early in Britain, and has lived on far into the time of man, and indeed is represented now in southern climes. 'It is scarcely distinguishable,' says Sir John Lubbock, 'from the spotted hyæna (*H. crocuta*) of South Africa, and the striped hyæna (*H. striata*). Another variety is still common in Morocco and Abyssinia.'[13]

In Wooky Hole, near Wells, Somerset, Professor Dawkins obtained flint instruments along with the remains of the mammoth, hyæna, hairy rhinoceros, and other animals.[14]

[8] 'Matériaux pour l'Histoire l'Homme,' I^re^ série, tome iii., p. 496; *ibid.*, 3e livraison, 1873, p. 142; *ibid.*, p. 144.
[9] *Ibid.*, I^re^ série, tome i., p. 303.
[10] *Ibid.*, I^re^ série, tome ii., p. 117.
[11] 'Popular Science Review,' 1869, p. 153.
[12] 'Cave Hunting,' p. 80.
[13] 'Prehistoric Times,' p. 286.
[14] 'Cave Hunting,' p. 17.

Amongst these 'other animals' Sir C. Lyell gives the wolf, the fox (*canis vulpes*), and the genus equus (*horse*). The wolf was living in Ireland in the eighteenth century; the fox was common in the time of the Swiss lake settlements,[15] and the genus equus lives on to the present time. 'The palæolithic horse,' says the author of a paper entitled 'Man as the Contemporary of the Mammoth and Reindeer,' 'has been improperly regarded as differing from that of the present day.'[16]

Wild horses inhabited different countries in Europe down to a recent date. Ekkerhand and Lucas David mention them as existing in Switzerland in the eleventh century, and in Russia in 1240. And Heberstein at the beginning of the seventeenth century speaks of the bisons, the uri, the elks, and the wild horses of Lithuania.

Both the lion and the hyæna abound, even to-day, in Morocco.[17]

In the caves of the Altai, examined by Professor Brandt, the bones of the mammoth and the *tichorhine rhinoceros*, as well as those of the hyæna, were found, but associated with more than thirty other distinct species, all of which are now living near the same region.[18]

From a table given in the report of the British Association, we learn that in the cave earth of Kent's Hole, the percentage of teeth found is:

In South Sallyport: Hyæna, 27; horse, 29; sheep, 7; fox, 3; elephant, 2; ox, 1; wolf, ·5; horse, dog, pig, ·5 each; rhinoceros, 11.

North Sallyport: Hyæna, 31; rhinoceros, 16; rabbit, 2; elephant, 2; lion, 2; ox, 1; wolf, ·5; horse, dog, and pig, ·5 each.

Charcoal: Sheep, 1; hyæna, 44; horse, 25; rhinoceros, 15; ox, 1; wolf, 1.

Long Arcade: Hyæna, 41; horse, 21; rhinoceros, 9; fox, 4; machairodus latidens, 1; pig, ·5.

Rodentia in second foot of cave earth. Teeth of hyena, rhinoceros, bear, elephant, lion, and one tooth of a sheep.

[15] 'Antiquity of Man,' 4th edit., p. 25.
[16] 'Ander Natur,' 1867.
[17] 'Epoch of the Mammoth,' pp. 173—175.
[18] 'Geographical Distribution of Animals,' vol. i., p. 111.

In this cave the remains of this devourer of flesh are mingled with remains of horse, ox, wolf, fox, rabbit, dog, sheep and pig. And the remains of these modern and domestic animals are largely mingled with those of extinct mammalia.

In what Professor Dawkins terms the neolithic stratum of the Victoria Cave, were obtained the broken bones of the stag, Celtic shorthorn, goat and horse. He supposes that the inhabitants of the cave were the possessors of domestic oxen.[19]

One of the most remarkable of the mammalia now extinct is the *machairodus latidens*, or sabre-toothed lion; a large lion-like animal armed with double-edged canines, in shape like the blade of a sabre, the edges of which are serrated. It ranks amongst the animals as one of the highest antiquity. As far as is known, only two have left their remains in England, and it is worthy of note that the remains of both have been found under such conditions as show that they lived on to a comparatively recent date.

A tooth of machairodus was found in Robin Hood's Cave, Creswell Crags, which was discovered in the upper cave earth along with the more common animals. Immediately above this *upper* cave earth and breccia, which were contemporary, was a surface soil containing Roman and mediæval pottery, with bones of recent animals, as sheep, etc.; and with this canine and *under* it, were artistic tracings of bone and skilfully wrought implements, indicating an advanced civilization.

The other remains of machairodus in England were found in Kent's Hole. In 1826, Mr. MacEnery discovered several teeth of machairodus in the cave earth; and in 1872 Mr. Pengelly found a well-marked incisor in the first or uppermost level of cave earth, having over it about twenty-five inches of the granular stalagmite floor, and under it the teeth of hyæna, bear and horse;[20] and with it, as we have seen in the percentage table, the teeth of pig.

Remains of machairodus have been found in two localities in France. In a deposit of diluvium near Puy by M. Aymard, and in the Cavern of Baume, in the Jura. In the

[19] 'Cave Hunting,' pp. 112, 113.
[20] 'Antiquity of Man,' p. 105.

latter case they were associated with bones of the cave-bear, spotted hyæna, elephant, wild boar, the rhinoceros, and with the ox and horse (*equus caballus*). No description is given of the remains associated with the former. Mr. Dawkins was shown a canine of this animal at Lyons, which lived, he says, in the pliocene period. It was found along with some extinct animals, but also with those of the horse.[21] The remains of this fierce carnivore, both from their position and association, show that it has lived to the time of man and domestic animals.

The *Reindeer*, another of these early mammalia of the pleistocene species, has lived on towards our time in Europe, and in some parts of the world is living now. It is proved to have been living in Caithness as late as the year 1159, and existed in sufficient numbers to be remarked by Cæsar among the more noteworthy animals living in the great Hercynian forest.[22] In the Cavern of Mas-d'Azil (Haut-Garonne) we are told great numbers of the worked bones of the reindeer were found by Professor Filhol mingled with chipped flints and remains of the ox, sheep, dog, wild goat, and aurochs.[23] Their bones have also been found in the more recent layers of the peat, in Denmark, assigned by archæologists to the bronze age.[24]

In the Cave of Veyrier are found mingled large quantities of the bones of the reindeer, of pigs and wolves, of stags and horse, and the ox (*Bos taurus*).[25]

In the fourteenth century, Gaston de Foix, third count of that name and lord of Bearn, passed over into Norway and Sweden to hunt reindeer.[26] In the Cave of Kesslerloch were discovered about a ton and a half of bones, ninety per cent. of which were those of the reindeer. They were mingled with flint-flakes, modern 'fauna,' earrings, and neck ornaments made of perforated teeth, bone, and brown coal. Here, too, was found, with other tracings, that elegant drawing of the reindeer browsing, evidently drawn from

[21] 'Early Man in Britain,' p. 114; and 'Cave Hunting,' pp. 330, 331.
[22] 'Cave Hunting,' pp. 76, 77.
[23] 'Matériaux,' 1875, p. 93.
[24] 'Primitive Antiquities of Denmark,' by Professor Worsaac, English translation.
[25] 'Cave Hunting,' p. 350.
[26] 'Epoch of the Mammoth,' p. 155.

life.[27] The reindeer was then living in Switzerland, when finger and neck ornaments were made and worn, and when artists sketched life-like representations of animals.

In the valley of the Tardoire, France, objects of bronze, and bones of the wild boar, ox, and stag, were mingled with the bones of the reindeer.[28]

From these facts we learn that the reindeer has lived in modern times and in temperate climates.

That stately creature, the gigantic Irish elk (*megaceros hibernicus*), a survival from the pleistocene age, has lived on to recent times. In the second stratum of a cave near Cappagh, county of Waterford, Mr. R. T. Ussher discovered bones of the Irish elk, associated with those of man, red deer, ox, badger, fox, bear, goat, pig, dog or wolf, marten, and hare.[29]

In Robin Hood's Cave, Creswell Crags, in the breccia, which is the highest stratum, lying immediately under the few inches of surface soil, were remains of spotted hyæna, reindeer, *rhinoceros tichorhinus*, wolf, fox, horse, and Irish elk. 'The animal was by no means uncommon in North Britain. In the south, it has been found only at Walthamstow, along with the goat, Celtic shorthorn, and reindeer.'[30]

In one of the crannoges of Ireland, in Lough Crea, at a depth of thirteen feet, the head of an elk was dug up, together with the bones of the ox, sheep, goat, pig, dog, wolf, etc.; and with these remains were found iron implements, a crozier of brass, a battle-axe, a cast for a coin, and bone and stone implements, etc.[31]

Dr. Petrie stated that he had in his possession an iron sword which had been found with the bones of a megaceros, in the county of Meath, Ireland. And Mr. Bailey referred to the discovery of remains of the megaceros which were found with spear-head and pottery in a lake in the canton of Berne in Switzerland, as mentioned by Professor Marlot.[32]

'The great Hercynian forest,' says Professor Dawkins,

[27] Geol. Mag., 1876, pp. 105, 162.
[28] 'Matériaux,' 1874, p. 14.
[29] Rep. of Brit. Asso., 1879, p. 339.
[30] 'Early Man in Britain,' p. 260.
[31] Dublin Quart. Journ. of Science, 1864, p. 125.
[32] Paper by R. H. Scott, Geol. Mag., 1878, pp. 415, 416.

'affords shelter to the true elk and the bison, both of which still live in Lithuania.'[33]

The urus—ure ox, or gigantic ox (*Bos primigenius*)—was hunted by Charles the Great in the ninth century, and probably became extinct in the fifteenth century.[34]

We come now to the mammoth (*elephas primigenius*), or primitive elephant, one of the earliest and most prominent of the extinct animals. The bones and tusks of this huge creature have been frequently found associated with the works of man; and this association has been adduced as an incontrovertible proof of man's remote antiquity. But this reasoning is altogether inconclusive, inasmuch as it cannot be shown that the mammoth died out at a remote period; and it can be shown that the mammoth lived on to a comparatively recent time.

We propose, in accordance with the views of Professors Prestwich and Owen, in this case as in others, not to carry back the date of man in past time, but to bring this celebrated mammal forward towards our own times.

Two perfect heads of the mammoth were found in Holyhead Harbour, in 1849, by the Hon. W. Stanley, in a bed of peat. The tusks and molars lay only two feet below the surface of the peat. It was of neolithic formation, and was covered with a stiff blue clay.[35] Sir Charles Lyell, who records the fact, thinks there must have elapsed a long interval of ages between the period when the mammoth was abundant, and the time when it died out, during which it was growing more and more scarce; and that we might expect to find occasional stragglers buried in deposits long subsequent in date to others. But of this interval of long ages there is not the slightest evidence, it is a mere conjecture; and if only a few stragglers lived on to modern times, the bones of those stragglers may have been the remains found with the works of man, especially when found under only two feet of neolithic peat, and associated, as they often are, with modern objects. Moreover, Sir Charles was shown a mammoth's tooth in the museum at Torquay, in Devonshire, that was dredged up at Torbay,

[33] 'Cave Hunting,' p. 30.
[34] 'Early Man in Britain,' p. 213.
[35] 'Antiquity of Man,' 4th edit., p. 399.

and which there was good ground to believe was torn out of the submerged peat or forest known to exist there. A more elevated part of the same peaty formation constitutes the bottom of the valley in which Tor Abbey stands. But in this case, as in that to which we have referred, he thinks this individual elephant must have been of more modern date than his fellows.[36]

In the Kesslerloch Cave a tusk and bones of the mammoth were mingled with flint flakes, with finger-rings and necklaces of perforated teeth, bone and brown coal, bone harpoons, needles, implements exquisitely worked and ornamented with varying patterns, drawing of a horse, and carvings of the head of a horse, the musk sheep, and the celebrated life-likeness of the browsing reindeer drawn on bone.[37]

In Wooky Hole remains of mammoth were obtained with those of other animals, and amongst these 'other animals,' as given by Sir C. Lyell, were wolf, fox (*canis vulpes*), and *genus equus*, which is now living. Professor Brandt, in his examination of the caves of the Altai, found the bones of the mammoth associated with more than thirty other distinct species, all of which are now living near the same region.[38]

In an address before the Geological Society, Mr. G. S. Poole stated that the remains of the mammoth and the *rhinoceros tichorhinus* had been discovered in a peat moss above those of man and fragments of pottery.[39]

The following has been furnished to the Quarterly Journal of the Geological Society by J. M. Wilson, Esq., M.A., F.G.S., mathematical and natural science master in Rugby School: 'As early as 1778 the teeth and tusk of the mammoth were dug out of the gravel about twelve feet from the surface in a field at Willoughby, near the public school. About the same time a tusk five feet long, and which weighed thirty pounds, was discovered. Another discovery of a tooth and tusk was made about two years ago. At Leamington, where excavations were being made, bones of elephant and

[36] 'Antiquity of Man,' p. 398.
[37] Geol. Mag., 1876, pp. 103, 162; and 'Epoch of Mammoth,' p. 87.
[38] 'Geographical Distribution of Animals,' vol. i., p. 114.
[39] The Geologist, 1864, p. 64.

rhinoceros were found. The alluvial soil in the valleys is perhaps seven or eight feet thick, and merely fills up the slight depressions. The present streams go on adding to the alluvial soil, *and must be considered adequate to have produced the whole of it.* The discovery of bones in several places in this alluvium a few years ago was made by Mr. E. Clemshaw, a pupil in the school, and caused considerable interest. A large collection of them is in the Arnold Library. I found,' says Mr. Wilson, 'in one of the localities, *associated with the same bones*, a piece of a wine-bottle, some pottery (not ancient), and the bowl of a tobacco-pipe. I am therefore sceptical.'[40] Mr. Wilson is very modest, and seems to shrink from views that are not orthodox. But there is no room for scepticism in his statement. The objects were found in the alluvium. They were found by himself, a teacher of science; and he wrote down his discovery and sent it to a scientific journal.

Two or three instances of the finding of mammoth remains in America, collected by Dr. Southall, will furnish evidence from the West that this remarkable animal did not become extinct at a remote date in the past.

'There can be no doubt,' says Professor Shaler, 'that a few thousand years ago these companion giants (the mastodon and the mammoth) roamed through the forests and along the streams of the valley of the Mississippi. They fed upon a vegetation not materially different from that now existing in that region. . . The fragments of wood which one finds beneath their bones seem to be of the common species of existing trees, and the reeds and other swamp which are imbedded with their remains are apparently the same as those which now spring in the soil. Almost any swampy bit of ground,' says this writer, 'in Ohio or Kentucky contains traces of the mammoth and mastodon; and at Big Bone Lick the remains are so well preserved, as to seem not much more ancient than the buffalo bones which are found above them.'[41]

The remains of these animals in America occur in the most superficial deposits. Professor Winchell remarks that he has himself 'seen the bones of the mastodon and elephant

[40] Quart. Journ. Geol. Soc., vol. xxvi., p. 201.
[41] 'American Naturalist,' vol. v., pp. 606, 607.

embedded in peat, at depths so shallow that he could readily believe the animals to have occupied the country during its possession by the Indians.' Professor Hall quotes Dr. Kage, who says: 'Cuvier states that the mastodons discovered near the great Osage river were almost all found in a vertical position, as if the animals had merely sunk in the mud. Since that time many others have been discovered in swamps, a short distance beneath the surface (frequently some of the bones appearing above the soil), in an erect position, conveying the impression that the animal (probably in search of food) had wandered into a swamp, and, unable to extricate himself, had died on the spot.'[42]

In a paper, read before the Troy Meeting of the American Association for the Advancement of Science, Professor Winchell, speaking of the post-tertiary phenomena of Michigan, remarked: 'These beds are the sites of ancient lakelets slowly filled up by the accumulation of sediment. They inclose numerous remains of the mastodon and mammoth. These are sometimes found so near the surface that one could believe they have been buried within 500 or 1,000 years. What is, perhaps, most interesting of all, is the discovery of flint implements in a similar situation. The arrow-head was found seven feet beneath the surface, in a ditch excavated in the southern part of Washetow county. The mastodon remains found but a few miles distant, lay but two and a half feet beneath the surface.'[43]

But while the mammoth has been distributed over large portions of the earth, its home seems to have been Siberia, where it has existed in countless herds. And here, as elsewhere, it has been found under such circumstances as show that it lived on into modern times.

One of the earlier accounts we have of the mammoth in this region is given by Father Avril, who travelled in Russia in 1685. In treating of this mammal, which he calls 'Behemot' (from, probably, 'Behemoth,' the Arabic form of the word 'Mammoth'), he says, 'The Russians have discovered a sort of ivory which is whiter and smoother than that which came from India, a commodity furnished by animals which are usually found in the River Lena.

[42] 'Natural Hist. of New York,' by W. W. Mather, vol. iv., 'Geology.'
[43] 'Annual Scientific Discovery,' 1872, p. 239.

The Persians and Turks,' he says, 'buy it up, put a high value upon it, and prefer a scimitar or a dagger-haft of this precious ivory before a handle of massy gold or silver.' Again he writes, 'Nobody better understands the value of this ivory than they who first brought it into request, *considering how they venture their lives in attacking the creature in producing it, which is as big and as dangerous as a crocodile.*' From a Russian, whom Avril calls 'Mushim Pushkim,' then Vowvoda of Smalusko, and who had been a long time Intendent of the government of Siberia and knew the countries beyond the Obi well, 'he learnt,' he says, that 'at the mouth of the Lena there was a spacious island, very well peopled, and which is no less considerable for hunting the behemot, an amphibious animal whose teeth are in great esteem. The inhabitants go frequently upon the side of the frozen sea to hunt the monsters.'[44]

Father Avril's estimate of the precious ivory, of which he writes so enthusiastically, may be an exaggeration or not, but that in his day, or at a not remote period from that day, the mammoth was hunted in the celebrated island admits of little doubt. His description has not the air of a tradition that had come down through some thousands of years. The inhabitants went frequently to hunt the monsters; they ventured their lives in attacking the creature and obtaining the precious commodity, and therefore valued it.

Witsen, in his work, 'Noord en Oost,' Tartarge edition, 1694, says that 'Many mammoths' teeth are found in Siberia; and that occasionally whole mammoths were found which were of a brownish colour, and emitted a great stench.'

In 1715, Lawrence Lange, envoy to China, said several people worthy of credit told him they had seen the horns, skulls, and bodies of the animal, with flesh and blood still remaining.

Müller, who wrote on the manners and customs of the Ostiaks, reports that the carcasses of the animal intact had been seen by many people; and that a cavity filled with clotted blood was often to be seen near the end of the bones.

[44] 'Father Avril's Travels,' vol. i., pp. 175, 177; H. H. Howorth, Geol. Mag., 1880, p. 492.

A mammoth, found between 1840 and 1850, in the Circle of Yakutsk, is mentioned by Herr Skhtschukin. It was well preserved when found, and had a mane of long hair reaching from the neck to the tail. Remains of its food, found between its teeth, consisted of twigs of trees.[45]

The celebrated 'find' of Adams must not be overlooked. In 1806 he was at Yakutsk, where he heard that in a peninsula, at the mouth of the Lena, a mammoth had been found with its flesh and skin and hair intact. A Tungus chief named Ossip Schamakhof, he was informed, in a journey to Tamul in 1779, saw a hummock or lumpy hill. In 1801 this had partially melted away, and disclosed the side of a large animal with the tusk projecting out. The following summer it melted but little, as it was a very cold season. In 1803 the ice between it and the cliff melted, and it subsided on to a bank. In 1804 Schamakhof returned to the mammoth, detached its tusks, and bartered them for goods. Adams did not see the mammoth till 1806. In the meantime the dogs of the Yakuts and the wild animals had eaten its flesh, and Adams found little more than the skeleton, of which one of the fore-limbs was lost. The bones were still united by their ligaments. The skin on the head was dried up, and a bunch of hair remained on one ear: in the left eye he thought he could distinguish the pupil. The skin of the side on which it had lain was covered with thick hair. Adams secured a portion of this hide, which was so heavy that ten men with difficulty dragged it to the bank. The remains are still in the Zoological Museum at St. Petersburg. The remains were embedded in a substratum of clear ice.[46]

In an exceptionally warm season, in 1846, as we are told by Middendorf, the mammoth discovered by Lieutenant Benkendorf on the banks of Indyiska was revealed to the astonished gaze of the beholders upright on its feet in the position in which it was bogged. Its skin was covered with long black hair, beneath which was a coat of reddish wool.[47] The thaw in that year proceeded so rapidly that

[45] H. H. Howorth in Geol. Mag., 1880, pp. 492-496.

[46] 'The Mammoth in Siberia,' Geol. Mag., 1880, p. 193.

[47] The *Times*, April 25, 1881; and 'Early Man in Britain,' p. 106.

Lieutenant Benkendorf and his Cossacks narrowly escaped the alternative of being entombed in the soft morass.

There are some differences to be noted in the circumstances of these two cases. The mammoth found by Mr. Adams was embedded in 'clear ice,' and that found by Lieutenant Benkendorf in 'frozen earth.' The frozen envelope of the former seems to have been thawed by the operation of two or three warm summers, the latter by one exceptionally warm season. In the sealing up, the preservation, and the unsealing of these embedded carcases, several conditions must be noted. In the case of the first, there must have been the presence of a considerable body of water, as it lay buried in clear ice. In both cases the animals must have been frozen up a short time after they perished, or they would have become putrid; and for the same reason they must have been ice-bound from the time of their envelopment until they were found with the hide and flesh intact. And with regard to Benkendorf's mammoth, there must have been the softening of the earth to a considerable depth for so large a creature to be buried in the morass. As Mr. Howorth says, 'You cannot thrust soft flesh into hard earth.'

And the unusually warm summer of 1846 did effect this; for 'Lieutenant Benkendorf and his Cossacks narrowly escaped being entombed.' There is no need for supposing the presence of water for this result. All that was needed for the entombment of this animal was that the alluvial deposits of the Tundra should have been so thawed as to form a bog or morass, and the weight of the enormous animal would sink it. This mammoth, like that found by Adams, seems to have been embogged in an elevated spot; since, when the frozen matter that enveloped it thawed, it sank from around it, so that it stood upright, exposed to the gaze of beholders.

Here then we have pretty conclusive evidence that these animals 'lived down to comparatively recent times.' There are two lines of proof. First, there is the evidence which comes from the condition in which the flesh was found. Mr. Howorth says it is 'so unchanged that, when examined under the microscope, it has all the characters of animals that recently perished, while it is readily eaten by the wild

animals that live in the Tundra. The flesh is as fresh as if recently taken out of an Esquimaux cache, or a Yakhet subterranean meat-safe.' If these animals had died many thousands of years ago, would the flesh of the carcasses have been as fresh, and the tissues under microscopic inspection be as regular and unwasted as the carcase of an animal which had recently died ? Secondly, it is undeniable, and indeed is admitted by all writers on the subject, that from the time when these carcases were embedded till the time they were found exposed, they had remained entombed in their frozen envelopment ; for had they been exposed to the action of the atmosphere and the heat of the summer sun, they would speedily have become putrid. It follows that during, say, a thousand years, assuming that they had lain so long, of the thousand summers that had passed since their entombment, an exceptional season like that of 1846, or two or three summers together such as those of 1801 and 1803, had not occurred.

The woolly rhinoceros (*R. tichorhinus*), one of the earliest of the extinct mammals, whose remains are often found with those of the mammoth, has lived down to recent times.

Three centuries back the Mogul emperor named in his public memoirs the occurrence of the rhinoceros, the wild buffalo, and the lion in the neighbourhood of Benares, and that of the elephant near Chunnar.[48]

In 1772 the carcass of a rhinoceros tichorhinus was found on the banks of the Wiljui, a tributary of the Lena, Siberia, sixty-four versts below Yakutsk, and was taken from the sand in which it had been frozen. Part of the skin was covered with a short, crisp wool, and with black-grey hairs. The carcass emitted an odour like putrid flesh, and Professor Brandt, in 1844, extracted from the cavities in the molar teeth of this skeleton a small quantity of half-chewed pine leaves, a coniferous wood ; and the blood-vessels in the interior of the head appeared filled even to the capillary vessels with coagulated blood, which in many places still retained its original red colour.[49]

The elephant and the rhinoceros, eighteen centuries ago,

[48] Figuier's 'Mammalia,' pp. 148, 150.
[49] Geol. Mag., 1880, p. 493.

inhabited the north-west regions of Africa, ranging in the vicinity of the Straits of Gibraltar. This fact is attested by Herodotus, Pliny, and Strabo, and in the fragment entitled 'The Voyage of Hanno.' From these authorities it is evident that these animals, as well as the cameleopard, the lion, the bear, and the crocodile, during the period 500 B.C. to 100 A.D., were common in the African territory contiguous to the south-western parts of Europe. The testimony in regard to the rhinoceros is given only by Strabo, but all the other writers mention the elephant.

'The Voyage of Hanno' is an official report of an exploration of discovery made to the Carthaginian Government, about 500 B.C., by the commander of a large fleet fitted out for the examination and colonization of the western coast of Africa. 'When we had passed the pillars on our voyage,' says the account, 'we came to Cape Soleis (Cantin), a promontory of Libya. . . . Here elephants and a great number of wild animals were feeding.'[50]

Some of the best evidence to show that the extinct mammalia lived on to a comparatively recent period is found in the reports of Kent's Cavern, read at the meetings of the British Association. In the report for 1874, we find that in the Long Arcade remains of rhinoceros, hyæna, mammoth, and machairodus were found in undisturbed cave earth, together with remains of horse, fox, and pig. In the charcoal, remains of hyæna and rhinoceros were mingled with those of horse, wolf, ox, and sheep.

In the second foot of cave earth in the cave of rodentia, the tooth of a sheep was found with teeth of rhinoceros, hyæna, bear, elephant, and lion. In the north sallyport the teeth of hyæna, rhinoceros, elephant, and lion were commingled with remains of ox, wolf, horse, dog, and pig. This commingling of remains of extinct, modern, and domestic animals occurs in the south sallyport; but we omit quoting them, as the deposits are said to be disturbed in that part of the cavern.

Passing up to the granular stalagmite and the black mould, we find very decisive evidence of the recent extinction of these early animals.

[50] Lenormant's 'History of the East,' trans., vol. ii., p. 263, quoted in 'Epoch of the Mammoth,' pp. 178, 179.

In his lecture delivered in Manchester in 1873, Mr. Pengelly says, 'I have myself taken out of the granular stalagmite teeth of the mammoth, teeth of the extinct cave bear, teeth of the extinct *tichorhine* (woolly) *rhinoceros*, and teeth of the hyæna, which, only partially buried in the stalagmite, were jutting up an inch and a half in relief in some instances.'[51]

From his address to the Devonshire Association for the Advancement of Science, we obtain further information respecting these four early extinct animals. They were, we learn, 'so little below the surface of the stalagmite, that not more than an inch and a half at most of calcareous matter had formed since they were lodged where they were met with.'

'In the north sallyport,' we are told, 'so long as it presented itself, the overlying black mould yields potsherds, marine shells, and bones, chiefly modern, but a few extinct animals, the astragalus of the rhinoceros being the most important of the latter.'[52]

From these statements we find that the teeth of four remarkable extinct animals were found lying on the upper surface of the granular floor above the works of skilful artificers, and jutting up an inch in relief, with at most not more than an inch and a half of the stalagmitic matter formed around them.

If we could find how long this inch and a half of calcareous matter was in forming, we should be able to measure pretty accurately the time that has elapsed since these remains were deposited. According to the rate of increase at the Ingleborough Cave, the inch and a half would have formed in six years; but we will suppose—not conceding it—that in this case it took 150 years to form. The black mould was from three to twelve inches thick, and does not appear to overlie the stalagmite through all this part of the cave, and not improbably was thinning out at this spot. As, however, it is difficult to find the exact position of these remains, we will add for the formation of that deposit, and the time that has elapsed since its deposition, 1500 years. Then, assuming that the black mould did overlie the granular floor at this

[51] P. 129.
[52] Rep. of Brit. Asso., 1870, p. 23.

part of the cave, these teeth of the mammoth, the woolly rhinoceros, the cave bear, and the hyæna were deposited on the surface of the granular stalagmite floor less than 1700 years ago.

Still nearer to our time we find remains of a few extinct animals, notably the knuckle-bone of the *rhinoceros tichorhinus* (the other animals are not named), in the uppermost bed of the cave, associated with the bones of ox, goat, sheep, fox, dog, pig, and man, smelted copper, and Roman and pre-Roman pottery, including a piece of Samian ware. The woolly rhinoceros and other extinct animals find their way to the same bed in the Devonshire cave as Samian ware and other productions of the Roman potter. According to Mr. Pengelly's estimate, these remains would not have found a bed in the black mould more than 2000 years back, and there is no proof that they are amongst the first relics deposited. They were more likely to have been deposited five or six centuries after Christ than a century before the Christian era.

Now, if the facts adduced in this chapter show that extinct animals lived into modern times, or even if it cannot be shown that they died out at a remote period, the association of their remains with the works of man will supply no proof of man's remote antiquity. Whether man left his implements, or weapons, or other handiwork in cave or river gravel, the date of their deposition, and consequently the age at which man lived, must be judged by the circumstances of the case, and the evidence of remote age would not be a whit strengthened by the presence of any number of mammalian bones. The age of these remains must be decided by the same conditions of the bed in which they are found as will furnish the evidence for deciding the date of the works left by man, and can therefore give no independent evidence. If it was a doubtful case in which a geologist would hesitate to pronounce a deposit palæolithic because he had found a solitary unpolished implement, the detection of a relic of a cave-lion, or rhinoceros, or other extinct animal, would not afford the slightest help toward showing that the deposit was of palæolithic, or glacial, or any other early age; for if it could not be proved that cave-lions and other extinct animals died out

in early time, as it cannot; and if it could be proved that they lived on to recent times, as we have shown that they can, how can the association of their bones with a solitary flint implement, or any number of implements, certify that they were of remote age? Or if the undoubted works of man were found in such position and under such conditions as would prove that they were deposited at a remote period, the proof of man's antiquity would come from the circumstances under which those works were found, and could receive no additional proof from the presence of any number of mammalian bones. In such a supposed case the evidence would be just as clear if the animal remains were absent.

CHAPTER IV.

THE THREE AGES.

'An examination of the principal bronze implements, weapons, etc., shows at once to what an extent the later age of bronze differs from the earlier. Various implements for casting bronze, and stamping it, and working it in *repousse*, are found with tools for working wood, reaping-hooks and swords, daggers, lances, arrow-heads, and personal ornaments. This later age of bronze will bring us down into the Christian era and the age of iron. We have come down to modern times. Yet France and Switzerland, particularly the lakes of Bourget, Geneva, Neuchâtel, and Bienne, have not come out of the stone age, for stone implements were still in use, such as saws, wedges, scrapers, and, in a smaller degree, also axes.'—PROFESSOR B. DAWKINS, M.A., F.G.S.

THESE ages are a threefold division of time termed the stone age, the bronze age, and the age of iron; divisions adopted by archæologists for classifying and dating relics of the past, especially in prehistoric times. Whether found in cave deposits, or drift, or tumuli, or bogs, stone implements, and relics found associated with stone implements, weapons, etc., are reckoned as belonging to the stone age. Articles of bronze, and objects found associated with them, are assigned to the bronze age, and so of iron.

The stone age is esteemed the oldest, because stone was used for tools and other purposes in some parts of the world before metals.

The stone age has been divided into the palæolithic or old stone period, and the neolithic or new stone period; and again, by some geologists, articles of the palæolithic type are divided into implements very rudely chipped, and those of a better make, which are esteemed to belong to an earlier and a later period. The neolithic or polished articles are supposed to belong to a still later time, and to have been constructed by men of a somewhat advanced civilization.

This division of time into three ages has, no doubt, been

found convenient by those who have endeavoured to show that man has lived on the earth through long ages of time; but it is out of harmony with facts. No such lines of demarcation can be found as will fix the date of the objects assigned to the several divisions. It is admitted that no hard and fast lines can be drawn between the divisions, and that there is an overlapping of the several periods. But this overlapping is, in fact, a parallelism running through most of the time of these so-called ages.

Stone 'implements,' on which the archæologist principally relies for finding the dates of prehistoric relics, have been found in every age from the earliest to the latest. Metals can be traced from the present up to a time before the flood. And bronze articles have been contemporary with stone, or iron, or both, through all the time of its use.

There is no early time at which stone has ceased to be used and given place to bronze or iron, and therefore to relegate an object to some far-off time in the past because found with a stone implement is at least uncertain, and may lead to false conclusions on questions of importance.

We need not stay to show that stone was in use in early times—that is admitted. The Egyptians used stone knives in embalming their dead. Zipporah circumcised her child, the son of Moses, with a sharp stone. Worked stone is found in the river gravels, and in some of the lower beds of the caves; we propose rather to show that the stone age *reaches down* to modern times, and overlaps the time allotted to the metal ages.

Professor Dawkins, a believer in the three ages, admits this overlapping. Treating of the 'later age of bronze,' he says it will bring us down into the Christian era and the age of iron; yet, he adds, France and Switzerland, particularly the lakes of Bourget, Geneva, Neuchâtel, and Bienne, have not come out of the stone age, for 'stone implements were still in use, such as saws, wedges, scrapers, and, to a smaller degree, also axes.'[1]

The Anglo-Saxons fought with stone mauls at the battle of Hastings. And the Germans used stone hammers in the Thirty Years' War.[2] Stone weapons were used in France

[1] 'Early Man in Britain,' pp. 381, 382.
[2] Chambers's Cyclop., art. 'Bronze.'

down to the Merovingian age ;[3] and in Ireland as late as the reign of Queen Elizabeth.[4]

Throughout the whole of America, Australia, and the Polynesian islands, stone implements were in use down to a comparatively modern period, and in many places are so still.[5]

The Australians are still making use of stone, and their implements being, for the most part, unpolished, they may be said to be in their palæolithic age.[6]

One hundred years ago, the Tchouktchis, in eastern Siberia, lived in caves. They had no instruments of iron, or any other metal. They used stone knives ; their punches were of bone, and their sewing-thread was the sinews of animals.[7]

Professor Rygh tells us that although the inhabitants of Scandinavia in the province of Nordland, Norway, lived for many centuries in communication with people who used iron, they remained themselves in the practice of the stone age till the beginning of the eighteenth century.[8]

When first found by Europeans, the Polynesians were using stone implements, though their ancestors had reared huge fortifications of *hewn* stone. The North American Indians were in their stone age when the country was occupied by the European settlers.[9]

Mr. E. B. Tyler states that stone weapons are still in use in some parts of China. 'It is stated,' he says, 'in a Chinese work, that the inhabitants of the province of Kwang-tong, in southern China, find in the mountains and among the rocks which surround it, a heavy stone so hard that hatchets and other cutting instruments are made from it.'

In the annals of northern China, composed under the Thang dynasty (A.D., 619-907), it is said that in the country east of Fo-ni, all the arrows had stone points. In these same annals mention is made of stone axes, a stone knife, a stone sword, and an agricultural implement of stone.[10]

[3] M. Millescamps.
[4] Lect. Antiq. of Man, T. R. Jones.
[5] 'Prehistoric Times,' p. 107.
[6] 'Matériaux,' liv. 5e et 6e, 1873.
[7] Cited in 'Matériaux,' from 'Description de toutes les Nations de l'Empire de Russie,' St. Petersburg, 1870.
[8] At the Stockholm Congress of Anthropologists, 1874.
[9] 'Epoch of the Mammoth,' p. 235.
[10] Quoted from the 'Epoch of the Mammoth,' pp. 227, 228.

Dr. Mohnike, formerly a physician in the Dutch East Indian Army, in a report to the Society of Northern Antiquarians, in 1853, states that, though the useful metals may have been known in Japan before the commencement of our era, he believed they were first imported from China, and employed but rarely in Japan before the seventh or eighth century after Christ, when copper mines were discovered. Before this stone was used, and perhaps until the ninth or tenth century,

Flint flakes are still in use among the natives of the Andamans, India. The stone implements found in Japan include axes, arrow-heads, and scrapers. The axes are formed generally of greenish stone. The Ainos used stone implements up to a comparatively modern date.[11]

Stone implements are, too, largely used by the Eskimo of the present day.

This method of fixing the date of objects in accordance with the three ages theory has been extended to the tumuli or barrows raised over the bodies of heroes or other distinguished persons; and some late discoveries made in opening these mounds have shown how sternly facts refuse to bend to the arbitrary arrangement. As it has been a custom to bury with the dead a number of flints in these tumuli, they have been allocated to the stone age. There were no metals found with the stones in the graves, and, therefore, they must belong to prehistoric times.

In opening some of these mounds of late years, archæologists have been perplexed to find in them articles of modern date. A notice of one discovery will serve as a sample of others. Dr. de Closmadeuc, one of the most distinguished antiquaries of Brittany, opened a perfectly virgin tumulus at Crubelz. After penetrating through three perfectly distinct but undisturbed strata, he reached the roof of the enclosed dolmen. In it he found the usual products of cremation, and the inevitable flint arrow-heads; but he refers in triumph to the 'absence of all trace of metals,' and adds, 'Doubt is not then possible. This dolmen belongs to the class of primitive monuments of the stone age.' But here a difficulty arises which the doctor very adroitly endeavours to surmount. Some Roman tiles

[11] Rep. of Brit. Asso., 1879, p. 401.

were found in the interior—how did they get there? If these flints had been buried under three distinct, undisturbed strata in prehistoric times, how did these articles of late historic times find their way there? Here is his way of escape from the difficulty. 'We take,' he says, 'little account of the remains of antique tiles met with in the superficies of the tumulus, and even under the tables of the dolmen. It is reasonable to admit that these fragments of tile, which show Gallic-Roman industry, have accidentally penetrated into the interior.'[12]

A writer in the *Quarterly Review* well says: 'These tiles, which it is admitted are scattered in quantities over the plains, must somehow have got to the top of the tumulus, some fifteen feet high, have penetrated through the undisturbed strata of the mound, have inserted themselves between the close-fitting stone of the roof, and finally lodged themselves in the interior of the chamber.'[13] 'In like manner,' he adds, 'the Baron de Bonstellen opened another tumulus in the same neighbourhood. At one foot below the undisturbed surface, the usual deposit of flint implements was found, and, *two feet below them*, two statuettes of Latona, and a coin of Constantine II.; but without the least shaking of his faith in the prehistoric character of the monument he was exploring.'

The stone age has evidently reached down to a recent date in Europe and many other portions of the world, and some communities are in their stone age now.

We now propose to show that the use of metals can be *traced up* to the time of the antediluvians. We need not attempt to prove that we are now in the iron age. Metals are now possessed by all civilized nations, and by some people who are not civilized. The displacement of stone implements has not civilized barbarous nations; for where other influences do not accompany the introduction of

[12] As this way of meeting the difficulty is so remarkable, we will give Dr. Closmadeuc's own words: 'Nous tenons peu de compte des débris des tuiles antiques rencontrées à la superficie du tumulus et même sous les tables du dolmen. Il est raisonnable d'admettre que ces fragments de tuiles qui dénoncent l'industrie Gallo-Romaine ont accidentellement penétré dans l'intérieur.'—*Revue Archæologique*, ix. 400.

[13] *Quarterly Review*, 1870, p. 467.

metals, their first wish generally is to obtain weapons of destruction.

In a paper on 'Fossil Mammalia in Ireland,' the writer stated that Dr. Petrie, of the Ordnance Survey of Ireland, had in his possession an iron sword which had been found with the bones of the megaceros in the county of Meath; and that the remains of the megaceros were found with a spear-head and pottery in a lake in the canton of Berne, Switzerland, as mentioned by Professor Morlet. The soldiers of Brennus were provided with iron swords; and when the armies of Rome brought the civilization of the south into contact with that of the north, they found the value of iron well-known to, and in general use among, their new enemies.[14]

Sir W. R. Wilde, in an address on Ireland, says of the Dannaus, who conquered the inferior tribes in two celebrated pitched battles, 'that they were warlike and energetic, and skilled in metal-work; that they were of superior knowledge, especially in smelting iron and the fabrication of tools, weapons, and ornaments. I look,' he adds, 'upon the great bulk of the metal-work of the north, especially in the swords of Copenhagen and Stockholm museums, as Asiatic; while Ireland possesses not only the largest native collection of metal weapons and tools, usually denominated "Celts," of any country in the world, but the second largest amount of swords and battle-axes.'[15]

A correspondent of the *Times*, at Pompeii, describes the opening of a chamber in that buried city, on the eighteen hundredth anniversary of its destruction. He tells us that, 'No sooner was the excavation of the chamber commenced, than a number of bronze and terra-cotta vessels, bronze fibulæ, bracelets and rings, iron keys, kitchen utensils, and other articles of household use, were found almost in a heap together near the door. There was abundant proof that this had been the shop of a seed-merchant and seller of singing-birds. Against the wall, seed was dug out mixed with pieces of carbonized wood and iron hoops, evidently the remains of small barrels and bins which had been ranged on this side.'[16] Here, in the year 79, in this

[14] *Quarterly Review*, Jan., 1870.

[15] Rep. of Brit. Asso., 1874, p. 122.

[16] *Times*, Sept., 1879.

buried city, this metal was sufficiently abundant to supply iron for kitchen utensils and hoops for the barrels and bins of a shopkeeper. Herodotus tells us of a dream which Crœsus had respecting his son Atys, who far surpassed all the young men of his age. The dream was the expression of the indignation of the god, and foreboded the loss of his son, who was to die of a wound inflicted by the point of an iron weapon. And on his son going out with a hunting party, to kill a boar which had ravaged the country, Adrastus, one of the company, in throwing his javelin at the boar, missed the animal, and struck the son of Crœsus, who was thus wounded by the iron point of the javelin.[17]

The Lydians then had iron javelins, used in hunting, in the sixth century before Christ.

Achilles proposed a ball of iron as one of the prizes to be distributed to the victors of the games instituted in honour of Patroclus.[18]

A saucer of iron, very curiously inlaid, was presented by Alyattes, king of Lydia, to the Delphic oracle, which was of surprising workmanship.[19]

A whale eighty-five feet long was found at Dunmore, near Stirling, Scotland, which lay about twenty feet above high-water mark ; and in the carse below Stirling, about twenty-five feet above high-water mark, an iron anchor was found.[20]

Dr. Livingstone states that in South Africa there are no flints found in the regions discovered by him, and no trace of a stone age ; but he found a rude furnace for smelting iron at every third or fourth village which he entered.[21]

Passing Eastward, the early home of the human family, we find that metals were possessed by the earliest inhabitants of that part of the world. In the time of Cyrus, Belshazzar the king of Babylon and his lords were feasting and drinking wine, and in their exhilaration the king commanded that the vessels which Nebuchadnezzar had taken out of the Temple at Jerusalem should be brought, and the king and his princes drank wine out of them, and praised the gods of gold, and of silver, of brass, of iron, of wood, and of stone.

[17] 'Clio,' i., 34, 43.
[18] Rees's Cyclop., art. 'Iron.'
[19] Herodotus, 'Clio,' xxv.
[20] 'Antiquity of Man,' 4th edit., p. 52.
[21] 'Expedition to Zambesi,' pp. 561, 562.

A few years earlier, Nebuchadnezzar, in a dream, saw a great image, the head of which was of fine gold, his breast and arms of silver, his belly and thighs of brass, his legs of iron, and his feet part of iron and part of clay. In his dream the king then saw that a stone cut out without hands smote the image upon his feet that were of iron and clay, and brake them in pieces. This image was understood to represent successive kingdoms that were to arise and give place to others; and the king must have been well acquainted with the properties of metals to have comprehended the teaching of the vision.[22]

Among the arms of the ancient Assyrians, discovered by Layard and Botta, were elegantly formed helmets, described by Herodotus as made of brass. Those, however, says Botta, which were discovered in the ruins appear to have been iron, occasionally inlaid with copper. The Assyrians, we are told, were also acquainted with the art of founding and working metals. The metal most frequently used appears to have been copper. Iron appears to have been used more rarely; but this metal oxidizes quicker than copper, and cannot resist a long sojourn underground.[23]

Some antiquities have been recently added to those in the British Museum; amongst which are a bronze hatchet-blade, inscribed with a drawing of a bull-fight; and terra-cotta tablets from Palmyra, stamped with figures of deities and other personages: among others, the name of Tirhaka, B.C. 690.[24]

Job, in the anguish of his soul under the calamities which had befallen him, pathetically exclaims, 'Oh that my words were now written . . . that they were graven with an iron pen and lead in the rock for ever!' He wished a permanent record that might be read on through ages to come. It was customary in records of this kind to cut the words deep in the rock and fill them up with lead, which was probably Job's wish with regard to his words. Certainly he wished a lasting record made in the rock by a sharp-pointed style of hard iron. Numerous inscriptions of this

[22] Daniel v. 1-4, and ii. 31-35.
[23] 'Nineveh and its Palaces,' by Bonomi, pp. 332, 336.
[24] Journ. of Archæological Asso., June, 1880.

kind are found by travellers in the East on rocks in the desert. Burckhardt, in his travels from Akaba to Cairo, by Mount Sinai, found many inscriptions on the rocks.[25]

Job, according to Hales's chronology, lived some twenty-three centuries before Christ. This early use of metals is confirmed by other historical records.

When the Israelites, who had been brought out from the bondage of Egypt, should reach the land of Canaan, six cities of refuge were to be provided for the shelter of the man from the avenger of blood who had killed another unawares ; but said Moses, if he smite him with an instrument of iron so that he die, he is a murderer, and shall be put to death.[26]

Amongst those who disputed the passage of the Israelites to this promised land was Og, king of Bashan, a man of large stature, who had a bedstead of iron of large dimensions.[27]

In an address which Moses delivered to the people, requiring them to keep the commandments of the Lord, he says, 'The Lord hath taken you, and brought you forth out of the iron furnace, even out of Egypt.'[28] This figure is based on the smelting of iron in the furnaces of Egypt ; so that, at the time when the posterity of Abraham was in Egypt, the Egyptians had furnaces for smelting iron.

In one of those articles by François Lenormant, supplied to the *Contemporary Review*, on 'Biblical Genealogies,' he gives a rendering and exposition of the song of Lamech, in Genesis iv. 23, 24. Lamech exultingly says, 'If Cain shall be avenged sevenfold, truly Lamech seventy and seven fold.' The cause of this joy, Lenormant thinks, is the discovery of metal weapons. Tubal Cain, one of Lamech's sons, was an 'instructor of every artificer' (or forger of every tool) 'in brass and iron' (ver. 22). And with metal weapons Lamech 'had killed a man who had hurt him, and a young man who had given him a stroke.' 'In the terrible threat,' says Lenormant, 'contained in the last verse of the song, we have the expression of the boastful confidence of the Cainite by the possession of these new

[25] 'Travels in Syria,' Lond. edit., pp. 506-614.
[26] Numbers xxxv. 16. [27] Deut. iii. 11. [28] Deut. iv. 20.

instruments of war. Cain has been sheltered from the danger to which murder had exposed him by means of the Divine protection extended to him. Armed as he now is, Lamech will be fully able to defend and protect himself. He who should lay his hand on Cain should have only a sevenfold vengeance. Lamech, thanks to the instrument of death which he has at his disposal, will be able to avenge himself seventy-seven times; for his power has now increased more than tenfold. This view,' he says, 'is supported by a number of modern interpreters, such as Hess, Herder, Rosenmüller, Ewald, Deletzsch, and Knobel, who appear to be right in establishing a relation between the song of Lamech and the manufacture of weapons attributed to his son Jubal.'

'Ewald,' he says, 'was perfectly right in speaking of this song as the most ancient fragment included in the Bible; and I am even willing to add the most ancient literary fragment bequeathed to us by any Semitic people.'[29]

Of what metals his weapons were composed, it is not necessary to decide. Two kinds are named; and one, if not both, would require to be hard and capable of being wrought to an edge to give the avenger the boastful confidence which he manifested. In any case, we have metals wrought into manufactured articles before the flood. And if the exposition of Lenormant and the scholars he names is correct, the metals were forged at that early time not into tools only but into weapons.

We have shown that stone has been used as implements and weapons *down to recent times*, and that with some people it is the stone age now; and we have traced worked metals *up to the time of the antediluvians*. We now propose to show that, through long periods, the use of stone and metals has been contemporary.

We learn from Professor Dawkins that bronze swords have been discovered in Switzerland in the lake dwellings of Moeringen and elsewhere, with the hilts inlaid with iron, and in association with iron swords of the leaf-shaped type, so characteristic of the 'bronze age.' In Britain, also, iron and bronze swords have been found together of the same leaf-shape; and a spear-head found in Scotland con-

[29] *Contemporary Review*, April, 1880, p. 571.

sists of an iron core covered with the harder and more brittle bronze.[30]

The late Mr. J. M. Kemble and other British antiquarians object to the classification of the three ages arrangement for chronological and scientific purposes. They point to the discovery of objects of stone, bronze, and iron in the same ancient urns, graves, and dwellings. They instance the case of the Huns, who had swords of iron, while they pointed their arrows with bone. They show stone weapons, in some of which the traces of metal are still fresh.[31]

The stone age is seen in full operation in the sixteenth century among the Mexicans and Peruvians—and the inhabitants of Central America, as well as the Mexicans and Peruvians, used stone weapons—but they all used obsidian knives, swords, spear-heads, and axes, along with implements of copper and bronze.[32] There seems to have been one uninterrupted iron age in Africa, south of Egypt. Notwithstanding the existence of this iron age among the central and southern tribes of Africa from the earliest times known to us, stone implements and implements of bone are still (along with iron) in use among the Bushmen, the Hottentots, the Damaras, the Kaffirs, and the coast negroes.[33]

At Loughcrea, county of Meath, Ireland, a large group of cairns were opened by Mr. E. Conwell, of Trim. In one of these cairns he found first the inevitable flints, then some thousands of fragments of bone implements. Mixed with these were vessels of bronze; then seven implements of iron, much corroded, but one of which seemed to be the leg of a pair of compasses with which the circles on the bone implements had been engraved.[34]

In the trenches before the ancient city of Alisia, where Cæsar besieged and captured Vercingetorix and his great army, and which was excavated by order of Louis Napoleon, 'the arms of the three eras were found in the same foss, arrows of stone with those of bronze and iron.[35]

[30] 'Early Man,' p. 425. [31] Chambers's Encyclop., art. 'Bronze.'
[32] 'Conquest of Mexico,' vol. i., p. 140.
[33] 'Descriptive Sociology,' Herbert Spencer, African Races.
[34] *Quart. Rev.*, 1870, p. 462.
[35] 'Palafites of Lake Neufchâtel,' trans., Smith's Report, 1865, p. 400.

At the excavations carried on by Napoleon, in 1862, between Trévaux and Riottier, on the plateaux of La Bruyère and St. Barnard—which the historian remarks leave no doubt of the place where Cæsar defeated the Helvetii on the Saône—there are found numerous sepultures, Gallo-Roman and Celtic. The tumuli furnished vases of coarse clay, and many fragments of arms of flint, ornaments of bronze, iron arrowheads, fragments of sockets, etc. The sepultures were by incineration and inhumation.[36]

In his excavations of old Troy, Dr. Schliemann has discovered the *débris* of a number of successive towns, with remains of their industries, and treasures of the people who once inhabited them. The remains of the Greek Ilium are confined to the topmost stratum, and this is separated from the next by a layer of *débris* which seems to indicate a long interval. All below this is pre-Hellenic. The ruins show an age of stone running through all the strata, and it coincides in all with an age of copper, iron being all but wholly absent. But more than this, the copper is scarcer, and stone implements more abundant in the thick stratum, than in those below. In other words, we have the very unscientific fact of an age of stone above an age of copper (bronze). The implements and weapons of stone and copper are mixed with ornaments of copper, gold, silver, and even ivory, and fragments of musical instruments, testifying to a state of no little civilization, and luxury, and commerce with foreign nations. Again, in all the strata there are hundreds of vessels of pottery, and remarkable objects of terra cotta; but in soundness of manufacture, elegance of form, and even size, there is a progressive falling off. In short, the newly-opened mound of Hisserlik, of whatever else it may be the monument, stands henceforth a lasting witness to a progressive decay of civilization, and industry, and wealth among the successive races of its inhabitants; and it completely overturns—for that part of the world, at least—the hasty assumption of the progress of mankind through the ages of stone, bronze and iron, which has been derived from regions that may well have been the last retreats of degraded races, rather than the first abodes of primitive man. We have long

[36] 'Life of Cæsar,' by Napoleon III., vol. ii., p. 65.

doubted whether such tokens of the lowest state of humanity would be found in the regions which history marks as the seat of primeval civilization, and this is at least one decisive answer. There is nothing astonishing in the fact that a comparatively civilized people among whom iron was scarce or unknown, should use knives, saws, axes, and hammers of flint, diorite, and other hard stones, as the best substitute for the hard metals. Many such examples may be found in the present day, and in our age of iron, the *débris* of London may furnish some curious proofs to the coming New Zealander of the low civilization of the nineteenth century.[37]

In old Troy, metal and stone implements were not only contemporary, but contemporary through a long period. The overlapping was for a considerable time. Bronze and stone ran through the whole of the ruins, but bronze was most abundant in the early stratum, and the stone implements in the latter, with apparently a 'long interval.'

This mingling of stone implements and metals is further shown by the ancient tumuli.

In a tumulus on a hillock called the Mané Bodegade, at Carnac in Brittany, an iron axe and an iron ring were found with a great number of flint flakes.[38]

In a dolman in Algiers, at the foot of the enclosed skeleton, M. Ferand found the remains of a horse, and an iron bit, a ring of iron, objects of copper, worked flint implements, and a coin of the Empress Faustina.[39]

On the Island of Rügen, in Germany, near Banzelwitz, was discovered in 1793, a long stone chamber, in which were found ten skeletons in sitting posture, and in the clay beneath these were nine urns on a layer of loose flints. Under each of the three large urns was found a flint axe, besides which there were also found an amber bead, and a rusted fragment of iron. There was no trace of a secondary interment.[40]

In a very large stone chamber in the parish of Veibye, district of Frederiksburg, Professor Worsaae found a great

[37] *Quart. Rev.*, 1874, pp. 544, 545. [38] 'Matériaux,' 1872, p. 63.
[39] Cited in 'Proceedings of Soc. of Antiquarians of Scotland,' vol. vi., p. 131.
[40] Archiv für Anthropologie, Jan., 1876, p. 203.

many stone wedges, knives and hammers, arrow-heads of flint, and a piece of iron that had been bent and which had a hole through the middle. This occurred in 1838, and in 1839 he opened another large gallery-grave in the same district, which contained skeletons and implements of stone. Near the skulls lay a flint knife and a piece of iron having the form of a knife, which was fastened with a nail to a piece of wood.[41]

In a cemetery of prehistoric age near Salzburg, in Austria, nearly a thousand ancient graves were discovered by M. Ramsauer, which contained various objects of *glass*, *wheel-made pottery*, and *African ivory*. In these graves the explorers also obtained a number of stone implements, over a hundred weapons of bronze, and 500 weapons of iron; more than 100 vessels of bronze, and over 1,000 specimens of pottery. Speaking of the stone graves of Mecklenburg, Lisch observes that although the predominant material is flint, yet traces of iron are found in them; this metal, he says, having in most instances perished. He also states that a battle-axe of iron, iron rings, etc., were found in stone chambers near Greven, Rosenburg, and Schlemmin, along with stone implements.[42]

Mr. Bateman found in a barrow on Cross Flatts (Derbyshire), an iron knife and a spear-head of flint; in Boerther Low, a flint arrow-head and a bronze 'celt;' in Rolly Low, a coin of Constantine, two flint arrow-heads, etc.; in a barrow on Ashford Moor, an iron arrow-head and flint implements; in Stand Low, stone implements and flint chippings; and at the centre an iron (Saxon) knife, a bronze box, silver, glass, etc.; at Moat Low, six rude instruments, a bronze lance-head, iron knives, etc.[43]

In India, implements of stone have been found contemporary with those made of metals from prehistoric times down to the present day. In a 'Manual of the Geology of India,' compiled chiefly from the observations of the Geological Society, it is stated that prehistoric implements have been found in India to a considerable extent. Chipped *palæolithic* weapons were first found near

[41] Archiv für Anthropologie, Jan., 1876, p. 285.
[42] 'Epoch of the Mammoth,' pp. 259, 264.
[43] Quoted by Dr. Southall in 'Epoch of the Mammoth,' p. 255.

Madras by Messrs. Foot, King, and Oldham, and have been subsequently met with in Orissa, Bengal and Assam. Knives made from agate, flint or chert are next noticed, which *possibly*, it is conjectured, are of more recent date than the quartzite implements. Similar flakes are still in use among the natives of the Adamans, we learn. The third kind of implement noticed is the neolithic, or so-called 'celts,' smoothed on the surfaces by grinding, which have been found at Kirwi, Clintta, Nagpen, and Knig. We have here the three kinds of stone implements: the quartzite, esteemed the earliest; the flint or chert knives, supposed to be of a later type; and the neolithic, considered to belong to a still later date, and some of the earlier of these are in use now amongst the native Adamans. These stone implements cover the whole time from the primitive use of the old quartzite to the present. The whole period is one stone age. Yet through this period metal implements have been in use, for we learn from this 'Manual' that a bronze axe has been discovered near Jabulpur; that copper (bronze ?) weapons are more numerous, and that iron implements are abundant. And the authors suggest that the art of working this metal may have been discovered earlier in India than in more Western regions.[44]

We have shown, from discoveries made in every quarter of the globe, that stone has been used for implements, weapons, and other purposes from the earliest ages down to the present time—that the use of metals for like purposes can be traced from the present day up to a time before the flood—and that articles made of bronze through the whole time of its use have been contemporary with the use of iron, or stone, or both.

The only exceptions to the contemporaneous use of stone and metals appear to be, that in Britain and some other countries, chiefly in Europe, for some centuries past, the use of iron has superseded the use of stone; and that for a time in the early history of some communities, where metals were not discovered, or not forged, or not obtainable, implements and weapons were made of stone.

[44] *Monthly Journ. of Science*, 1879, p. 698.

Not improbably man in his primeval condition used stone implements. Principal Dawson, of McGill's University, renders Genesis ii. 12, 'Gold, and whampum, and flint-stones;' and this would be in accord with the fact that both stone and metals were possessed by early Eastern nations, as Egypt, Assyria, India, etc.

The Creator, while He provided all that was needed for man's sustenance and well-being, and endowed him with the faculties of invention and contrivance, and imparted an earnest thirst for knowledge, did, we may probably assume, greatly for His creatures' happiness, leave him to prepare his tools, and make his discoveries. If He had prepared for him all the ministries of his service, and opened for him all his discoveries, he would have known the miseries of idleness, the want of many of the pleasures of life, and the joy of the 'eureka' cry.

However this may have been, man in his early home, and in the settlements of his after-history, has through the great portion of his time possessed together both stone and metal implements. And it is evident that no such arrangement as the 'three ages,' even with some overlapping allowed, is possible.

The assignment of objects to any one of these so-called ages, because found associated with articles of stone, or bronze, or iron, for the purpose of fixing their date, is vague and misleading.

CHAPTER V.

PRIMEVAL MAN—WAS HE A SAVAGE?

'The rougher material did not itself prove greater antiquity. Quartz and quartzites had been used at all periods, from that of the laterite of India, to that of the neolithic caves of Britain, and even later elsewhere. The difference of material might be explained on the supposition that the people who left the quartzite implements had lived in that, or some other district where quartzite was the only or most common material; while the flint was brought by a tribe who came from a district where flint was abundant.'—PROF. MCK. HUGHES.

WE have been used to think of man in his original state as a noble being, bearing in some sense the image of the Creator, a lord of the inferior creation, and the only being on earth who could adore and love his Maker, and offer Him intelligent and intended praise. We have esteemed him the child of the great Father, richly endowed and placed in an abode of beauty and fruitfulness, where grew every tree that was pleasant to the sight, and good for food; with orbs above him that were for signs and seasons, and which told of the greatness and goodness of Him who made them.

Alas! how the glowing picture becomes shaded down, and the fine gold dimmed, under the metamorphic hand of modern scientific theorists. According to this modern creed, original man was a low savage. Some of his posterity have, we are told, in the course of many long ages, struggled upwards, and have by a very slow process attained to an advanced social position termed civilization; while a large portion of the human family still remain in a state of barbarism. 'Palæolithic man,' says Mr. Sidney Skertchley, 'was more degraded than any known savage tribe.'[1] Mr. Tiddeman, the explorer of the Victoria Cave, who thought man was living in North Britain in pre- or

[1] *English Mechanic*, 1879, p. 49.

inter-glacial times, styles him 'the craven savage.' Sir C. Lyell cites with approval the description of Horace, as accordant with the train of thought which the modern doctrine of progressive development has endorsed. Here is the likeness of early man, as traced by this pencil: 'When animals first crept forth from the newly-formed earth, a dumb and filthy herd, they fought for acorns and lurking-places with their nails and fists, then with clubs, and at last with arms, which, taught by experience, they had forged. They then invented names for things, and words to express their thoughts. After that they began to desist from war, to fortify cities, and enact laws.'[2]

Professor Dawkins has made a list of prehistoric mammalia, in which he has classified them as wild and domestic animals. At the head of the list of wild animals he places man, and closes it with wild boar. At the head of the list of domestic animals stands dog, and at its close hog.[3]

The evidence offered in proof of this barbarous condition of early man is drawn largely from caves, and river-drift, from the burial-places of 'prehistoric' generations, and from the necessities of the theory of evolutionists, who, excepting those who believe in the independent creation of man, hold, and must hold, the savage state to be transitional between civilized man, and beings who had struggled out of a multitudinous line of nondescript forms between the brute and the human.

Mr. Mello, who with Mr. Dawkins explored the Creswell Caves, states that it was the evidence furnished by these caves of the connection of man with the fauna of the period, and the early stages of human culture, that had given the discoveries they had been enabled to make their great importance. 'Simple and rude quartzites, found in the lowest deposits of the caves,' he said, 'marked the earliest appearance of the old palæolithic savage in the district.' And Mr. Pengelly states that the cave-men whose 'tools' were found in the breccia of Kent's Cavern; and the cave-men whose better-made implements were discovered in the cave-earth above, were two grades of savages, 'troglodytes' he calls them. Professor Dawkins accepts this finding, and thinks it would be difficult to escape Mr.

[2] 'Antiquity of Man,' 4th edit., p. 424. [3] 'Early Man in Britain,' p. 261.

Pengelly's conclusion, that the two sets of 'implements' represent two social states, of which the ruder is by far the most ancient.[4] And in a later page[5] he adds, 'In the course of this chapter, we have seen that the river-drift "implements" in the caves of Creswell Crags, Kent's Hole, and L'Eglise, are found in the strata below those with the cave-men (in the bed above), and, consequently, that the river-drift-men lived in Britain and France before the cave-men.'

Unmistakably, the teaching of these extracts from the works of leading scientists who are considered authorities in matters of cave-lore, is: First, that early man in Britain and France is proved to have been a low savage, because he made rude, clumsy tools: secondly, that he is proved to have lived at a remote age, because in the caves these 'tools' were found in the lowest beds: and, thirdly, that the river-drift-men who made like 'tools' are proved to have lived before the cave-men, or higher grade of savages; that is, at the time when the low savages left their 'tools' in the lowest beds of the caves.

We have been trying to discover how the conclusions here arrived at come logically out of their premises, and have certainly failed.

At the very threshold of the inquiry it is assumed that these rude pieces of flint or chert found in the caves were chipped into 'tools' by the hand of man. They may have been, but the probability is that man never touched them till the explorers discovered them. The nodules found in the lowest bed in Kent's Cave, we are told, were no better for chipping; the pebbles found in the neighbouring cave of Brixham had been washed to their destination in the bottom bed by tributary streams. Kent's Hole has evidently been excavated partly by the erosive action of water, and these nodules had probably been broken by collision as they were driven by the impetuous current.

There are many articles of flint in the caves that the hand of man has manifestly shaped into tools, the marks of design are upon them, but in multitudes of cases it is very difficult to decide whether they have been chipped by man or broken by natural fracture. Even experts have come to different conclusions concerning them. Principal Dawson,

[4] 'Early Man in Britain,' p. 195.

[5] *Ibid.*, p. 320.

who examined a large number of flints at Amiens and Dover, states that 'no one can distinguish those which man has used from the vastly greater number which nature has produced and man has not touched, except where they are found with unquestionable human remains.'[6]

And Mr. D. Wilson, in his 'Prehistoric Man,' admits that unwrought flints in every stage of accidental fracture are found in the gravels, including many which the most experienced archæologist would hesitate whether to classify as of natural or artificial origin.

At the Victoria Institute Mr. Whitley showed some specimens of flint broken by Blake's patent stone-breaker, in which a cast-iron jaw is worked by a steam-engine, which flints selected from the broken mass could not be well distinguished from those which in the ossiferous caves are the reputed knives and scrapers of palæolithic man.[7]

With this uncertainty, the most that can be said of these clumsy pieces of flint is, that they *may have been* shaped by the hand of man, and from these precarious premises is drawn the important conclusion that the lower cave-men were low savages.

But, assuming that these rude tools *were* made by men, that will not prove that the men who made them were of remote age or were low savages; rather, they are found to be so situated and so associated with modern objects and historic times as to disprove the assumption.

Before adducing the facts that will disprove this assumption, it may be well to ascertain what these rude 'tools' of the caves and the drift are, that in our inquiry we may be able to identify them. In the Kent's Cave they were nodules of flint and chert, and were more massive and less symmetrical than flakes. In the Creswell Caves they were quartzite pebbles used for 'hammers or pot-boilers.' In the river-drift at Gray's Inn Lane, and the neighbourhood of Salisbury, these 'implements' are described as roughly chipped, and in make oval and pear-shaped. In the valley of the Somme the drift 'implements' are similar to those in Britain, and the identity in form, we are told, leaves no doubt that man's culture was of the same low order. At

[6] *Leisure Hour*, 1874.

[7] 'Antiquity of Man Reconsidered,' by T. K. Callard, F.G.S., pp. 34, 35.

Ousidan, Africa, 'implements' of the time of St. Acheul have been discovered, and on the bank of the Narbada, Northern India, a quartzite hâche was found. The two stages of culture have been proved, it is affirmed, in the Grotto de l'Eglise at Excideuil. At the bottom of the cave a yellow sand contains rough choppers and rude flakes of 'jasper,' unaccompanied by higher forms.[8]

It will be seen that the 'implements' described are rude in their make; and on this rude unfinished character is based the conclusion that the men who made them were of the lowest type of savages. It follows that where implements of this make are found, the early men of those regions should be deemed savages. Indeed, that is the principle that has guided the decisions of Professor Dawkins and others whose words we have quoted. In his general conclusion respecting the drift-men, the professor traces them through large tracts of the earth by means of 'palæolithic implements.' 'It is clear,' he says, 'that the river-driftman followed the chase over the Mediterranean area when the only obstacles to his passage from Spain to Africa, or from the Peloponnesus to Palestine, would be offered by the rivers and morasses. It is impossible to doubt that he wandered either from India to Palestine, or from Palestine to India.' And how are we to be assured that man as a low savage wandered in early time over this large area? Here is the answer: 'His implements (found) throughout this wide region prove him to have been in the same low stage of culture.'[9] In then this wide region, including territory where an early civilization prevailed, man is proved to have been in a savage condition, and that simply because in these countries have been found some rudely constructed stone implements. So that if an archæologist wishes to learn where early men have been barbarians, he has only to hunt the caves or follow the track of some pebble-borne stream and find chipped nodules, stone hâches, or hammer-stones bearing the marks of collision, and he may take it as a settled fact that the region where these 'tools' were found, was once peopled with low savages.

This is a facile mode of reading the history of man in

[8] 'Early Man in Britain,' pp. 158-166, 179, 181, 194, 197.

[9] *Ibid.*, p. 192.

what are called prehistoric times; but the theory is not in accordance with facts. These rude 'implements,' as we have said, are so situated, or so associated, as to disprove the assumption.

In the ancient tombs of Babylonia and Assyria have been discovered flint hatchets and arrow-heads, *and with them* tools of bronze, with chains, nails, fish-hooks, etc., of the same metal, and armlets, bracelets, and finger-rings of iron.

From the sun-dried mound of Abu-shahrem, in South Babylonia, Mr. J. E. Taylor, British Consul at Basrah, obtained, some years ago, two taper-pointed instruments of chipped flint, which, to judge from a cast of one of them, would be passed without hesitation as *drift implements.*[10]

The Assyrian arrow-heads are either of bronze or iron, while a few stone arrow-heads are also found.[11]

The stone axe was one of the hieroglyphical characters of the Egyptian monarchy, and was represented with stone sickles, knives, and arrow-heads on the bas-reliefs of Beni-Hassen (of the twelfth century) and on the Egyptian monuments.[12]

At a meeting of the Institut Egyptien, held on May 19th, 1870, Mariette Bey said: 'The fact that there are found (in Egypt) flints worked by the hand of man cannot be contested. . . . They belong to the historic age of Egypt; and their great number on the plateau of Biban-el-Molouk simply shows that in all historic antiquity, even in the time of the Ptolemys, flints were worked on this plateau on account of its proximity to Thebes, in order to supply the demand for instruments of this material, which have been always used. . . . In a geological point of view it remains to be observed that the worked flints up to this time have always been found *on the surface of the soil.* This is their position on the plateau of Biban-el-Molouk; in another *gisement*, situated at the entrance of the same valley; in another which is found at the entrance to the turquoise-mines of Mount Sinai; and in a fourth at Monfalont. It is the same with those which are found at

[10] The italics in these extracts will be mine.

[11] Smith's 'Ancient History of the East,' vol. i., p. 210; Rawlinson's 'Five Great Empires,' 2nd edit., vol. i., p. 454; quoted from 'Epoch of the Mammoth,' pp. 119, 120.

[12] Archiv für Anthropologie, Jan., 1876, p. 250.

the quarries. But, on the contrary, if the flints were truly prehistoric, it would happen that we would encounter them in certain beds in the interior of the soil, which has never yet occurred.'[13]

In these several instances we find stone implements mostly of the drift type, but not the drift-men.

In Babylonia and Assyria have been found *flint hatchets* and *arrow-heads* in tombs erected by civilized men, and associated with articles of bronze and iron. And in South Babylonia, from a sun-dried mound, a British consul obtained taper-pointed instruments of *chipped flint*, which would pass without hesitation as *drift implements*. Passing to Egypt we learn that the *stone axe* was emblematic of the Egyptian monarchy, and the *arrow-head* was traced on the bas-reliefs of Egyptian monuments. Then these were not the devisings of ancient barbaric drift-men.

Mariette Bey tells us that the worked flints of Egypt belong to the historic age; that they have always been found on the *surface of the soil*, not in certain beds in the interior of the soil, which has never occurred.

In Greece, *axes* and knives of flint, obsidian, and compact quartz have been taken from the tombs of Attica, Bœotia, Achaia, and the Cyclades;[14] and *arrow-heads* of flint and bronze are found on the plains of Marathon,[15] the only question being whether they belonged to Greece or Persia.

The Abbé Richard examined the so-called Tomb of Joshua, at Gilgal, on the banks of the Jordan, in Palestine, and found within great numbers of knives, saws, and fragments of flint.[16]

In the annals of Northern China, composed under the Thang dynasty (A.D. 619-907), mention is made of *stone axes*, a stone knife, a stone sword, and an agricultural implement of stone.[17]

In a tomb on the banks of the Jordan have been discovered great numbers of flint knives and *axes;* and stone *axes* are named in the annals of Northern China com-

[13] Reported in 'Matériaux,' 1874, p. 17.
[14] Lenormant, 'Ancient History of the East,' trans., vol. i. p. 35.
[15] Evans's 'Ancient Stone Implements,' p. 328.
[16] 'Comptes Rendus de l'Acad. des Sciences,' Dec., 1871, p. 541.
[17] Quoted from 'Epoch of the Mammoth,' pp. 226, 227.

posed during the Thang dynasty. But these facts all point to civilized times and civilized peoples. There is no place for low savages.

We have been to the East for evidence; the Smithsonian Report will supply us with facts from the West.

All over the United States, we learn, are found stone implements belonging to the Red Indians, which show that *the polished and unpolished specimens were in use at the same time*, while on the surface and in the mounds, as we are told by Professor Rau, flint implements *of the European drift type* are by no means scarce. Professor Rau mentions particularly in this connection that in one of the 'sacrificial' mounds of Clark's work, on the north fork of Paint Creek, Ross County, Ohio, Messrs. Squier and Davis found more than 600 *oval or heart-shaped implements, clumsy* and *very roughly chipped*, averaging six inches in length by four inches in width, which bear a striking resemblance to the flint 'hatchets' discovered by Boucher de Perthes and Dr. Rigollet in the diluvial gravels of the valley of the Somme.[18]

This testimony is very important. Implements belonging to the Red Indians are found all over the United States, which show that the polished and unpolished specimens were in use at the same time. There were no signs of palæolithic and neolithic ages, much less was there any indication of a gap between the two. And, according to Professor Rau, flint implements of the European drift type are by no means scarce, and are found, not in the lower beds of caves nor in gravel beds, but on the surface and in the mounds. Moreover, Messrs. Squier and Davis found in a 'sacrificial' mound over 600 oval or heart-shaped implements, clumsy and very roughly chipped, averaging six inches in length and four inches in width, which bore a striking resemblance to the flint hatchets discovered in the diluvial gravels of the Somme.

If drift implements found in Europe, in Palestine, India, etc., show that the people of those countries were low savages, by parity of reasoning these implements of the European drift type belonging to the Red Indians ought to prove that the people of the West, who made and

[18] Smithsonian Report, 1872, pp. 398-400.

used them, were also low barbarians. Before these facts, the assumption that the presence of 'clumsy quartzite pebbles' and 'rude tools made from nodules of flint and chert' is the sign and proof that early man was an 'old palæolithic savage,' cannot be maintained.

It is, too, evident, from these and other facts, that if these drift implements were wrought into tools by the hand of man, they afford no proof that man belonged to a remote age.

These implements of the drift type are not only scattered on the surface of the soil, are not only found in modern mounds and tombs of Assyria, Palestine, and Greece, with tools and ornaments of bronze and iron, but in the higher beds, and mingled with modern objects of the caves, which are thought to give proof of remote antiquity.

In the principal cave at Creswell a few rude quartzites were discovered in the lower bed, which were said to indicate the presence of the old palæolithic savage; but in the highest bed, on the floor of which lay Roman and mediæval pottery and a piece of Samian ware, hundreds of these clumsy quartzites were found, the makers of which, by parity of reasoning, must have been savages. In the red sand of another of these caves were found two human skulls, thought to belong to neolithic times, which if not on the same horizon with these quartzites would be under them.

In Kent's Hole, which from the presence of rude 'tools' in the lowest bed is supposed to furnish some of the strongest evidence that can be adduced in proof of man's remote antiquity, these lumps of flint and chert were found in association with pieces of coarse pottery; while in the higher bed of cave earth a hammer-stone was found, and in both beds were remains of common fox.

The testimony of these facts is supported by the testimony of eminent scientists. In a discussion on papers read before the Geological Society by Professor Dawkins and the Rev. J. M. Mello on the deposits of the Creswell Caves, where some quartzite pebbles had been found, Professor Hughes is reported to have said: 'The rougher material did not itself prove greater antiquity. Quartz and quartzites had been used at all periods, from that of the laterite of India to that of the neolithic graves of

Britain, and even later elsewhere.' 'The difference of material,' he suggested, 'might be explained on the supposition that the people who left the quartzite implements had lived in that or some other district where quartzite was the only or most common material, while the flint was brought by a tribe who came from a district where flint was abundant.' Professor Prestwich said that 'fineness of finish does not necessarily prove more modern date, as is exemplified by the Shrub Hill implements.'[19]

Moreover the skill and taste displayed by so-called palæolithic cave-men show that they were not savages.

These are the men of the cave earth who made tools and weapons and other objects more symmetrical and of higher finish than the nodules and clumsy quartzites found in a lower bed, but who, because they used what are termed palæolithic or unpolished tools, are writ down savages. Of a higher grade, it is said, than the old palæolithic or low-typed savage, but still savages. For this classification there seems to be found no reason in the facts of the case, and certainly the handiwork of the men of this time will not justify this appellation. Considering the means at their disposal, and the disadvantages under which they laboured, they manifested as much skill and contrivance as those who polished their stone implements or wrought in metals.

The possession of metals has no doubt given larger scope and freer play to the inventive and constructive faculties of the artificer, and has quickened the spirit of enterprise; but to construct a stone saw, and drill the well-formed eye of a needle without a metal tool; to make gouges, and awls, and scoops, and harpoons of bone and reindeer antlers; and to trace accurate and tasteful drawings on the antlers and teeth and ribs of animals, certainly show as much ingenuity and refinement as the worker in iron manifests when he shapes it into various forms by the help of the furnace and anvil and mould; and certainly show as much or more than those who, by a change of fashion, rub up their implements and weapons to a polish, which is made the sign of their having risen out of the barbaric state.

[19] Journ. of Geol. Soc., 1876, pp. 256, 257.

Dr. Schliemann, in a letter to the *Times*, states that the settlers who had built a new town on the Trojan territory, worked with tiny saws of silex or chalcedony, and stone axes. Unable either to cut or cleave planks, they used beams covered with brick earth to floor their houses, each of which had a clay-paved terrace.[20] Here are old Trojans living in the stone age who built a city, and having no metal tools with which to cleave and plane their timber, with stone axes and tiny saws they prepare and lay down the beams with which they floor their habitations. These men show a contrivance and perseverance beyond what are required for the construction of modern habitations with all the appliances of modern times. These Trojan city-builders are not shown to be savages because they wrought with stone axes and saws, neither are the cave-men, who for useful purposes constructed the delicate flint-boring tool, the bone awl and needles, and who, with 'artistic perception,' without style or compass, drew artificial designs which, had some of them been produced in our day, would probably have been placed before the public as promising designs of amateur artists.

A remarkably fine drawing of the reindeer was found in the Cave of Kesslerloch, near Thayingen, Switzerland. It is drawn as browsing on the green herbage. Dr. Southall says that 'it is elegant and accurate in execution,' which no one who has seen a sketch of it can doubt. He well adds 'that no imbecile hand guided the pencil that drew it.' Another work of art, discovered in one of the Creswell Caves, is described by Professor Dawkins, who was present when it was found. 'The most important discovery,' he writes, 'of the handiwork of man is the head and fore-quarters of a horse incised on a smoothed and rounded fragment of rib *cut short off at one end*' (my italics), 'and broken at the other. On the flat side the head is represented with the nostrils and mouth and neck carefully drawn; a series of fine oblique lines show that the animal was hog-maned. They stop at the bend of the back, which is very correctly drawn.'[21]

The incised bone, we learn, has been carefully prepared.

[20] *Times*, Sept. 8th, 1880.

[21] Quart. Journ. Geol. Soc., 1877, p. 592.

One end has been cut short off, for which some sharp tool would be needed, and the portion of rib smoothed and rounded. The nostrils and mouth and neck of the animal were carefully drawn, and the curve of the back is correctly traced, probably with a piece of sharp flint, and the horse is hog-maned, which is shown by a series of fine oblique lines terminating at the bend of the back. 'The whole is well done, and is evidently a sketch from life.'[22]

A hog-maned horse is a horse whose flowing mane has been trimmed down to a line corresponding to the 'oblique' line of the neck. This process requires the use of sharp shears, or scissors, and to be clipped with a true eye and a steady hand. What tools would palæolithic savages possess for mane-clipping? Had they contrived stone shears and sharpened them sufficiently for this operation? If they had, they must have been more skilful in stone-working than civilized men of this age; and if they had not, they must have had metal shears, which would show that they had lived since metal was used in Britain.

Moreover, hog-maned horses would be domestic horses, which had owners who trimmed the manes of their horses after the fashion of the times. It is difficult to conceive that wild horses, hunted for food or for sport, would be hog-maned. If these cave-men hunted horses, and if, as Mr. Mello conjectured, their manes were singed, few persons, we judge, would be disposed to engage in the dangerous and purposeless work of burning down the manes of these wild animals, which, if hunted, would be devoted to the slaughter. The hair of their manes, if clipped, might be of some use, but burnt hair could be of none whatever. Nor is it conceivable that only the one horse from which the artist made his sketch was hog-maned. It was doubtless the fashion of the time, a fashion probably prevailing on the continent; for Professor Boyd Dawkins, in his last work, has engraved figures from La Madelaine Cave, France, of two horses incised on antlers, both hog-maned; and unless the engraved representation is inaccurate, the manes were very clearly cut.

Hog-maned domestic horses, again, suggest a community of people outside the caves, some of whom were in com-

[22] 'Early Man in Britain,' p. 220.

fortable circumstances, who kept horses at their homesteads. Indeed, the contents of the caves of this time indicate a people living considerably advanced in civilization. They constructed harpoons with their barbed edges, which imply boats and fishing in deep waters. They made needles with well-formed eyes, not to lay by as curiosities, we may assume, but to be used for domestic purposes. They made saws and gouges, not for ornaments or charms, but for the accomplishment of some useful work. They made sketches of horses and reindeers, of the mammoth, the bear, the urus, and the beaver, of the whale and the pike; and though last in this list, not the least as a sign of civilization, was sketched a glove ornamentally worked, intended apparently to cover the hand and part of the arm of some lady. Yet these cave people are set down as savages, and as far as appears, simply because they made and used what scientists have agreed to call palæolithic, or old stone implements. If they had polished their tools and rubbed up their cutting edges, which many a simpleton might have done, they would have been lifted out of the category of barbarians and reckoned as belonging to the civilized tribes. It is very easy to relegate men and things to the old stone age, but it is not so easy to say when the stone age was, or rather, when it was not. It has existed from the earliest time, and stone is now plentifully found in the surface soils of the caves and on the exposed surface of our roadsides.

There is another aspect of this question which deserves notice.

It seems to be taken for granted that these cave-men represented the social condition of an outlying population, whereas they were frequently the destitute without a home, and the conveniences and tools of their better-off neighbours; or in some cases a residuum, the very dregs of society. It is not always safe to estimate the civilization of their age by their standard. While they were using the roughest, clumsiest stone tools, other members of the population might be using tastefully prepared and polished stone implements or metal tools.

In a work by Arthur Mitchell, M.D., lately published, the doctor reports a visit that he and two friends made to a cave at the north side of Wick Bay. In the cave they

found twenty-four inmates, belonging to four families, who had retired to rest shortly before the arrival of the visitors. Their beds consisted of straw, grass and brackens spread upon the rock or shingle, and each bed was supplied with one or two dirty or ragged blankets or pieces of matting. Some of them were destitute of all clothing, and others had very little.[23] No one in this day will reckon these destitute, naked, degraded cave-dwellers of Wick Bay as representing the social condition of the population of the district; but it might probably be as fairly concluded as that the cave-men of Kent's Hole and Creswell represented the outlying populations of their times.

It is conceivable that early settlers in Britain, until they had provided better accommodation, would be glad of the shelter which the caves afforded them, and would for a time be content to use rude unpolished stone with bone and the wood of the forest for tools and weapons. Nor is it unlikely that there would be a remnant amongst them who would be too idle or too dissolute to improve their accommodation or their tools; but it is not to be supposed that an enterprising people who were seeking a new home would, for any length of time, be content to live in dens and caves of the earth.

Moreover, there is no evidence to show that the men of the caves were men of distinct races, separated by long intervals of time; rather, they seem to have belonged to continuous progressive communities, subject to the changes of people and fashions, and composed of the several social grades common to all communities; but with no such social distinctions as are expressed by the terms 'savage' and 'civilized.' Some generations of these communities were probably ruder than others, and not unfrequently, it may be concluded, the occupants of caves would be ruder than the outlying population, but they cannot be separated out as peoples of distinct periods. M. de Mortillet, in classifying the '*palæolithic* deposits of the caves and the river beds,' proposes four subdivisions, the first of which is defined as the age of the river-drift. Professor Dawkins thinks these divisions are not sharply defined except the first, that is the lowest, of the four. 'I am able' he says, 'to recognise merely local differences, due

[23] *Birmingham Daily Post*, April 26th, 1880.

probably to tribal isolation or to abundance of stone or antler between the contents of the caves of the three last stages. The differences are of the same order as those observed by Arctic explorers among various tribes of the Eskimo, some of which are rich and admirably equipped for the battle of life, others poor and without the higher forms of implements and weapons; but nevertheless all their implements are to be referred to the same race, and to be grouped together as belonging to the same stage of culture. Nor are there any periods in the history of the palæolithic caverns of Belgium, Germany, or Switzerland well defined by different implements, or by different mammalian species. In them the characteristic implements of the three later ages of M. de Mortillet occur in the same strata in association with the remains of the same animals, and therefore must be referred to the same people in the same stage of culture as that observed in the caves of France and Britain.'[24]

If all the implements of these beds are to be referred to the same race, and to be grouped together as belonging to the same stage of culture, it is difficult to see upon what ground the first or lowest bed is to be 'excepted.' There are no periods, we are told, in the history of the palæolithic caverns of Belgium, Germany, or Switzerland. In them the characteristic implements of the three later ages of M. de Mortillet occur in the same strata in association with the remains of the same animals, and therefore must be referred to the same people in the same stage of culture as that observed in the caves of France and Britain. But in Britain we find the same class of implements in association with remains of the same animals in the fourth bed as in the three, and according to the axiom that things which are equal to the same, are equal one to another it is probable that the beds of the caverns in France, Belgium, Germany and Switzerland are of one period. In the Brixham Cave a hammer-stone was found in the lowest bed, and two nodules in the next higher bed. Remains of the same fauna are found in the lowest and highest strata, and in an intermediate bed.

'As *each bed* of Robin Hood's and Church Hole Caves

[24] 'Early Man in Britain,' pp. 202, 203.

(Creswell group) were examined, implements of human workmanship were found in association with mammalian bones. The characteristic implements and remains of animals were of the lowest deposit, and in the next, and on the floor of the next and highest, were a large number of these same implements and some 2,000 mammalian bones and teeth. Even in Kent's Hole, the lowest bed of which is specially excepted from the other palæolithic beds, the same class of implements and the same animal remains are found in the higher strata. Nodules of flint and chert, and remains of bear, fox, deer, horse, hyæna, and mammoth, were discovered in this excepted bed, and the cave earth, black band, and granular stalagmite contained hyæna, horse, *rhinoceros tichorhinus*, bison, red-deer, mammoth, cave-bear, brown bear, cave-lion, wolf, fox, reindeer, etc. ; whetstones, and a hammer-stone. Fox is found in almost every deposit, and the teeth of mammoth and hyæna were on the surface of the granular stalagmite jutting up into the black mould.

If the occurrence of the same implements in a series of beds, in association with the same mammalian remains, be a proof that they are of one period, then the fourth or lowest bed of these caverns cannot be excepted from this rule, but must be referred to the same race, and be grouped together as belonging to the same stage of culture; for certainly no sharply defined division occurs between the lowest and highest deposits.

The cave of Kesslerloch gives decided testimony on this question. It has five beds, containing flint-flakes, remains of weapons, ornaments in bone and horn; bones and tusk of mammoth; remains of horse, ox, bison, deer, fox, wolf, pig, dog, etc. ; *rhinoceros tichorhinus*, cave-lion, *Bos primigenius*, bear, reindeer, glutton, etc.[25] None of these five divisions are sharply defined; the whole of the beds are of one period. In the lowest bed there were no implements or bones; but the bones and implements of the next bed, No. 4, lay pressed into it. The bed No. 3, which contained many bones, rested immediately on bed No. 4, so that there were no intervals. The editor of the magazine remarks on this cave, 'Just as the palæolithic, the neolithic, the bronze,

[25] *Geol. Mag.*, 1876, p. 103.

and the iron ages shaded into each other, or existed side by side, so the period of the mammoth, the reindeer, and the modern fauna have passed imperceptibly and by slow gradations over Western Europe.'

Solutre.—This is not a cave, but a large depository of relics, ancient and modern, at the base of a cliff near Macon, in Eastern France.

In the subsoil were found fragments of recent pottery, with bones of reindeer, horse, and man. Beneath the subsoil were hearths or fireplaces, with slabs of stone; and lying around, and sometimes under these, were refuse-heaps (*the débris de cuisine*), containing fragments of reindeers' horns, flint implements, consisting of scrapers, arrow and lance heads, the bones of the horse, the mammoth, the cave-lion, the cave-bear, cave-hyena, wolf, lynx, etc.

Around these refuse-heaps, *and sometimes under them*, are found beds of horse-bones. At one place, *over* one of these beds, two feet thick, was a hearth with remains of reindeer, elephant, and numerous flint implements. Over the spaces which the kitchen and horse-bones occupy, are numerous human skeletons. The sepulchres contain worked flint, and bones of extinct animals. In 1873, 200 members of the French Association visited the place, and in their examination found 'a human skeleton reposing on slabs, which themselves rested on a fireplace, and in such conditions that all the members present admitted that this skeleton was contemporaneous with animal bones, and quaternary flints.'

The flint weapons found at Solutre have excited the admiration of the archæologists by the beauty of their form and their elegant finish. The stemmed and barbed arrow-heads had been regarded as characteristic of the polished stone age, and M. de Mortillet found it difficult to believe that they were contemporary with the quaternary deposits; but M. l'Abbé Ducrost, who had visited the locality, stated in reply, that he had found at Solutre, on the hearth of the age of the reindeer: 1st. A type derived from the type of St. Acheul; 2nd. A type characteristic of Solutre; 3rd. A transition from this type proceeding towards the type of polished stone; 4th. A perfection of edge entirely identical with that of the polished stone age; 5th. Instruments common to these epochs.

In a discussion before the French Association at Lyons in 1873, it was generally conceded that the burials in the fireplaces were contemporary with the worked flints, and remains of the mammoth, reindeer, etc. M. Cartailhac, at the close of the discussion on the first point, said: 'Cette discussion est de la plus haute gravité, et restera célèbre dans l'histoire de la science anthropologique . . . . Ce qui est certain c'est que plus de dix fois un squelette humain s'est trouvé sur un foyer quaternaire et pas un fait ne vient s'opposer à ce qu'on admette la contemporanéité.' 'M. Broca partage cette opinion, et déclare ouverte la discussion sur le deuxième problème—les chevaux.'[26]

The number of horses represented in the *amas de chevaux* would probably amount to 40,000. The flints are ascertained to occur in large numbers in the 'horse deposit,' while all the animals (except the horse) are represented, though in small numbers, in the same deposit.

M. Toussaint, in a paper read by him, affirms that the horse of Solutre was *domesticated.* 'All the parts of the horse,' he says, 'were found in their normal number, which shows that the animal was always slaughtered at the station. The skeleton of the horse at Solutre, too, bears a close resemblance to the horse of the present day, which, according to M. Steenstrup, is alone a proof that the remains found there belong to the domesticated horse.' Dr. Gosse, of Switzerland, remarked that the observations of M. Toussaint had convinced him.'[27]

M. l'Abbé Ducrost gives an account of a hearth which occurred at the depth of four feet seven inches. At this point he struck an enormous slab which rested on a fireplace some twelve inches thick, containing implements in flint and bone, and burned bones. On the slab at full length reposed a skeleton. Under the right hand of this were placed two lance-heads of flint, perfectly preserved, and of large size;

[26] 'This discussion is of the greatest gravity, and will remain celebrated in the history of anthropological science. . . . . That which is certain is, that more than ten times a human skeleton is found on a quaternary hearth, and not a fact opposes itself to an admission of its contemporaneity.' 'M. Broca shares this opinion, and declares the discussion of the second question open, viz., *the horses.*'

[27] Discussion at a meeting of the French Association, at Lyons, in 1873.

a great number of smaller arrow-heads; a valve of *pecten jacobæus*, pierced with a hole; and a small figure of a reindeer carved in *molasse*. The arrow-heads and lance-heads were of all forms and sizes, sometimes of the type of the river gravel, sometimes presenting the rudiments of the barbed type of the neolithic age; but in general the form was that lozenge type which we call solutreen.

Even in the surface deposits of Solutre the fauna seems to be the same as that below; there is no 'modern' fauna, while great numbers of flint implements of the palæolithic type occur.

In some later explorations MM. Ducrost and Arcelin have found in the bottom relic-bed, bones of the mammoth, reindeer, *cervus Canadensis*, horse, cave-bear, cave-hyæna, cave-lion, etc., and flint implements of the types of St. Acheul and Moustier, together with tools and ornaments of bone.[28]

We have here no sharply defined divisions between the several beds, no intervals or 'gaps' between palæolithic and neolithic deposits. They are all of one period. Weapons were found on the hearths of the reindeer age of a type derived from the type of St. Acheul; a transition from the characteristic type of Solutre, proceeding towards the type of polished stone, and a perfection of edge entirely identical with that of the polished stone age.

There is no place for different races or grades of men; no room for low savages, or savages of any kind.

In the surface deposits at Solutre, says M. l'Abbé Ducrost, the fauna seems to be the same as that below; there is no 'modern' fauna, while great numbers of flint implements of the palæolithic type occur. Under the right hand of a skeleton on one of the deepest quaternary hearths, adds the Abbé Ducrost, were lance-heads of flint, 'taillées à grand éclat,' perfectly preserved and of large size; a great number of smaller arrow-heads, a valve of *pecten jacobæus* pierced with a hole, and a small figure of a reindeer carved in *molasse*. Flints found on the quaternary hearths were of beautiful form and elegant finish, and

[28] Condensed from a report of the explorations of MM. Ferry and Arcelin, given in Dr. Southall's 'Epoch of the Mammoth,' pp. 95-105.

stemmed and barbed arrow-heads were contemporary with the quaternary deposits.

And if 'deposits' of domestic horse-bones lay under human sepultures belonging to the quaternary period, as leading archæologists of France, Germany, and Switzerland say they did, then not only is the remote antiquity of man not found here, but the theory is negatived.

CHAPTER VI.

PRIMEVAL MAN—WAS HE A SAVAGE?—continued.

'Dr. Bastian has lately visited New Zealand and the Sandwich Islands, and gathered some interesting information as to native traditions. The documents strengthen the view which for years has been growing amongst anthropologists as to the civilization of the Polynesians. It is true that they were found in Captain Cook's time living in a barbaric state, and their scanty clothing and want of metals led superior observers even to class them as savages; but their beliefs and customs show plain traces of descent from ancestors who in some way shared the higher culture of the Asiatic nations.'—DR. EDWARD B. TYLOR.

SIR JOHN LUBBOCK has endeavoured to show that primeval man was a savage by a line of argument different from that considered in the last chapter. He does not base his argument on the character and position of cave and drift deposits, but finds it difficult to conclude that the uncivilized people of the present time have descended from a civilized ancestry. 'If,' he says, 'the barbarous people who have been found in large portions of the earth were the descendants of civilized ancestors, it is difficult to conceive that there should not be found amongst them the proofs of their earliest civilization.'

These proofs which he thinks ought to be found may be thus summarized. The cattle imported would remain, or at least their bones would be found. Cereals and other plants would survive. As a general proposition no implements or weapons of metal have been found in any country inhabited by savages wholly ignorant of metallurgy. There is, too, the absence of architectural remains. No fragment of pottery even has been found in Australia, New Zealand, or the Polynesian Islands. It is impossible, Sir John thinks, that any race of men who had been agriculturists and herdsmen should entirely abandon these pursuits. The

art of spinning and the use of the bow are quite unknown, he says, to many savages, and would be hardly likely to have been abandoned where once known. Moreover, it is difficult to believe, he adds, that any people who once possessed a religion should ever entirely lose it![1]

It may be satisfactory that we should briefly notice this long list of difficulties that have arisen in the mind of Sir John, although it is almost a work of supererogation, inasmuch as over most of the wide regions which these uncivilized peoples occupy there is abundant evidence to show that their ancestors *were* civilized. The absence of 'architectural remains' is adduced as one proof that the uncivilized people of later times were not the descendants of a civilized ancestry; but modern discoveries have disclosed, and are disclosing, behind the rude structures of so-termed barbaric tribes, ruins of erections which show the possession of machinery, and tools, and an architectural skill, which prove the existence of an advanced civilization.

'When the inhabitants of the Polynesian Islands were first encountered by Europeans, they were using beautiful stone implements, but had no metals;' but 'we find on these islands traces of an anterior and superior population, and ruins of temples and fortifications, as in the Marquesas Islands, Navigation Islands, Tahiti, Hawaii, Asunsion, Strong's Island, Easter Island, and others.'[2]

A description of some of these structures in the valley of the Marquesas, as given by an eye-witness who was resident there for some months, will show that the ancestors of the present population were far from being savages. 'In returning one day,' he writes, 'from a mineral spring by a circuitous path, I came upon a scene which reminded me of Stonehenge and the architectural labours of the Druids. At the base of one of the mountains, and surrounded on all sides by dense groves, a series of vast terraces of stone rises step by step for a considerable distance up the hillside. These terraces cannot be less than one hundred yards in length and twenty in width. Their magnitude, however, is less striking than the immense size of the blocks composing them. Some of the stones, of an oblong

[1] Appendix to Sir John Lubbock's work on 'Civilization.'
[2] 'Epoch of the Mammoth,' p. 235.

shape, are from ten to fifteen feet in length, and five to six feet thick. These structures bear every indication of a very high antiquity, and Kory Kory (a native attendant) gave me to understand that they were coëval with the creation of the world, and that the great gods themselves were the builders. The dwellings of the islanders were almost invariably built upon massive stone foundations. The dimensions of these, however, as well as of the stones composing them, are comparatively small, but there are other and larger erections of a similar description composing the "moracs," or burying-grounds and festival places, in nearly all the valleys of the island.'[3]

Discoveries of this kind are not confined to the Polynesian Islands. 'Important archæological discoveries have lately been made in New Mexico. In the ancient Pueblo of Zuni the natives retain the purely aboriginal character. They live in stone houses piled upon each other like immense beehives. They manufacture a fine grade of pottery entirely uninfluenced by civilization. The ruins in the vicinity are very extensive, covering hundreds of miles, and point to a population of millions of souls. The collection made by Mr. Stevenson comprises many thousands of modern clay vessels, implements of stone, utensils, and articles of clothing and of ceremony, and also a vast number of prehistoric relics from the ancient ruins.'[4]

Dr. de Plongeon has exhumed vast numbers of graven stones and slabs in the buried cities of Mexico, at Uxmal in Yucatan. He has identified a well-preserved clay bust with the god 'Cay.' He says he has discovered a key to the language of the inscription, and can prove it to be in the Maya language; and if so, they must have been engraved by the progenitors of the present race of Indians inhabiting that continent. Some of the houses were marvels of architecture, and are richly sculptured. In one building there are many wonderful chambers, and the cornices and window-sills, the balustrades of the long galleries and the balconies overhanging the court, are ornamented with bas-relief figures, coloured stuccoes, and sculptured mosaic carved with an unrivalled richness and variety of detail. Dr. de

[3] 'Valley of the Marquesas,' by Herman Melville, pp. 134-136.
[4] *Public Opinion*, Nov. 26, 1881.

Plongeon says that many of the articles he has found closely resemble those discovered at Heliopolis and Memphis, in Egypt, and *that he has traced Chaldaic words.*'[5]

These marks of an early civilization are found also in Egypt and in the Assyrian ruins; among the primitive Aryans of Bactria, and at Mycenæ; among the ancient Malays, the ancient Italians, and the inhabitants of Siberia; in Ashantee, and with the mound-builders of North America. And in some cases the earliest monuments of this civilization were the best.

These facts turn the tables upon Sir John Lubbock. The exhumed cities of New Mexico show that the ancestors of the present degenerated inhabitants were highly civilized, and it is difficult to conceive that their cornice-work, their richly sculptured architecture, and their unrivalled mosaic carvings were accomplished with stone implements.

The discoveries in the Polynesian Islands prove that the uncivilized occupants of these islands were preceded by a people who were architects and builders, who possessed tools by which the stones they used were cut and chiselled, and powerful machinery by which enormous blocks were moved and fixed. And if the first men of these regions were savages, and their descendants are uncivilized, who built these temples and fortifications and Stonehenges? Between early man as a savage and uncivilized people of later times there is no place for these architectural remains.

There is proof, moreover, that these builders were not mere predecessors of the present occupants of the islands, but their ancestors. The traditions of these early people have come down to the present generation of their descendants—traditions which showed that whereas these descendants knew of no race or tribe coming between them and these builders, so they knew of no people, savage or civilized, who were before them. These vast terraces, said an intelligent native, were coëval with the creation of the world, and the gods themselves were the builders.

The traditions amongst these people, and which link them with a civilized and intelligent ancestry, are given more fully by Dr. Bastion, who has lately visited New Zea-

[5] *Christian Age*, 1881, p. 216.

land and the Sandwich Islands, and gathered some interesting information as to native traditions. The documents, says Dr. E. B. Tylor,[6] now printed in a small volume, all strengthen the view which has for years been growing amongst anthropologists as to the civilization of the Polynesians. It is true that they were found in Captain Cook's time living in a barbaric state, and their scanty clothing and want of metals led superficial observers even to class them as savages; but their beliefs and customs show plain traces of *descent* from ancestors who in some way shared the higher culture of the Asiatic nations. At Wallington, continues Mr. Tylor, Professor Bastion found Mr. John White, who, as a skilled translator of Maori, worked for Sir George Gray in bringing out the Polynesian mythology, and has been engaged in the study of native lore ever since. We have here a specimen of one of those mystic Maori cosmogonies which make us fancy we are hearing some Buddhist or Gnostic philosopher pour out his dreamy metaphysics about the origin of things. 'Out of the primal night,' says the Maori poet, 'there divided itself nothing; then came darkness, the seeking and following, and then such stages as Conception and Thought, Spirit and Desire, Coming into Form, Breath, Life, Space.' All this is of a piece with the native Polynesian poetry in Taylor's 'New Zealand,' and lately published in Hawaii.

Here are minds struggling with great subjects too high for unaided mortals, with a mixture of incoherency; but it is an incoherency after the style of the schools, and not of savages.

Thus in every quarter of the globe are found the architectural remains and other signs of early civilized populations who were the ancestors of later generations. And while the thousand links that should show the descent of man from the brute *are all wanting*, the links that show his descent from a civilized ancestry are everywhere found.

We are not concerned to account for the fact that the Polynesians, and probably other uncivilized people, were without metals when encountered by Europeans. It may have been that they had not the means or the will for

[6] See *Nature*, 1881, p. 29.

making it. Anyhow their ancestors were civilized, and it is useless to be making the absence of metals a difficulty in the way of admitting that these people were the descendants of civilized ancestors, when as a matter of fact they were.

It is inconceivable, Sir John thinks, that any race of men who had been agriculturists and herdsmen should entirely abandon their pursuits. The cattle, he says, should remain, or at least their bones should be found; and cereals and other plants should survive. With regard to many of these people, very little in the way of cultivating the land was needed, and in a relaxing climate where the earth brings forth its fruits almost spontaneously, the inhabitants would not be disposed to expend much labour in tilling the ground. The 'cereals and other plants' indigenous to the country whence these early settlers came out might not be so suitable for their new country as those found there, and might not be needed. Indeed they were not, as in most of those countries where these people had settled the substitutes for the food obtained from cereals and other plants were abundant. The vegetable productions of Polynesia are, the cocoa-palm, the bread-fruit tree, bananas, plantains, the screw-pine, yam, tara, and sugar-cane; besides a number of delicious fruits. The cocoa-palm is highly esteemed by a Polynesian. He reposes beneath its shade, eats its fruit, and the juice of its nut supplies him with a delicious draught. The shells of the nuts furnish him with beautiful goblets, and the boughs of the trees are formed into baskets, the dry trunks kindle his fire, while their fibres are turned into fishing-lines and cords. The bread-fruit tree is a splendid object in the landscape, and its fruit when roasted supplies nourishing food. Captain Cook says the principal of the many vegetables that have been mentioned as serving for food is the bread-fruit, to procure which costs the natives no trouble in labour but climbing a tree. The tree which produces it, he adds, does not indeed shoot up spontaneously; but if a man plants ten of them in his lifetime, which he may do in about an hour, he will as completely fulfil his duty to his own and future generations as the natives of our climate can do by ploughing in the cold of

winter and reaping in the summer heat as often as these seasons return.[7]

Why through a number of generations, 'cereals and other plants' from other countries should not survive if ever introduced, amidst these abundant vegetable growths, it is easy to divine. Nor does the absence of cattle create any difficulty. The probability is that they never were 'imported.' But however that may have been, these peoples are found to possess in their new home various kinds of animal food. They have the pig, the kangaroo, and the buffalo; fowl of different kinds, and fish. At one of the islands visited by Captain Cook, one hundredweight of fish was caught at one haul; and at another place visited, green turtle was obtained, larger and more delicious than any the captain had ever known in England.

With this abundant supply of pleasant and nourishing food, little in the way of cultivating the soil would be required. Notwithstanding, there were in the islands of the Pacific spots under careful cultivation. At Balbac, New Caledonia, the ground near a village where the crew of one of Cook's vessels obtained a supply of water, was being laid out as a plantation of sugar-canes, plantains, yams, and other roots; and water from the main stream was conducted to the plantation by little rills.[8] We have no reason to conclude that this village was the only place where plantations were laid out.

It is not unlikely that the art of spinning is unknown amongst many savages—it is unknown now by many civilized people; still we not unfrequently read of native cloths and mats made by so-called uncivilized people. That some of the uncivilized tribes are without bows and arrows as weapons is probably correct; they seem to have preferred the spear and club, but not a few of them use the bow and arrows. The hunters of Bay San Francisco and the Ojibbeway Indians use both the club and the bow and arrows.[9] Bows and arrows are extensively used by the natives of the Pacific Islands. Captain Cook relates that at the time of his visit to the Island of Erromanga (where the missionary Williams was afterwards *clubbed* to death),

[7] 'Cook's Voyages of Discovery,' by John Barrow, Esq., F.R.S., p. 58.
[8] *Ibid.* [9] Pritchard's 'History of Man,' at pp. 411, 584.

most of the people on the shore were armed with clubs, spears, darts, and bows and arrows.

At the Island of Tanna on two occasions the natives assembled on the shore armed with bows and arrows. At Mulletolla, Friendly Isles, a native being refused admission into one of the ship's boats, bent his bow to shoot a poisoned arrow at the boat-keeper, and then at the captain. Afterwards five hundred people, all having bows and arrows, assembled on the shore.[10] These are only incidental notices of the possession of these weapons, the probability is that they would have been found in most of the islands if inquiry had been made for them; but if none could have been found, it is difficult to see how that fact could show that the ancestors of these people were uncivilized.

Further, Sir John states that no fragment of pottery even has been found in Australia, New Zealand, or the Polynesian Islands, and seems to have great confidence in this objection against early man being civilized; he has referred to it in his presidential address at the meeting of the British Association.

We would, however, with all respect ask Sir John what is meant by this statement. Is it meant that throughout these vast tracts of country *no one* has found a fragment of pottery? If so, it is a very venturesome thing to say. Pottery may have been found both by the natives and those who visited these countries who never thought of making their 'finds' known. Why should they? The finding of fragments of pottery would be to them of no more significance than the turning up of a stone. No persons would care about finding a piece of pottery but scientific men, and they have not searched through Polynesia, Australia and New Zealand to find it. And if it is not there, its absence will afford no proof that the ancestors of the population of these countries were savages, as we have abundant proof that they were civilized. It would no doubt be difficult to conceive that a race of people who had learned to count up to ten, could ever unlearn a piece of knowledge so easy and useful; but it would not be difficult to conceive that more than a few would fail in the attempt. It is not clear

[10] 'Cook's Voyages,' p. 258.

that in our own country a generation or two back, or even now when the schoolmaster is abroad, that some *individuals* might not be found who would halt in the count. But has Sir John any proof to give that these people were unable to count up to ten, or is it a mere assumption ?

The Rev. J. Edkins of Pekin, who seems to have gained an extensive acquaintance with the history and traditions of many Asiatic peoples, in a paper read before the British Association, states that the Polynesians count, or could once count, up to one hundred, and did so when their ancestors spoke a common language.[11]

Moreover, Sir John finds it difficult to believe that a people who once possessed a religion should ever entirely lose it. That *a people* should crush out entirely that element of our nature that prompts man to venerate and worship some Being, or thing, higher, or supposed to be higher, than himself, it *is* difficult to believe ; for 'man will worship.' But that religion may be lost amongst a people to the extent of the substitution of a base superstition for the worship of the true God, or may be so repressed and overborne that God is not in all their thoughts, we have painful evidence, even where the light of religion and science surrounds them. Paul (I quote him as an historian), in writing to Roman Christians, looking around him and back into the past, sketches the history and causes of this declension. There were people who had around and above them the things that were seen, which witnessed to the invisible things of God, even His eternal power and Godhead. But in the midst of this wonderful testimony they became fools, and changed the glory of the incorruptible God for an image made like to corruptible man, and of birds and four-footed beasts, and of creeping things. Here then were a people who once knew God, but who became vain in their imaginations and corrupt in their hearts and lives, who held down the truth in unrighteousness ; and not liking to retain God in their knowledge, they exchanged (μετήλλαξαν) the truth of God for a lie, and worshipped and served the creature rather than the Creator.[12]

Here, then, was the primal cause of degeneracy, both

[11] Rep. of Brit. Asso., 1874.
[12] Epistle to the Romans i. 18-28.

physical, mental, and moral; and when the knowledge of God, filled and enriched with more of love and grace than the earlier revelation, has been carried in modern times to peoples whose minds were darkened and their lives corrupt and debased, we have seen them lifted up out of their barbarism into a state of advanced civilization. And for instances of this social and moral re-elevation of man by the knowledge of God which he had lost, we have not far to look.

George Pritchard, Esq., late her Majesty's Consul in the Pacific Islands, records some remarkable changes that have occurred amongst the people of that region as the result of missionary labour. Liars became truthful; the dishonest, who had been much addicted to thieving, became honest; fierce, cruel, bloodthirsty men became gentle and kind; men who had butchered their fellow-creatures for food or from hate, learned to respect life and love their neighbours. Desolating wars were prevented, and the people who had been almost destitute of clothing were decently clad. Their industries and acquirements form quite a long list. There were carpenters and builders, cabinet-makers, wood-turners and blacksmiths, boat-builders, canvas-makers, sugar-boilers, exporters, and purveyors of supplies for ships, printers and bookbinders, dress-makers, bonnet-makers, laundresses and weavers. They had schools; many copies of the Bible and scientific books were printed, and many thousand copies of a semi-monthly paper were circulated in the Sandwich Islands alone. Codes of law were enacted by their own legislature, by which the rights of private property were secured and crime repressed and punished. Mr. Pritchard well adds, in speaking of the people of these islands, 'Their civilization appears not merely in the article of dress. A savage may be clothed in the best attire, and he will be a savage still; but let the same individual experience the transforming influence of the Gospel, and that visage, almost too terrific to look upon, which was a true index of the ferocious disposition and the vile passions within, becomes placid and mild, indicative of the peace and tranquillity which reign in the heart. Those eyes, formerly accustomed to flash with rage, now sparkle with benignity; that thundering voice, once a terror to all

who heard it, now falls pleasantly on the ear; that heart, full of haughty pride and cruel revenge, is humble and filled with tender emotions.'[13]

The changes which have occurred in the Fiji Islands are equally remarkable. Cannibalism, in its worst form, prevailed there. For the slightest offence, or for none, a portion of flesh would be cut from a victim or a limb severed, and cooked or eaten in the presence of the agonizing sufferer, who previously had been made to kindle the fire by which the horrible feast was prepared. A principal chief was a very Nero, who from his youth had delighted in torturing and murdering the victims of his ferocity. Now all this has passed away; and the people, in probably a larger proportion than in our own country, place themselves under religious instruction, and accept the precepts of the Gospel as the guide of their life; while those who are not influenced directly by religion, are constrained by the force of example and public opinion to conform their conduct in some measure to the higher standard of morality which has been established. And whence came this great change? In the year 1835 two missionaries, at the risk of being clubbed and eaten, ventured amongst these rude people with a message of mercy and reconciliation, from Him who had loved them, and requiring for Him their love and obedience. Other missionaries followed; and multitudes accepted the glad tidings which they proclaimed, and became imitators of Him who hath set us an example that we should follow His steps.[14]

Yet one other instance. In the *Times* newspaper for May 18, 1880, there appeared a notice describing a Hawaiian almanac, which had come into the possession of the writer. It was well printed, and contained many advertisements and a complete court calendar. The advertisements called attention to restaurants, coffee-saloons, palace ice-cream parlours at No. 60, Hotel Street; to watches and clocks, household furniture, confectionery, wedding-cakes always in stock, and books for sale. There were, too, reading-rooms, and regulations for carriages, with rate of fares.

Just a hundred years before this almanac was dated, the

[13] 'The Missionaries' Reward,' pp. 8-32, 165, 168.
[14] *Good Words*, 1881, p. 667.

ancestors of these people, at this Hawaiian island, murdered Captain Cook with their clubs. About three-quarters of a century back, the Gospel of mercy was carried to this and other islands, and has proved to be not only the great salvation but the great civilizer.

Now these are not pictures of the fancy, but patent facts which belong to our own day; facts, too, that dispose of the notion which we so often meet with, that a very long time is required for the civilization of barbarous people.

No; the religious element has not been lost from amongst degenerated people. But living a loose life they adopted a loose creed; and not liking to retain the knowledge of a holy God, they endeavoured to reason away His existence, or exchanged Him for gods more like themselves, who would patronize their cruelties and lusts, and thus pleased themselves with the notion that they were religious while they fulfilled the desires of the flesh.

In the paper read by Mr. Edkins on 'Degeneration,' to which we have before referred, he says: 'Asia was probably the birthplace of the whole human family; and the question is, therefore, whether the inhabitants of Polynesia, America, and Africa are not degraded Asiatics, and the Europeans improved Asiatics. China showed vestiges of communication with the West, both recently and in extreme antiquity. The old signs of connection with Western Asia were the cycle of 60, made by the combination of 10 and 12, a dual philosophy, and a hebdomadal division of time; to these should be added the art of writing, weaving, astronomical calculations, and agriculture, which seem to show that Chinese primæval civilization was not self-originated. The Polynesians all count, or could once count, up to 100; and did so when their ancestors spoke a common language. This is proof of a former high civilization. If the Polynesians were civilized, it was because of their connection with Asia. That connection was proved by identity of customs and beliefs; for example, the practice of circumcision in Tonga, with other Semitic customs; the belief in paradises and a pantheon, which remind the inquirer of India. Their language has words arranged in a Semitic order, agreeing also with the order of words in

the Siamese and Annamite languages. Among the Chinese linguistic peculiarities found in the language of Polynesia, may be mentioned the extensive use of numeratives between numbers and nouns as in the Ponapean. This is not Aryan, or Semitic, or Ural-altaic, but is both Chinese and Polynesian.'[15]

To the proofs adduced by Mr. Edkins that uncivilized tribes have descended from a common ancestry, from the prevalence amongst them of common customs, may be added the use of the throwing-stick and boomerang, the practice of scalping, etc. Captain Cook informs us that at one of the islands of New South Wales, where he called to take in a supply of water, the people had lances for throwing which were ten feet long and had four prongs pointed with bone, and with them a short stick.[16] He describes the natives of another island as throwing spears or lances, with the hand if those they wished to wound were from ten to twenty yards from them, but with a throwing-stick if the distance was forty or fifty yards.

This throwing-stick, or womera, is common to the Australians, the Eskimo, the New Caledonians, and some Brazilian tribes. The boomerang, another remarkable weapon which implies contrivance and skill in its construction, is found in Australia, among the Moqui Indians of Northern Arizona and New Mexico, the Indians of California, and the Davidian races of India.[17] *The Westminster Review* says: 'It seems unlikely that such peculiar implements as the *boomerang* and the *womera* should have been independently invented by Australians, Eskimo, and North Americans. We are therefore forced to the conclusion that these peoples were branches from a common stock.'[18]

From an address by Colonel Lane Fox, we learn that the boomerang was in use among the ancient Egyptians.[19] It is seen in the hands of hunters in a basso-relievo at Thebes. It has also been discovered in the hand of the sculptured Nimrod of Khorsabad. It was known in ancient times to

[15] 'Degeneration of Man,' by Rev. Joseph Edkins, of Pekin; Rep. of Brit. Asso., 1874, p. 150.

[16] 'Cook's Voyages,' pp. 111-113. [17] 'Epoch of Mammoth,' p. 19.

[18] *Westminster Review*, July, 1876, p. 52.

[19] *Nature*, Aug., 1872.

the Gauls, and the Lybian tribes who accompanied Hannibal into Italy.[20]

This common possession and use of these remarkable weapons show a racial relation between the American Indians, the Australians, the Eskimo, the Indians of New Mexico, and California, etc., with the Gauls, the Ancient Egyptians, the Assyrians, and the Davidian races of India.

The common stock from which these tribes had descended, evidently were not savages.

The practice of scalping, known to have prevailed among the American Indians, was practised also by the South Sea Islanders. At Hawaii, where Captain Cook fell, on the bones of the murdered commander being recovered, it was found that the skull had been scalped. The practice is named by Herodotus as prevailing amongst the Scythian tribes. And the wild tribes of the frontier in the north-eastern district of Bengal use the scalping-knife with a ferocity only equalled by the American Indians.[21] The scalps are carefully preserved as the evidence of valour. The head of Captain Cook was in possession of the principal chief or king, and the scalp was probably retained by him for that purpose.

At the volcanic Island of Tanna, where the people were very rude, and Captain Cook thought them to be cannibals, they practised circumcision. Mr. Edkins found that it was practised at Tonga. The rite also prevailed amongst the Jews, the Egyptians, the Idumeans, Ammonites, Moabites, Ishmaelites, and Persians. This is another link that connects degenerated sunken people with civilized nations.

That the civilized people were anterior to the sunken and degraded, is also shown by the traditions that have come down to us. The Camden Professor of Ancient History has collected some of these traditions, which we quote from his work.[22]

'The Greeks told of the "golden age" when men lived the life of the gods, a life free from care, and without labour and sorrow. Old age was unknown; the body

[20] 'Epoch of the Mammoth,' p. 19. [21] *Ibid.*, p. 18.

[22] 'Historical Illustrations of the Old Testament,' by the Rev. T. G. Rawlinson, M.A., pp. 8-11.

never lost its vigour; existence was a perpetual feast, without a taint of evil. The earth brought forth spontaneously all things that were good in profuse abundance; peace reigned, and men pursued their several employments without quarrel. Their happy life ended by a death that had no pain, but fell upon them like a gentle sleep.'[23]

'In the Zend Vesta, Yuna, the first Iranic king, lives in a secluded spot, where he and his people enjoy uninterrupted happiness. Neither sin, nor folly, nor violence, nor poverty, nor deformity have entrance into the region; nor does the evil spirit for a while set foot there. Amid odoriferous trees and golden pillars dwells the beautiful race, pasturing their abundant cattle on the fertile earth, and feeding on an ambrosial food which never fails them.'[24]

In the Chinese books we read that, 'during the period of the first heaven, the whole creation enjoyed a state of happiness; everything was beautiful; everything was good; all beings were perfect in their kind. In this happy age heaven and earth employed their virtues jointly to embellish nature. There was no jarring in the elements, no inclemency in the air; all things grew without labour, and universal fertility prevailed. The active and passive virtues conspired together, without any effort or opposition, to produce the universe.'[25]

'The literature of the Hindoos tells of a first age of the world when justice in the form of a bull kept herself firm on her fore-feet; virtue reigned; no good that mortals possessed was mixed with baseness; and man, free from diseases, saw all his wishes accomplished, and attained an age of 400 years.'[26]

Traces of a similar belief are found among the Thibetans, the Mongolians, the Cingalese, and others. Even our own Teutonic ancestors had a glimpse of the truth; though they substituted for the 'garden' of Genesis a magnificent drinking-hall glittering with burnished gold where the primeval race enjoyed a life of perpetual festivity, quaffing

[23] Hesiod, Op. et D., ii. 109. [24] Vendidad, Farg. ii., §§ 4-41.
[25] See Faber's 'Horæ Mosaicæ,' p. 146.
[26] Kalisch, 'Comment. on Genesis,' p. 64.

the delicious beverage from golden bowls, and interchanging with one another glad converse and loyal friendship.[27]

It will be seen that these traditions belong principally to the East, which was the cradle of the human family, and unmistakably show that in the opinion of the ancients the first inhabitants of the earth were not low savages.

[27] *Edda*, Feb. vii.

CHAPTER VII.

ALLUVIAL DEPOSITS.

'With regard to the alleged discovery of traces of glacial man in Suffolk and Norfolk, he thought it was founded on a complete misunderstanding of the nature of the beds, which were really *remanies*.'—JOHN EVANS, F.R.S., F.S.A.

'The beds in the neighbourhood of Brandon and Thetford, in which the flint implements had been found, rested upon various members of the middle glacial hollows scooped out of the middle glacial beds. . . . The only deposits at all like boulder clay, which overlaid these implement-bearing loams, he considered to be wash, either from boulder clay or directly from the chalk, as the case might be.'—PROF. McK. HUGHES.

IT is proposed in this chapter to show that in the superficial sands or gravels, brick earths and boulder-clay deposits, no remains of man are found so situated as to prove that he was of high antiquity. Of this drift the lowest deposit is the boulder clay, 'which is a remarkable kind of deposit, consisting of a paste which may graduate from tough clay to loose sand, and which holds large angular and rounded stones or boulders confusedly intermixed.' In this drift it has been affirmed the works of man have been found so circumstanced as to prove that he lived in glacial, or even pre-glacial times.

Of these drift formations which have been adduced to prove this antiquity, prominently, are the Thames river gravels; the Brandon Beds; Hoxne deposits; Beeches Pit, Culford; Norfolk drift; Valley of the Ouse, near Bedford; and Victoria Cave, near Settle, Yorkshire.

By most of the leading geologists of Great Britain, remains found which show the presence of man, are now held to belong to post-glacial times. A few dissent. Dr. James

Geikie and Mr. Tiddeman think that the deposit at the Victoria Cave in which the bone thought to be human was found, was a stiff glacial clay.[1] But Professor Dawkins says it is not proved to be glacial clay, because clay of that kind is now being deposited in that very cave, which has ultimately been derived from the wreck of the boulder clay at a higher level which was formerly spread over the country.[2]

To the same (glacial) period the Hoxne deposits (Suffolk) yielding palæolithic implements are assigned by Messrs. Geikie and Croll, and by Mr. Belt to pre-glacial times.

Some flint implements had been found at Crayford and Erith, which Professor Dawkins felt some hesitation in pronouncing post-glacial. Though he did not identify the Thames Valley with the other river deposits, from the presence of the musk-sheep, he was inclined, he said, to place them later than at one time. And in this country he thought we had no evidence of pre-glacial man, unless the brick earths were pre-glacial.[3]

We have the history of this 'find' elsewhere. 'During a visit to Crayford in 1872,' says the professor, 'I obtained a "worked" flint which I picked out of a band of rounded flint gravel lying beneath the sandy stratum which contains abundance of shells, and among them the *corbicula* (or *cyrena*) *fluminales*, and *unio litorales*.' In his last work, Mr. Dawkins says, 'Man is proved to have belonged to this fauna (mid-pleistocene mammalia) by the discovery in 1872, in my presence, of a flint flake in the lower brick earths at Crayford, by the Rev. Osmond Fisher. It was *in situ* in the same stratum of gravel in which I discovered the skull of the musk-bull in 1866. In 1876 a second "implement" was found in the same series of beds at Erith, also *in situ*, at a point about two inches above the shell-band in the pit. . . . The discovery in two separate spots establishes the fact that man was living in the valley of the lower Thames before the Arctic mammalia had taken full possession of the valley of the Thames, and before the big-nosed rhinoceros had become extinct.'[4]

In, too, the list of mammalia given by the professor, are

[1] Quart. Journ. of Science, July, 1876.
[2] Quart. Journ. of Geol. Soc. of London, 1877, p. 607.
[3] *Ibid.*, p. 612.
[4] 'Early Man in Britain,' pp. 136, 137.

found the modern horse (*equus caballus*), the common fox, the wolf, stag, etc.

That the flints found were implements is not unquestioned, and there is no proof that the brick earths were glacial deposits. In the judgment of eminent geologists, they were not, which we shall see as we proceed.

Mr. Alfred Bell read a paper at a meeting of the Geological Society, on *corbicula fluminales*, its association and distribution ; and having traced its distribution, both in place and time, the author pointed out its value in discriminating geological horizons, especially in the Valley of the Thames ; and commented on the different spheres of *unio* associated with it. *Unio litorales* only occurring in the gravels and brick earth of Kent at Crayford and Erith, and *unio tumidus* and *unio pictorum* being equally confined to those of Essex and Middlesex, at Grays, Ilford, and Hackney Downs. The difference in the size of the *corbicula* from these localities was, that the Essex gravels and brick earth were newer than those of Kent. All these, however, were anterior to those gravels in the Thames Valley which have yielded palæolithic flints, none of which have produced either the *corbicula* or *unio litorales.* A cast of the flint flake found at Crayford by the Rev. Osmond Fisher, below the *corbicula* beds, was shown to the author, who did not concur in its being indicative of the presence of man at that early date, since he considered natural agencies were equally capable of producing such flakes.[5]

In a paper read by Professor Dawkins, on the British Post-glacial Mammalia, he indicated the difficulty of proving from palæontological evidence whether the brick earths of the Thames Valley and Clackton are pre- or post-glacial. In the discussion that followed, Professor Ramsay stated that he had always regarded the Thames Valley deposits as post-glacial.

Mr. Whittaker had been brought to the conclusion that the brick earth of the Thames Valley belonged to *the latter part* of the post-glacial period. *Beneath* the *corbicula* beds of Erith were the remains of *pisidium, and many of the common recent species of the neighbourhood.* He saw no such extreme difficulty in the excavation of the Thames Valley since the

[5] *Geological Magazine*, 1872, p. 430.

deposition of the boulder clay. Mr. J. S. Jeffreys mentioned the *Helix ruderata* and *H. fructicum* as living instances of shells of northern character occurring in the Thames Valley at Ilford.

'Mr. Prestwich was glad to find that the opinion of the Thames Valley deposits being post-glacial was gaining ground.'[6] And in another discussion on the question, the professor stated it to be his opinion, that we have no evidence of the presence of man before the glacial age. The lower Thames gravels, he said, are of post-glacial age, as the *graphæa incurva* has been found in them, and this would tend to fix their date as subsequent to the boulder clay from which that fossil is most likely derived.[7]

The palæolithic gravels of Hoxne, Bedford and Teddington are considered by Mr. Evans later than the upper boulder clay of Searles Wood.[8]

There is another case to be considered, thought by some geologists to be an important discovery. Mr. Sidney J. B. Skertchly, F.G.S., has found in East Anglia, near Brandon, Suffolk, a number of flint implements, embedded, as he thinks, in strata of clearly ascertained inter- or pre-glacial age, and which he has named the Brandon Beds. His statements appears in *Nature* for September, 1879, from which the following extracts are taken:

'The object of the paper was chiefly to record the sections in which the author had discovered palæolithic implements beneath the chalky boulder clay. The beds which yield the implements, he said, are a series of loams, clays, and sands. Near Mildenhall, on the River Lark, in Suffolk, two sections have yielded implements. They are at Warren Hill and Mildenhall brickyard. The section at Warren Hill is as follows: (1) Sandy soil, two feet; (2) chalky boulder clay, six feet; (3) gravel, four feet; (4) loamy clay, four feet; (5) boulder-clay, six feet; (6) chalk. The spot has yielded great numbers of flakes and many implements. At Mildenhall the section is: (1) Sandy soil, one foot; (2) chalky boulder clay, six feet; (3) loam, ten feet; (4) chalk.

[6] *Geological Magazine*, 1869, p. 180.
[7] Quart. Journ. Geol. Soc. of London, 1877, p. 612.
[8] *Ibid.*, 1875, p. lxxiv.; Presidential Address.

From this place many implements and flakes have been obtained. They occur in the loam.

'*Culford, in Suffolk.*—The Brandon Beds are here dug under fifteen feet of solid boulder clay; from these I obtained two flakes.

'*West Stow, in Suffolk.*—Boulder clay underlies, overlies, and wraps round the Brandon Beds of this place; some well-worked implements have been obtained, one of which was dug out by the author.

'*Brandon.*—Near Brandon the same beds are being dug beneath boulder clay, and have yielded very good implements. The author, in this paper, merely desires to emphasize the fact that from several sections he has himself dug out palæolithic implements from below tough, undisturbed chalky boulder clay. These proved the existence of man in these districts previous to the glacial periods.'[9]

In reference to this statement, Professor Dawkins says: 'I feel inclined to accept the evidence brought before the British Association at Sheffield in 1879, founded on the section at High Lodge, Culford, Mildenhall, West Stow, and Bromhill, in favour of man having lived in East Anglia before the upper boulder clay had ceased to be deposited.' He reserves it, however, as a suspense account for further consideration. 'It must,' he says, 'be remarked that the proof of this, brought forward by Mr. Skertchly from his discoveries at Brandon and elsewhere in Norfolk and Suffolk, is still under discussion, and that it is not established by any other discovery, unless the lower brick earths of Crayford and Erith be considered pre- or inter-glacial.'[10] That the discoveries at Crayford and Erith are not considered pre- or inter-glacial by the current opinion of many leading British scientists is evident, and therefore these discoveries of Mr. Skertchly's stand alone as offering evidence that man lived in glacial times. And it will not be difficult to show that these discoveries, reserved for further discussion, have been discussed by a large number of geologists and archæologists, most of whom have come to the conclusion that Mr. Skertchly's discoveries in the Brandon

[9] *Nature*, Sept. 18, 1879, p. 489. [10] 'Early Man in Britain,' p. 169.

Beds give no proof that man lived in East Anglia in pre- or inter-glacial times.

Dr. John Evans, 'whose cautious prudence,' says Professor Dawkins, 'had put these discoveries to a suspense account,' said: 'With regard to the alleged discovery of traces of glacial man in Suffolk and Norfolk, he thought it was founded on a complete misunderstanding of the nature of the beds, which were really *remaniés*. He had not,' he stated, 'met with any conclusive evidence that man was in this country in glacial or pre-glacial times.'[11]

The inconclusiveness of the evidence drawn from the deposits of the neighbourhood is further shown by discoveries of flint implements found in the drift in Norfolk and Suffolk by J. W. Flower, F.G.S. About three miles from Bromhill and Brandon, on the north, he says, a high table-land of about a mile in width divides the valley of the Little Ouse from that of the Wissey. This hill is capped with drift-gravel and silicious sands, closely resembling those at Brandon. We have clear evidence that even within the historical period the district to the westward through which the river flows after leaving Brandon was at a much lower level than at present, the valley having been filled up with peat, and thus brought to a dead level, or nearly so, extending over many hundred square miles. Polished flint implements of the neolithic period have been often found lying below the peat, or low down in it. Mr. Flower adds: 'I have visited the place with Mr. Prestwich. He considers this gravel to belong to the boulder-clay series, and we certainly saw a capping of clay a foot thick covering a portion of it. The implement-bearing gravel at Brandon is precisely of the same composition.' Mr. Prestwich, however, considers it to be a reconstructed gravel, and of subsequent date to that in the watershed. The brick-earth 'find' at Crayford, which Professor Dawkins hesitated to pronounce post-glacial, and the discovery of flint implements by Mr. Sidney Skertchly at Brandon, which was put by as a suspense account, have been adjudged, we have seen, by some of the most eminent geologists as decidedly post-glacial.

We have now to call attention to a conference held at the

[11] Quart. Journ. Geol. Soc. of London, 1877, p. 612.

Anthropological Institute, to consider the question of the antiquity of man, and where the question of his pre- or inter-glacial, or post-glacial appearance was discussed. As reported in *Nature*,[12] the attendance was large and influential. There were present John Evans, F.R.S. (president), Lord Talbot de Malahide, Professor Rolleston, Professor Huxley, Professor Prestwich, Professor Busk, Professor Dawkins, Professor Mc K. Hughes, Rev. Professor Sayce, Mr. J. Heywood, Colonel Lane-Fox, Mr. A. W. Marks, Captain Douglas Galton, Rev. E. M. Edgill, and many other gentlemen.

The president, in opening the conference, alluded to the altered position of the question since it was first brought before the British public in 1859. The chief interest of the debate turned upon the question as to whether there was any evidence in this country of man in the caves or river deposits older than post-glacial times. Messrs. Croll and James Geikie ascribe the traces of palæolithic man in this country either to a pre- or inter-glacial age, basing their conclusions principally upon the fact that in the river deposits and caves some of the associated animals, such as the hyæna, lion, and hippopotamus, are now only to be found in hot climates. They account for the association of southern and northern animals by the supposition that they occupied the country at different times, during glacial or inter-glacial æons of from five to twelve thousand years. To this it was objected that both sets of animals inhabited the country at the same time. The reindeer formed a large portion of the prey of the hyæna, and must therefore have been contemporary.

Professor Dawkins thought Mr. Geikie's perpetual summer was inconsistent with the abundance of the reindeer associated with the palæolithic remains of the caves. It was also pointed out that the tiger crosses the frost-bound rivers of the Amoor to prey upon the reindeer. The lion, now found only in the south, lived in the days of Herodotus in the inclement mountains of Thrace. The hippopotamus in Regent's Park takes his tub regularly in spite of the east winds so prevalent in the spring, which reminds one of the glacial period. It was, too, deemed unfair to put one class

[12] *Nature*, 1877, p. 69.

of animals in evidence to the exclusion of other classes. Why should the climate be deemed tropical because southern animals left their remains there, and not Arctic or temperate as the home of the musk sheep, the lemmings, and the reindeer, or the horse, the bison, or the stag? It might be, and probably was, a varying climate, such as is found now in central Siberia, where the summer heat and winter cold are very severe.

Professor Hughes criticized the cases adduced from the neighbourhood of Brandon and Thetford. By an appeal to sections, he showed that the beds in which the flint implements had been found rested upon various members of the middle glacial hollows scooped out of the middle glacial beds. In the case of the Beeches Pit, opposite Culford, he said that the implements were found in a deposit which seemed to be the end of a terrace of valley gravel, which further down, as it followed towards Icklingham, became more clearly marked, consisting of gravel and brick earths, with pupa, pisidium, and mammalian remains. The only deposits at all like boulder clay, which, either in the Beeches Pit or at Botany Bay, overlaid these implement-bearing loams, he considered to be the wash either from boulder-clay, or directly from the chalk, as the case might be.

The editor of *Nature* remarks that 'the almost unanimous conclusion of the meeting was as follows: The fossil mammalia of the pleistocene tell us nothing of the relation of man to the glacial period. The Arctic species invaded Europe, probably from Asia, while the ice was finding its way southward from the mountains of Scandinavia. When the ice ultimately retreated, they followed it, and thus were both pre- and post-glacial.

The reported cases of the occurrence of palæolithic remains in the deposits older than the post-glacial age, were minutely criticized. The asserted interglacial age of the river gravels containing palæolithic implements proved equally unsatisfactory. The cases supposed to be decisive of the question in the neighbourhood of Brandon and Thetford were considered by Professor Hughes to throw no light upon it, since the deposits above them, supposed to be boulder clay, are not boulder clay *in situ*. It was forcibly urged by several speakers, especially by Professor Prestwich,

that flint implement-bearing strata are proved by their position in the valleys to be later than the glaciation of the district, or in other words, that they were decidedly post-glacial.

The general question of the antiquity of man in Europe was not discussed, although we gathered that the evidence of the presence of man in the Italian pliocenes was not considered satisfactory. The general impression left on our minds is that in Britain there is no evidence of any palæolithic man, *either in caves or the river deposits* (my italics) of an age older than post-glacial.

At the close of a discussion on a paper reported in a May number of *Nature*, the president, Mr. Evans, said the questions principally discussed were : 'In the first place were they to assign any implement found in this country to a pre-glacial or inter-glacial period, or must they assign them to a post-glacial period.[13] Some of the implements found in the river gravels were made from stones derived from the glacial drift, and were therefore clearly post-glacial. The characteristic forms of the implements gave a guide by which they might fairly argue that others of a similar character belonged approximately to the same date.

[13] *Nature*, 1877, vol. xvi., p. 106.

CHAPTER VIII

ALLUVIAL DEPOSITS—continued.

Valley of the Somme.

'The question as to the exact time to be attached to the alluvial remains in the Valley of the Somme could not be settled satisfactorily. Few persons, except men of science, were aware that there had been enormous changes during the last 500 years in the north of Europe. The volcanoes of Iceland had been continually active; great floods of lava had been poured forth, and the level of the coast had been most remarkably changed. Similar causes might have produced enormous changes in the Valley of the Somme, and therefore any arguments based, as to time, upon the appearances of the valley were not to be trusted.'—Prof. Huxley.[1]

On the sloping sides of the valleys of the Thames, the Seine, the Somme, etc., are found terraced layers of gravels and loams which have been deposited by the action of water. Amongst these the valley of the Somme, situate in Picardy, France, with its river deposits, is of special interest in relation to the date of man's presence in Western Europe. Some of these terraces rise from ten to one hundred feet above the present river-level. Between Amiens and Abbeville the valley is about a mile in width. Near the bed of the river, resting on the chalk, is a deposit of peat or silt which is from twenty to thirty feet thick, and contains articles of iron, bronze, and polished stone. In both the high and low level gravels are found palæolithic 'implements' with the bones of mammoth, rhinoceros, deer, and other animals.[2]

If, as some scientists have assumed, the river has scooped out the valley, then first in the order of time will stand the high-level gravels, and after them, in descending succession,

[1] *Times*, weekly issue, Aug. 29, 1879.

[2] See chapters viii. and ix. in Lyell's 'Antiquity of Man,' 4th edit.

the lower deposits; and upwards from the chalk on which the deposits immediately rest, rises the peat from twenty to thirty feet high, the time needed for the formation of which has to be calculated.

On the question of man's antiquity, this valley takes the place in river gravels which Kent's Cavern holds amongst caves. It was the first love of those who advocated the antiquity theory.

The argument, as put by those who hold that the present river has excavated the valley, may be thus stated. The river has worn down the valley from ninety to one hundred feet, and left on its sloping sides thick beds of gravel and loam, the excavation of which must have required a long period of time. And upon the chalk near the bed of the river there has grown up a bed of peat from twenty to thirty feet in thickness, which must also have taken a long term of years for its formation. In these gravel beds are found palæolithic 'implements' made by man, with the bones of extinct mammalia;[3] man therefore must have been present in this part of Europe at a very remote period in the past.

The neolithic flints, it is admitted, were shaped and polished by man, but is it past question that the palæolithic flints were of his workmanship? The whole neighbourhood abounded with chalk and flint. Sir C. Lyell says that these 'implements' were found at different depths, that they were dug out of the drift, or deposits of gravel or sand, as flints were wanted for repairing the roads or fortifications at Abbeville, and that some 'tools' figured in the *antiquités celtiques* were so rudely shaped, that many imagined them to have owed their peculiar forms to accidental fracture in the river bed.[4] Mr. Whitley says that in Northern France there is a great development of chalk. He found that angular flints had been washed through the valleys of the Somme and Oise, and that the soil around Spennies teemed with them.[5] And he tells us that he had gathered from a heap of flints broken for repairs of the road at Menchecourt most perfect flint-flake knives, and

[3] On presence of extinct animals, see chapter iii. of this work.
[4] 'Antiquity of Man,' pp. 145-147.
[5] *Popular Science Review*, Jan. 7, 1876.

long, thin, delicately formed 'arrow-heads' of the most convincing forms. As these flints, supposed to have been the 'tools' of man, were in the 'river bed' where they were exposed to accidental fracture; as some of them were so rudely shaped that many imagined them to have owed their shape to this kind of fracture; and as they were selected from the multitude, there is very slender proof that they were the handiwork of man. And if they were not made or used by man, the argument from the gravels of the Somme Valley is worthless. Assuming what is not proved, however, that these flints were 'tools,' we may pass on to the inquiry—Would the layers of gravel deposited on the sides of the valley require a long time for their deposition?

The river, we are told, has worked its way down from the high-water level to its present bed, and in its way has deposited these thick beds of gravel, in the earliest of which these 'implements' are found, which must have been the work of many ages.

And if the valley was scooped out by the river as it now is, and as it now moves, there can be little doubt that a long time would be required, if indeed it could have accomplished the work at all. The stream is not now more than sixty feet broad, while the eroded valley is seven or eight thousand. Professor Andrews of Chicago College, an eminent American geologist and archæologist, who some time back visited the neighbourhood of the Somme, remarked that the present stream, if spread over the valley, would not be half an inch deep.[6]

'The fall of the river,' says Dr. Southall, 'from its source to its mouth is 220 feet or 1·77 foot per mile. This is the present fall of this little stream. Before the valley was excavated (supposing this to have occurred), it had a fall of little more than one-third of this; for the plateau at St. Valéry was 140 feet above the sea, and the fall from above St. Quentin was only eighty for the 124 miles.[7] Moreover, there are no water-bearing strata on the hills, or the valley slopes along or at the source of the Somme. There are not now, and never could have been, any springs to supply the Somme with water. This river is sustained and fed by the

[6] *American Journal of Science and Art*, vol. xlv.
[7] 'Epoch of the Mammoth,' p. 126.

turbaries, or peat-bogs along its course, which hold the rain-water in suspension, and supply it to the river as from a sponge.'[8] And, according to Sir C. Lyell, rounded tertiary pebbles and great blocks of hard sandstone, some of them three or four feet in diameter, are found both in the higher and lower level gravels around Amiens, and at the higher level at Abbeville.[9] It seems impossible to conceive that this broad, deep valley was excavated, and these stones, some of them more than a ton weight, were borne to their resting-place by this small, sluggish stream. A number of careful observers who have visited the locality, have come to the conclusion that forces mightier far than the small river that now meanders through the valley were needed to have effected the great changes that have occurred.

Colonel Lane Fox, speaking at a meeting of the Anthropological Institute of the rivers Somme, Thames, etc., said that all the facts favoured the opinion that powerful eroding forces must have been at work.[10]

Dr. Andrews, after careful observation on the spot, said that the stream had filled the valley from bluff to bluff.[11] 'A volume of water,' he added, 'a thousand times the volume of the present river, and which was supposed to have been supplied by excessive rains, the melting of snow and ice; or (as some think) by the submergence of the land under the sea.' Mr. A. Tylor, F.G.S., has long held that what are termed high and low valley gravels were of one age, and were formed in what he has designated the Pluvial period, by the enormous force of the river water, 120 times greater than at present.[12] 'M. Belgrand estimates the discharge of the Seine at that time to have been twenty or twenty-five times greater than at present;'[13] and as reported in the 'Journal of the Anthropological Institute,' remarks, that the floods in palæolithic times were extremely violent, and that the amount of rainfall was so great that it rolled on the surface of even the most permeable soils.[14] Dr. Southall thinks 'that when the implement-bearing gravels

[8] 'On Relation between the Somme River and Somme Valley,' by J Parker, F.G.S.

[9] 'Antiquity of Man,' p. 182.

[10] *Nature*, 1877, p. 106.

[11] *American Journal of Science and Art*, vol. xiv.

[12] 'Lect. on Antiquity of Man,' T. R. Jones, p. 24.

[13] *Ibid.*

[14] Journ. Anthropol. Soc., 1873, p. 433.

of the Somme were deposited, the valley was filled with a body of water one or two miles at least in breadth, and 100 or 150 feet deep. It was the palæolithic flood,' he says, 'an event now well recognised by geologists.'[15] Principal Dawson calls this 'the geological deluge, which separates the post-glacial period from the modern, and the earlier from the later pre-historic period of the archæologists.'[16]

Mr. A. Tylor says, 'It is certain that both the high and low level gravels of the Somme and other valleys, with human implements and mammalian remains, are more recent than the boulder clay.' His theory is 'that in remote geological periods the valleys were excavated, and filled up with marine or fluviatile gravel, and re-excavated prior to the epoch of the higher and lower gravels; and that these gravels are all of one formation and one date, reconstructed of drift and gravels of the glacial period, or of its equivalent south of the Thames, mixed with a certain amount of local material.'[17] This theory of reconstruction is held by several eminent geologists. Professor Hughes thinks that the beds in the neighbourhood of Brandon and Thetford were remains of valley deposits resting on older deposits. Professor Prestwich considered the implement-bearing gravel of Brandon to be reconstructed from the boulder-clay series of subsequent date.

In a paper read at the meeting of the British Association in 1877, Dr. Edward B. Tylor expressed his conviction that no such great changes had occurred in Europe at so late a date as had been stated in a work recently published by Principal Dawson. At the close of the address, in seconding a vote of thanks to the writer of the paper, Professor Huxley said: 'The question as to the exact time to be attached to alluvial remains in the valley of the Somme could not be settled satisfactorily. . . . There had been enormous changes during the last 500 years in the north of Europe. The volcanoes of Iceland had been continually active; great floods of lava had been poured forth, and the level of the coast had been most remarkably changed. Similar causes might have produced enormous changes in the valley of the

[15] 'Epoch of the Mammoth,' p. 127.
[16] 'Story of the Earth and Man,' p. 290.
[17] Journ. Geol. Soc. of London, 1866, p. 463.

Somme, and therefore any arguments based, as to time, upon the appearances of the valley were not to be trusted.'[18]

There is no proof here, nor the slightest probability, that through a vast period of time the valley of the Somme has reposed in quiet slumber, while the tiny, sluggish stream, even with some occasional increase in the course of its flow, has excavated the valley down from the width of a mile, and lodged the beds of gravel on its sloping sides down to near the level of its present bed. But if the sea has invaded it, or from heavy rainfalls and melted snow the water-force has been augmented until its opening slopes have been filled from bluff to bluff, or if a geological flood has swept through it, and excavated it, or if it was originally a valley scourged by a flood that reached the height where the highest gravel beds were deposited—then there has been needed no long time for the deposition of the gravel and loam, and 'implements' shaped by man may have been deposited, and the men who made them may have lived in the neighbourhood at a comparatively recent period.

The rate at which peat has increased in the Somme Valley forms the second part of our inquiry.

Besides the formation of the gravel beds on the sides of the Somme Valley river, superimposed masses of peat have formed on the chalky bed of the river, some of which are from twenty to thirty feet thick, and must have taken, M. Boucher de Perthes thinks, some 30,000 years for their formation.

Fortunately, the French explorer whose calculations have been so largely accepted as, at least, approximately correct, by the help of some relics found in the peat, has taken measurements, and has calculated the rate of increase, and the term of years required for its growth. In his explorations he found some flat Roman dishes lying in a bed of peat, which, from their shape and horizontal position could not, he thought, have sunk below the level at which they were found. Concluding that this level marked the Roman period, he reckoned the superincumbent peat to have taken 1,400 years to form. Here was his time-gauge by which he worked his sum, and here was the rule by which he worked out the conclusion. To form the peat

[18] *Times*, weekly issue, Aug. 29, 1877.

lying above the Roman relics took 1,400 years, and at this rate of increase the time required for the deposition of the whole bed would amount to 30,000 years. This mode of calculation is based on two fallacies.

First, it assumes that through a number of years, and under the varying conditions to which it is subjected, peat forms at a uniform rate. On measuring the peat underlying the Roman dishes, it was found that it had increased at the rate of three centimetres in a century, which would be a foot in a thousand years, and consequently thirty feet would require for their formation 30,000 years.

A little careful examination reveals a number of disturbing causes which show that the rate of increase was not uniform. As a rule, in their early growth, peat-beds increased much more rapidly than during the later time of their formation. Professor Andrews, President of Chicago Academy of Science, and who has extensive knowledge of the backwoods of America, visited the Somme Valley some time back, and made a careful inspection of the beds of peat. He says it is forest peat, and in the earlier period of its formation the leaves and fruits of the forest-trees, and the undergrowth and grass of the swamps, supplied vast masses of vegetable matter, by which the rising mass of peat was fed, and rapidly increased. To one who studies the actual quantity of this material, a growth of two or three feet in a century is by no means improbable. 'The forests of the Somme Valley,' he says, 'have disappeared centuries ago, and with their disappearance the peat ceased to grow, so as to be perceptible to the inhabitants.'[19]

There is another fact which must not be overlooked. M. de Perthes found the trunks of some alders and birches standing erect as they grew with their roots fixed in an ancient soil.[20]

'These trunks,' says the professor, 'were sometimes a metre in height, but mostly less; and in the damp air of swamps, unless covered by the peat, would rot in sixty or seventy years. They, therefore, to be preserved undecayed, must have been covered in from sixty to 100 years with three feet of peat. The decay of trunks exposed to the

[19] *American Journal of Science and Art*, Oct., 1868.
[20] 'Antiquity of Man,' Lyell, p. 155.

action of the atmosphere in wet situations is,' he adds, 'a fact well known to naturalists.'

This preservation of tree-stumps by being covered with vegetable matter from the action of a wet atmosphere, is used by scientific men as a means of measuring the rate of increase of coal-formations in the carboniferous period.

At the meeting of the British Association in 1879, Professor Duncan said: 'It is certain that some of the vegetation which subsequently became coal, and many feet of the roof above, were not always formed with great slowness, for stumps and trunks of trees have been found standing where they grew, with their roots in the under-clay, and their stems wrapped round with coal.'[21] And a writer in the *Contemporary Review*, in repudiating the idea of interminable ages having been spent in the formation of the fossiliferous rocks, refers to the trunk of a tree found in Parkfield Colliery, near to Wolverhampton. He says, 'It is evident that the superincumbent stratum or set of strata into which the trunk of the tree penetrates, must have been formed before there had been time for that trunk to decay and waste away in the ordinary course of things.'[22]

We add the valuable testimony of Principal Dawson. 'In 1865,' he says, 'I had an opportunity to examine the now celebrated gravels of St. Acheul, on the Somme, by some supposed to go back to a very ancient period. With the papers of Prestwich and other able observers in my hand, I could conclude merely that the undisturbed gravels were older than the Roman period, but how much older only detailed topographical surveys could prove; and taking into account the probabilities of a different level of the land, a wooded condition of the country, a greater rainfall, and a glacial filling of the Somme Valley with clay and stones subsequently cut out by running water, the gravels would scarcely be older than the Abbeville peat. . . . . The composition of the Abbeville peat shows that it is forest peat, and the erect stems preserved in it prove that in the first instance it must have grown at the rate of about three feet in a century, and after the destruction of the forest its rate of increase down to the present time diminished rapidly

[21] *Nature*, 1877, p. 450. [22] *Contemporary Review*, 1880.

almost to nothing. Its age is thus reduced to perhaps less than 4,000 years.'[23]

It has been abundantly shown, we think, that the uniform increase of the peat in the valley through its twenty or thirty feet is disproved by the facts.

There is a second objection lying against M. Boucher de Perthes's calculation. It is by no means certain that the base-line from which he takes his measurement is correctly placed. He reckons that he has found *the* Roman period where the flat Roman dishes were discovered; but, by his own showing, Roman relics were found at a much lower plane. He informs us that Roman pieces of copper, much worn by time ('*des pièces romaines de cuivres frustres*'), were found thirty-six feet or more from the surface, which, deducting the superincumbent gravel, clay, and surface soil, (which would require time for their deposition), would lie buried in the peat at a much lower depth than the dishes to which he refers.[24] At a depth of six metres (twenty feet) in an excavation for a gas-meter, and lying under the layer of peat between the Pont Rouge and the Marcadi Gate, he found fragments of a large amphora, and in the same level some medals of the Lower Empire. A few centimetres lower down were found an iron chisel.[25] In the same Celtic soil, 100 metres distant from the site of the gasometer, M. de Perthes found vases and worked flints, with an axe of sandstone, and another of highly polished jade. One metre below this bed, in 'a second Celtic bed,' he found a 'vase' almost entire, having a place in the side for a light of rosin or wax, and near by were the head of a urus, and some worked flints. This vase, he tells us, 'is not of a high antiquity,' having been hardened in the fire, and *turned in the wheel*.[26] How then came it in this position, five or six feet from the surface? The solution is, that it *sank* to the level where it was found. But the vase was about six inches in diameter, and seven in height, and would have to sink through beds of sand and peat many feet thick.

This stratum in which the vase was found, was im-

[23] 'Story of the Earth and Man,' pp. 294, 295.
[24] 'Antiquités Celtiques et Antediluviennes,' vol. i., p. 201.
[25] *Ibid.*, p. 213. [26] Quoted in 'Epoch of the Mammoth,' pp. 143, 144.

mediately preceded by a bed of peat, which, we are told, presently raises itself to the surface, and is no longer dominated by the humas or vegetable mould. This same bed, we are informed, has been signalled at seven metres below the soil of the city. It was in this peat, where it shows itself at the surface, that M. de Perthes found certain Roman dishes at the depth of one metre, and on which he has based his calculation as to the rate of the formation of the peat; and since the placement of these dishes, there has elapsed the time for the accumulation of the peat which has formed above them, *and the deposition of twenty-three feet of sand, and gravel, and mud.*

Besides the Roman articles, a number of remarkable objects were found by M. de Perthes—such as a paved subterranean causeway between Abbeville and Hesdin at the depth of several metres; a copper poniard twelve inches long at the depth of five or six metres in the peat; a lump of iron between Abbeville and Epagne, at seven or eight metres deep; a kind of iron spade at a depth of six metres, and another object of iron which resembled a hache à sapeur beneath a stratum of gravel at a depth of three metres below the level of the Somme, and five or six metres below the surface.[27]

In the *Geological Magazine* there is a description of a deposit in the Somme Valley, given by M. de Marcey, which was superimposed on the (Celtic) peat. It comprised, first, brick earth, with fragments of Roman pottery, and land shells, having at its base a few pebbles and marine shells, and lying over it a bed of river gravel. 'If authentic,' says the writer in the magazine, 'the events and changes thus indicated must have all occurred since the days of Julius Cæsar.'[28]

Before these facts M. de Perthes's theory of a uniform increase of peat at the rate of a foot in 1,000 years becomes worthless, and his 30,000 years required for its accumulation a myth.

[27] 'Epoch of the Mammoth,' pp. 142, 144.
[28] *Geological Magazine*, 1878, p. 360.

CHAPTER IX.

ALLUVIAL DEPOSITS—continued.

PEAT-BOGS OF DENMARK.

'Ascending through the series of formations of the outer zone of the *skovmoser* (forest-bogs), we find that the pine-trees gradually disappear, and are replaced by oaks, which finally prevail exclusively. . . . . At the present time the oak is, in its turn, in a fair way of disappearing from Denmark. . . . . If the oak has not entirely disappeared, the beech has established a footing there, and that a long while ago, as is testified by public opinion, which holds that the forests of beech, of which the Danes are rightly proud, are of extreme antiquity.'—T. RUPERT JONES, F.R.S., F.G.S.

WE have seen that M. de Perthes's estimate of the time required for the formation of the peat in the Somme Valley is disproved by the facts of the case. In this chapter we propose to show that the increase of peat generally has not been of slow but rather of rapid formation; and especially, that the rate of its growth in the Denmark peat-bogs affords no proof of the early appearance of man in that country.

The remains of two log-huts, together with flint implements and hand-made pottery, were discovered a short time since by Mr. Thomas Plunkett in a primitive crannoge near Behoe, county of Fermanagh, lying under twenty-one feet of dark compact peat, which had accumulated since the huts had been built and the pottery made.[1]

In his 'Principles of Geology,' Sir C. Lyell mentions a peat-bed due to the destruction of a forest at Lochbroom, Ross-shire, towards the middle of the seventeenth century, which when opened, fifty years after the destruction of the trees, was found to be eighteen inches in thickness.[2]

The rapid increase of peat when it is fed with decayed vegetable growths is shown in an article on peat, by G. H. Kinaham, M.R.J.A., in the *Quarterly Journal of Science.*

[1] *Nature*, 1880, p. 478.

[2] *Ibid.*, 1874, p. 300.

The writer states that at the present day the growth of the lowland bogs in Ireland is slow on account of their being more or less drained; but in some of the depopulated valleys the growth of the peat is remarkable, being principally due to the growth and decay of vegetation. In Drumkelin Bog, county Donegal, a log-house eight feet high was discovered under fourteen feet of bog, while under it was fifteen feet of bog; in all, thirty-seven feet deep. Stone 'celts,' sharpened stakes, and methers full of lard or butter have been exhumed in the parish of Feakle, county Clare, from under bog from ten to fifteen feet.

George Earl of Cromarty records that in 1651, in passing from Achadiscald to Gonnazd, near the sea, there was a plain covered over with a wood, which was so old that not only had the trees no green leaves, but the bark was quite thrown off. 'About fifteen years after, I had,' he says, 'occasion to go that same way, and observed that there was not so much as a tree or appearance of the root of any, but instead of them, where the wood had stood, was all over a flat green ground covered with a plain green moss. I asked the people what had become of the wood; and they told me that, being all overturned from the roots by the wind, the trees lay so thick over one another that the green moss or bog had overgrown the whole timber, which they said was occasioned by the moisture that came down from the high hill above it and stagnated on the plain. Before the year 1699 (in forty-eight years), the whole piece of ground was turned into a common moss, where the country people were digging turf and peats, and still continue to do so.'[3]

In a turf bog, near Templemore, Tipperary, a shoe was found at a depth of twenty feet. It was a right-shoe of thick well-tanned leather, with a double sole. It is No. 28 in Sir W. R. Wilde's 'Catalogue of Antiquities of Stone, etc.,' in the Royal Irish Academy.

Dr. Plott, in his 'Natural History of Stafford,' states that a parcel of coins of Edward IV. were discovered in peat-moss, eighteen feet deep, which, supposing them to have been dropped on the surface in that reign, would show that the moss must have increased upwards of an inch a year.[4]

Another instance, mentioned by Mr. Maxwell in his

[3] *London Quarterly Review*, Oct., 1871. [4] Steele on 'Peat Moss,' p. 13.

'Statistical Account of the Parish of Kilbarchan, Renfrewshire, shows that a peat-moss, eight or nine feet deep, referred to by him, has grown in depth at the rate of three feet in the century. This is proved by the stumps of the trees broken off three feet above the roots standing erect in the peat.[5]

Here, as in former instances, we find nothing like the uniform growth of peat, and no such time needed for its increase as is required by M. de Perthes.

The forest-bogs of Denmark are supposed to show that the peat in these bogs were of slow growth; and by the position in which the works of man are found in them, to give decisive proof that man lived in Europe at a remote prehistoric period.

These forest-bogs (*skovmoser* of the Danes) are described by Sir C. Lyell in his 'Antiquity of Man,' and more fully by T. R. Jones, F.R.S.;[6] and both quote from the work of M. Morlet on the 'Peat-bogs of Denmark,' who seems to be esteemed an authority on the subject.

The argument is that there have been three distinct and successive periods of arborescent vegetation in Denmark; a first period of pine or Scotch fir (*pinus sylvestris*), a second period of oak, and a third of the beech; and that at a considerable depth in these bogs, which are from ten to thirty feet deep, under the buried trunks of the pines, were found flint implements made by the hand of man; and in the oak period—coincident, says Sir C. Lyell, with the bronze age—some swords and shields of bronze, now in the Museum at Copenhagen, were discovered.

The first of these successive floras, the pine, is supposed to have occupied the forests and forest-bogs at a very early time. There is no historical allusion to it, we are told, as having grown naturally in Denmark, and in the middle of the large swamps are found as many as two or three layers, one over the other, of these pine-trunks *in situ*, with their roots well preserved; the trunks of the oaks, too, were often four feet in diameter.

[5] Last three instances quoted in 'Epoch of the Mammoth,' pp. 311-313.

[6] 'Antiquity of Man,' 4th edit., p. 7; and Lect. on 'Antiquity of Man,' Jones, pp. 12-15.

The argument for a high antiquity, it will be seen, is based on the long time that these several floras have occupied the bogs, the great depth of the swamps, and on the presence of objects in the bogs which bear the impress of man's handiwork. The successive floras, it is affirmed, have occupied *distinct periods*, each of which flourished through a great number of years. The oak supplanted the pine, and the beech the oak. This argument from the successive, and therefore long occupation of the bogs, cannot be sustained. Three *successive* growths of pine and oak and beech, with *distinct periods*, have never existed; rather, like the so-called stone and metal ages, with which these vegetable growths are supposed to be synchronous, they have been contemporary through most of their time. It needs nothing more to prove this than the history of these growths as given by Mr. T. R. Jones, who quotes from M. Morlet and Professor Steenstrup. It is admitted that there is some overlapping which is not very consistent with distinct periods, especially as the overlapping was almost, if not quite, a continuous parallelism. 'We find,' the description runs, 'that the pine trees *gradually* disappeared and are replaced by the oaks, which finally prevail exclusively.' Plainly the order of growth was, that as time went on both pine and oak were growing together; but from causes not difficult to find, the pine-growths gradually diminished, and the oaks gradually prevailed. 'The pine was an easy wood to cut, and pleasant to burn.' The oak would probably be more extensively cultivated as more durable, and for many purposes better suited. We quote again: 'At the present time the oak is in its turn in a fair way of disappearing from Denmark.' Then it is still there; it has not yet disappeared. The record continues, 'If the oak has not entirely disappeared, the beech has established a footing, and that a long while ago.' 'Public opinion holds that the forests of beech are of extreme antiquity.' If then the oak is there now, and the beech which is flourishing now was there a long time back, so as to be esteemed of extreme antiquity, through all that 'long time' the oak and the beech must have been contemporary; and as the pine *gradually* disappeared, and the oak gradually increased and only finally established itself, the forests of beech which

had existed so long as to be popularly regarded as of extreme antiquity, must have reached back to the time when the pine was flourishing, and thus instead of reaching the conclusion 'that there have been three distinct periods of arborescent vegetation in Denmark, a first period of the pine, a second period of the oak, and a third period—still continuing—of the beech;[7] we arrive at the conclusion that, with the exception of a short recent time, during which the pine is said to have been absent, and which will not affect the question of antiquity, there has been but one period in which the pine, and the oak, and the beech have grown together. Moreover, the evidence supplied from these bogs will not show that they increased by a slow process, but rather that they formed in a short time. 'They are pot-like depressions,' that drained the surrounding surface, and were plentifully supplied with vegetable matter from the trees and undergrowth. The sides were precipitous, and the trees growing on the margins fell over into the bogs. Some of these fallen trees, too, serve to furnish the means of measuring the rate of increase. Their stumps, found in bogs, often three feet in diameter, would have decayed in the course of two or three generations, if in that time they had not been covered with the surrounding mass.

Under similar circumstances peat has elsewhere formed in a short time. The Roman soldiers under Ostorius, in the time of Vespasian, destroyed the forest of Hatfield, in Yorkshire, in great part by fire. Some of the large trees which were left growing, being thrown down by the action of the wind, intercepted the river, so that the water flooded the whole flat country. This moorland is now a boggy peat, covered with heath.[8] Mr. Steele, on 'Peat Moss,' says that since this time the peat has formed; and when the bog was drained, many feet deep, at the bottom of the moss or fen-mould, old Roman axes, and knives, and links of chains, and some ten or twelve coins of the Roman Emperors were found. In this peat, too, were found in great numbers, trees of Scotch fir, oak, birch, beech, etc., the roots standing in the hard soil at the bottom of the moss.

[7] Lect., T. R. Jones, p. 15.
[8] *Penny Magazine*, article 'Bog.'

And as the age of the trees, and the rate of increase of the peat, will not show a high antiquity for these bogs, so neither will the character. nor the position of the articles found in them prove the presence of man in Denmark at a remote period. Mr. Jones says, 'The traces of the presence of man cannot be followed to the very bottom of the *skovmoser*, which are generally the most ancient of the peat-bogs; but the traces of man appear in the pine-layer of the outer zone of the *skovmoser*.' But he adds, 'Various objects of flint, characterizing the age of stone, have been found in the pine-layer. Professor Steenstrup took some with his own hand from beneath trunks.'[9] This finding of objects of flint under the layer of pine gives no proof of antiquity. They were of the neolithic type. No palæolithic implements have been found in Denmark. How far back, then, will the stone age reach in Denmark? M. Worsaae says, 'It is no exaggeration if we attribute to the stone age an antiquity of at least 3,000 years.'[10] And that man made neolithic implements two or three thousand years ago, few persons, probably, will care to question.

Nor do the swords and shields of bronze, which Sir C. Lyell says were taken out of the peat, and are now in the museum at Copenhagen, help the argument for man's antiquity. Professor Worsaae makes the bronze age in Denmark to last down to the third century of the Christian era. And bronze articles of this kind were not made in Denmark at a very early date; and were not probably buried in the peat-bogs at the time when they came out of the workman's hands.

There is no proof that the handiwork of man was found at such depths in peat-bogs as will show that he lived in Denmark at a remote date; but there *is* proof that in the early strata of Danish peat, his works of modern date have been found.

Professor Worsaae, in his 'Section on the Antiquities of the Stone Age,' in the work to which we have referred, states that the apparel of the aborigines of Denmark consisted chiefly of skins, and that bodies dressed with such

[9] Lect. on 'Antiquity of Man,' T. R. Jones, p. 15.
[10] 'Primeval Antiquities of Denmark,' trans., p. 135.

skins have from time to time been dug up from the peat-bogs with some primitive leather shoes or sandals made of a single piece of hide sown together behind. And 'with these,' he adds, 'have been found also remains of woollen cloth.'[11]

The work of the shoemaker, and the weaver of woollen cloth, was found with pine-trunks lying at various depths in peat-bogs, in the neolithic stone age.

[11] 'Primeval Antiquities of Denmark,' trans., p. 147; quoted in 'Epoch of Mammoth,' p. 307.

CHAPTER X.

THE GLACIAL PERIOD.—WHEN WAS IT?

'Very important questions of time are involved in this idea of post-glacial man. If we hold that it is measured by those slow movements now in progress, the time required will be long. If with most continental, and some American, geologists we believe in paroxysmal movements of elevation and depression, it may be much reduced. We have seen in the progress of our inquiries that the movements of the continents seem to have occurred with accelerated rapidity in the more modern periods.'—J. W. DAWSON, LL.D., F.R.S., F.G.S.

As we have shown in a previous chapter, it is now almost unanimously concluded by the leading scientists of Great Britain that the appearance of man, in this part of Europe at least, was post-glacial.

By this decision our inquiry after the time of man's advent becomes simplified. An important position has been gained. We are on the hither-side of the Arctic period, and the question placed at the head of this chapter assumes a new interest. It is a question, however, that cannot be definitely answered. No precise date can be given in a time of years; yet the evidence now at hand seems sufficient to show that the close of this time of cold was a comparatively modern occurrence. Certainly there is no evidence to show that it must have belonged to a remote age in the past.

This glacial period, or ice age, as it is otherwise called, is well described in few words by Professor Mivert. 'It is plain,' he says, 'that in comparatively recent times an extended cold prevailed over the northern portion of the world—over England, Central Europe, and the greater part of North America.'[1]

There is a general agreement in the scientific world that there has been in the past a time of Arctic cold and ice;

[1] *Contemporary Review*, Jan., 1880, p. 103.

beyond this we get into the region of conjecture and theories. How was that low temperature produced? Was there one ice age, or were there more than one? Were they glaciers drifting from an ice-capped Arctic region that ground and scored hill and dale, or were they water-borne icebergs, or both? When did this ice age occur, and how long did it last? are questions that have exercised the inventive faculty of those who have meddled with scientific inquiries.

The following are some of the theories that have been propounded to account for this change of temperature: A lessening of the original heat of the earth; changes in the distribution of land and water; the diversion of the Gulf Stream; variation in the amount of heat radiated by the sun; variation in the temperature of those regions of space through which the solar system moved; the obliquity of the ecliptic; the combined influence of the eccentricity of the earth's orbit, the precession of the equinoxes, and the obliquity of the ecliptic.

With the last of these only are we concerned in the question before us, as it is by this theory that it is proposed to date this time of cold, and fix it at an early period.

While the date of the glacial age was being debated, Mr. James Croll turned his attention to the astronomical aspect of the question; and searching his way back with much diligence through a million of years, found at about 800,000 years ago a conjunction of circumstances which he thought would produce a glaciated condition of the northern hemisphere. Eventually, however, he fixed upon a later date. At about 200,000 years back he concluded that he had found in the concurrent influence of the eccentricity of the earth's orbit, the precession of the equinoxes, and changes in the obliquity of the ecliptic, the conditions that would produce a time of Arctic cold so intense as to form an ice-cap 3,000 feet thick, and which he concluded was the ice age. This theory was supported by Dr. James Geikie,[2] and accepted by some other scientists.

It is known that the orbit of the earth is an ellipsis, so that its distance from the sun is not the same in different parts of the year. Besides this deviation from a perfect circular orbit, it may be drawn many millions of miles from

[2] 'Great Ice Age,' p. 400.

its elliptical path by the gravitating force of other bodies. Something over 200,000 years back it had reached an eccentricity of about 10,000,000 miles, or some 7,000,000 of miles in excess of its eccentricity at the present time.

Would this deviation from its orbit so reduce the temperature of the earth as to produce this time of cold and ice ?

This is an astronomical question, and the general conclusion arrived at by astronomers, says Mr. T. Belt, including the eminent names of Humboldt, Arago, and Poisson, was that the climate of the globe could not be affected by any possible change in the ellipticity of its orbit.[3] And 'Sir John Herschel has shown that practically all the change produced simply by the increase of eccentricity on radiated heat is but slight, and may be safely neglected.'[4]

This opinion accords with the fact that the present eccentricity of 3,000,000 miles has made no perceptible difference. And if on one side of its orbit the earth was farther from the sun, it would be so much nearer on the other ; and the increase of ice and snow, produced by the greater cold of one season, would be melted by the greater heat of another.

But Mr. Croll does not rely on the eccentricity of the earth's orbit alone to produce the time of cold ; he thinks the cold would be intensified by the combined influence of this eccentricity and the precession of the equinoxes. In consequence of the retrograde motion of the equinoxial points from east to west, or contrary to the order of the signs, the sun crosses the equator at different points each succeeding year ; and it has been ascertained that the sun does not return exactly to the same spot again till after about 21,000 years, in which time the seasons will make a complete revolution. In about 10,500 years consequently, or half that time, the two hemispheres will have changed places, and what is now mid-winter will be the height of summer, and the earth in the winter will be at the greatest distance from the sun, and not as now at the nearest.

If this conjunction occurred about 200,000 years back, Mr. Croll thinks the combination would produce a state of glacial cold. But assuming this conjunction to have oc-

[3] *Quart. Journ. of Science*, 1874, p. 427.
[4] Lect. on 'Antiquity of Man,' T. R. Jones, p. 25.

curred, if the earth was further from the sun in the winters of that time, it would be nearer in the summers; and consequently, if in the winters there was more cold, in the summers there would be more heat. So that here again, what the refrigerating effect of the winters with the earth in aphelion did in lowering the temperature and forming ice, with the earth in perihelion would be undone by the greater heat it would receive; so that there could be no such continuity of cold as would produce a thick ice-cap.

To the eccentricity of the earth's orbit and the precession of the equinoxes, Mr. Croll adds changes in the obliquity of the ecliptic as a third factor; and which he thinks in combination would help to increase the cold of the glacial period.

These changes, however, promise little or no help to the theory. The prevailing opinion of astronomers up to the present time appears to be that the limit within which the inclination of the planes of the equator and the ecliptic to each other can vary is less than a degree and a half. 'Sir John Herschel informed him,' says Sir C. Lyell, in his 'Principles of Geology,' 'that although the limit calculated by Laplace, which is 1° 21′, was true as regards 100,000 years, yet if *millions of years* were taken into account it was conceivable that the variation might be found to extend to three or even four degrees.' This, it is presumable, was his earlier opinion; for in the *Quarterly Journal of Science*,[5] the writer says, that 'in the opinion given by Humboldt, Arago, and Poisson, Sir John, who had at one time thought that great changes might have been produced by the altered position of the earth, afterwards coincided.' But taking these variations as given by Sir Charles Lyell, they would effect but a trifling, if any, difference in the temperature. The largest variation of 4° would make in millions of years a difference for a few weeks in the winter, equal to the climate of a town about 300 miles north of a central spot, and in the summer to the climate of some locality about 300 miles south of such spot.

Further, Mr. Croll thinks that the increased heat of the summer, due at that season to the corresponding occurrence of the perihelion, would be neutralized by the absorption

[5] 1874, p. 427.

and reflection by ice and snow of a large portion of the heat received. He argues that a considerable amount of heat is absorbed in melting one pound of ice, which is completely lost so far as raising the temperature is concerned. But will not the heat absorbed in melting a pound of ice be liberated when it becomes solid ice again and be given out to the surrounding air ?

Snow and ice are bad reflectors of heat; but whatever is reflected goes to increase the temperature of the atmosphere or is absorbed by it; they are, too, non-conductors of heat. The cultivator of the corn is glad to see its springing blade covered by the snow, and the 'Eskimo will freely perspire in his frozen hut.'

With this law of compensation, which runs through all these changes of the position of the earth in relation to the sun, the supposed thick ice-cap of Messrs. Croll and Geikie could not accumulate. The greater heat of one part of the year would loose what the greater cold of the other part had bound up.

Sir C. Lyell, in his 'Principles of Geology,' mentions a fact given by Alexander Agassiz, which serves to illustrate this. 'On the shores of Lake Superior,' he states, 'the thermometer for four months in the year stood at 5° below zero. The average annual snowfall for fifteen years was seventy-two feet; yet the snow never lay more than six feet thick on the ground, and disappeared completely in the summer, the snow being chiefly got rid of by evaporation.' He also states that the ground beneath the snow never froze.[6]

We have shown that in accordance with the opinion of eminent astronomers, and the evidence of the facts of the case, the theory of Messrs. Croll and Geikie which dates the glacial period some 200,000 years back cannot be established; and the inquiry before us still is, when did this time of cold close, and what time has since elapsed ? As has been before stated, it would be a folly to attempt fixing any precise date in a term of years, but we shall endeavour to show that it was of comparatively recent occurrence.

[6] Quoted from T. K. Callard's pamphlet, 'Geological Evidences of the Antiquity of Man Reconsidered,' p. 24.

And first, we observe that the movements of the crust of the earth have not been by a gradual and uniform elevation and subsidence, but often by paroxysmal and violent disturbance which has effected rapid changes.

The uniformity principle means that the movements of the crust of the earth through all ages, whether by upheavals or depressions, have been at the same rate, and that the rate is to be measured by the movements of modern times.

Professor Jones gives the number of years required for the oscillations of Snowdonia as 'calculated by Ramsay and Lyell,' which will serve as an instance and an illustration.[7] The rate is two and a half feet of vertical movement in a century. The number of years is: for the upheaval from the pliocene land-level in the early glacial period, 200,000 years; for the subsidence to the archipelago condition, middle glacial period, 156,000 years; for rise to present height, later glacial period, 92,000 years; for rise to former height, 156,000 years; for slight sinking and denudation since, prehistoric, or submergence of Snowdon to the covering of the shell-beds of Moel Tryfaen, 52,000 years. And taking 800 feet more to cover some stratified drift high up the mountain, we must add 32,000 more, equal to 84,000 years; and the same time would be required for the re-elevation of the tract to its present height, altogether amounting to 168,000 years. But if the land rose in the second Continental Period as much as 600 feet above the present level, this 600 feet first of rising and then of sinking would require 48,000 years more; the whole of the grand oscillation having thus taken about 224,000 years.

According to this mode of reckoning, there can be little doubt that the glacial period is a long way off from our time. Is it any wonder that this rate of movement is styled 'an uncertain estimate,' with the redeeming qualification, however, that 'it was made by Sir C. Lyell after much study'? The earth has been in a state of unrest through a long tract of time. It has been heaving and quaking, has been lifted above, and cast down under the waters; and yet through these ages and changes it is

[7] Lect. on 'Antiquity of Man,' T. R. Jones, p. 28.

deemed to have risen and subsided at the one uniform rate of two and a half feet in a century. The theory is, however, giving way before the logic of facts. Dates in a term of years are mostly given up. Many scientists now judge distances of time by a sort of chronological perspective. Few, probably would now choose to take their measurements by Sir C. Lyell's two and a half feet rule. Still, though they do not accept this rule of measurement, there are geologists who yet make their calculations upon the uniformity principle.

We propose to show from facts and the opinions of scientists that while there has been, and is, uniformity of working in the movements of the earth, there have been times when by violent and eruptive forces changes have been wrought which have stridden over vast portions of time, and have effected in a few years or months results which according to the uniformity theory would have taken ages to accomplish.

Principal Dawson gives an instructive description of the glacial and post-glacial movements of the crust of the earth. 'Out of the waters,' he says (of a great glacial submergence), 'the land again rose slowly and intermittingly, so that the receding waves worked, even out of hard rocks, ranges of coast cliff which the further elevation converted into inland terraces. As the land rose its surface was rapidly modified by rains and streams. There is the amplest evidence both in Europe and America, that at this time the erosion by these means was enormous in comparison with anything we now experience.'

It was the spring-time of the glacial era, a spring eminent for melting snows, its rains, and its river floods. To an observer living at this time it would have seemed as if the slow process of moulding the continents was being pushed forward with unexampled rapidity. The valleys were ploughed out and cleansed, the plains levelled and overspread with beds of alluvium, giving new features of beauty and utility to the land, and preparing the way for the life of the modern period. It seems not improbable that it was when the continents had attained to their greatest extension, and when animal and vegetable life had again overspread the new land to its utmost limit, that

man was introduced on the Eastern Continent, and with him several mammalian species not known in the pliocene period. Very important questions of time are involved in this idea of post-glacial man, and much will depend in the solution of them on the views which we adopt as to the rate of subsidence and elevation of the land. If with the majority of British geologists we hold that it is measured by those slow movements now in progress, the time required will be long. If with most continental and some American geologists, we believe in paroxysmal movements of elevation and depression, it may be much reduced.[8]

It is questionable if the majority of British geologists *now* hold that the post-glacial movements of the land are to be measured by those slow, uniform movements now in progress. Eminent geologists admit that there have been paroxysmal movements in post-glacial times.

Referring to this time, which Principal Dawson has so graphically described, Mr. A. Tylor, F.G.S., in a passage from which we have before quoted, states that what are termed high and low valley gravels were of one age, and were formed just before the historic age, in what he has designated the pluvial (succeeding, or partly contemporaneous with, the glacial) period, by the enormous force of the river-water, 120 times greater than at present, the rivers being at least twenty times larger.[9]

In his presidential address at the annual general meeting of the Geological Society, Professor Huxley said: 'To my mind there appears to be no sort of antagonism between catastrophism and uniformitarianism. On the contrary, it is very conceivable that catastrophes may be part and parcel of uniformity. Let me illustrate my case by analogy. The working of a clock is a model of uniformity of action. But the striking of the clock is essentially a catastrophe; the hammer might be made to blow up a barrel of gunpowder, or turn on a deluge.'[10]

This is an apt illustration of this double action of catastrophism and uniformitarianism, but as in many other analogies, the resemblance must not be traced through all

[8] 'Story of the Earth and Man,' pp. 286-291.
[9] Lect. on 'Antiquity of Man,' p. 24.
[10] Report of Meeting of Geol. Society, 1869, pp. xlvi., xlvii.

parts of the comparison. In the movements of the crust of the earth, uniformity and catastrophe do not occur in the same time, at the same place; the disturbance of the one breaks up the uniform movement of the other. While the hammer of the clock, which in the illustration represents catastrophe, falls on the noisy bell, and the alarum, it may be, wakens the sleeper by its dissonant sounds, the pendulum oscillates at the same uniform rate, and the hands creep over the dial-plate at the same even pace; there is no cessation or acceleration of the movement. But *where* the disturbing forces lift up, or depress, or erupt, the crust of the earth, uniform movement ceases, and the hands of time fly swiftly over the face of the index.

On a later occasion, as we have seen, the professor observed, that during the last 500 years there had been enormous changes in the north of Europe. The volcanoes of Iceland had been continually active; great floods of lava had been poured forth, and the level of the coast had been most remarkably changed. Similar causes might have produced enormous changes in the valley of the Somme, and therefore any arguments based, as to time, upon the appearances of the valley were not to be trusted.

At the meeting of the British Association, held at Swansea in 1880, when Professor Ramsay, in his presidential address, discoursed on uniformitarianism, Professor Prestwich said, 'that, while admitting the river-origin of gravel-terraces in valleys, he called attention to the fact that overlying them and the raised beaches, there is an angular deposit of strictly local character, variously known as "head," "warp," or "trail." This he believed to be evidence of a submergence of the south-west of Europe beneath the sea in quite recent geological times. The submergence, in his opinion, occurred after the hills and valleys had assumed almost their present shapes, and after the country had been inhabited by early man and the mammalia now extinct. The submergence was gradual, but the upheaval rapid.'[11]

J. W. Flower, Esq., F.G.S., supplies similar facts. Treating of some flint implements found in the Norfolk Drift, he says: 'In conclusion I would suggest that the distribution, in the first instance at least, of these drift-beds, containing

[11] *Daily News*, Aug. 31, 1880.

as they do so large an admixture of chalk and tertiary and boulder clay rocks, may reasonably be attributed to the same forces or conditions, whatever they were, by which the tertiaries and boulder clay were broken up and the materials so widely dispersed and intermingled. We know nothing of these but by their results; but whatever they may have been, it seems quite certain that they are not ascribable to fluviatile agency; and I am therefore disposed, with the French geologists, to attribute them to some powerful cataclysmal action, perhaps of short duration and several times repeated.[12]

Sir C. Lyell narrates some remarkable distortions of the cretaceous and drift strata which show the violent forces which were at work in the glacial and post-glacial periods in Denmark and on the coast of Norway.[13] And on the Island of Möen, Denmark, an elevation of the land took place since the post-glacial epoch. During the glacial period the land subsided, we are told, to the depth of 400 feet; after the glacial period it again rose 400 feet. Sir Charles also supplies a few facts from Scotland, which show rapid upheavals in modern times. At an average depth of about nineteen feet, where the city of Glasgow stands, twelve canoes were found, and in one of them was a beautifully polished celt or axe of green-stone.

About twenty-five feet above high-water mark, is the Carse of Stirling, a low tract of land, consisting of loamy and peaty beds, in which several skeletons of whales of large size have been found. One of these was dug up at Airthrie, near Stirling, seven miles from the sea, and near it were found two pieces of stag's horn artificially cut. Another whale, eighty-five feet long, was found at Dunmore, near Stirling, which lay about twenty feet above high-water mark. Three other skeleton whales were found at Blair-Drummond, at an elevation of between twenty and thirty feet.

In the carse below Stirling, about twenty-five feet above high-water mark, an iron anchor was found.[14]

The position of these fossil whales and bone implements, and still more of the iron anchor found in the carse below

[12] Journ. Geol. Soc., 1869.

[13] 'Antiquity of Man,' 4th edit., pp. 344, 345.

[14] *Ibid.*, p. 52.

Stirling, shows that the upheaval extended far westward, and probably as far as the Clyde, in the banks of which more than twenty canoes have been found, one of them containing marine shells.

'On a review of the whole evidence afforded by the Scotch coast-line,' says Sir C. Lyell, 'we may conclude that the last upheaval of twenty-five feet took place not only since the first human population settled in the island, but long after metallic implements had come into use.'

On the south coast of America pottery has been found in a marine bed, showing an elevation of 150 feet since it lay in the sea-bottom. ('Encyclopædia Britannica,' article 'America.')

Count Albert de la Marmora, in his description of the geology of Sardinia, states that on the southern coast of that island, at Cagliari and in the neighbourhood, an ancient bed of the sea, containing marine shells of living species and numerous fragments of antique pottery, has been elevated to the height of from seventy to ninety-eight metres above the present level of the Mediterranean.[15]

In 1858 the entire coast at Pozzuoli, near Naples, was raised twenty feet in a single night.[16]

We learn from Humboldt that, on a day of September, 1759, the mountain of Jorulla, in Mexico, rose from a level plain to a height of 1,681 feet.

According to Chinese and Japanese accounts, several volcanic mountains have risen from the bed of the sea on the coasts of Japan and Corea in historical times. In the year 1007, a roar of thunder announced the appearance of the volcano of Toinmoura, on the south of Corea, and after seven days a mountain, four leagues in circumference, towered up to the height of 1,000 feet.

Dr. Southall of America, in referring to the last two instances we have quoted, says, 'This action of course is paroxysmal, but paroxysmal action has given form to the vast region east and west of the Rocky Mountains in the United States.' The geologist who would follow in the track of Professor Hayden's exploration of the territories, would probably relinquish his belief in uniformitarianism,

[15] 'Principles of Geology,' 12th edit., vol. ii., p. 512.

[16] M. Pozzi.

and demand more energetic forces than Sir C. Lyell's two and a half feet per century for the elevation of a coast. 'The surface phenomena of this region are,' says Professor Hayden, 'only the dim departing evidences of a series of events which once were performed here on a scale that almost baffles human conception. The evidence of volcanic action, commencing in the later miocene or early pliocene epoch, and continuing down "to the commencement of the present period"—the existing geysers and hot springs being the faint departing remnants of these once terrific forces—point to something that must be described by a broader word than *earthquake:* it was a fiery convulsion, which extended east and west of the Rocky Mountains, and over the whole Pacific slope, and altered the whole face of the country, from the head-waters of the Yellowstone to the valley of the Rio Grande and the Gulf of California. . . . . The upheavals, the depressions, the inundations, the erosion, the ice action, the subterranean throes, of which Idaho, Montana, Oregon, Washington, Wyoming, Utah, Nevada, Colorado, New Mexico, Arizona, and California were the theatre, seem to have been without parallel elsewhere, if we may judge by the marks which the storm has left.'[17] The lake deposits, continues Professor Hayden, are certainly of very moderate date, at least as late as, and perhaps later, than the pliocene. Upon this rests a huge bed of drift, which was deposited still later, and then comes the outflow of basalt. 'As I have frequently said, the effusion of basalt is a modern event, probably occurring, for the most part, near the commencement of our present period, after the entire surface reached nearly or quite the present elevation.'[18]

Here we have in review the evidence of facts, and the views of eminent scientists, which show that man's appearance on earth was of post-glacial date, and that before and since the close of that period the earth has been lifted and depressed, has been ruptured and redistributed by the powerful and rapid action of internal and external forces; changes which dispose of the plea for a long date from

[17] 'Epoch of the Mammoth,' pp. 194, 195.

[18] 'United States Geological Survey of Montana, Idaho, etc.,' 1871, pp. 30, 42, 48.

the slow uniform movements of the earth's crust, and which, if not amounting to a demonstration, yet make it highly probable that the close of the ice age was of modern date; and certainly showing that it cannot be proved to have occurred at a remote era in the past.

We now pass to consider another line of evidence more direct, and which shows, we think, that the close of the glacial period was not of remote date.

1st. Our first proof comes from the Somme Valley, where the peat, containing relics of the neolithic period, rests on the implement-bearing gravel and sand, admitted to be post-glacial. In the 'Antiquités Celtiques et Antédiluviennes,' M. Boucher de Perthes has numbered up the strata, or beds, which he had found in the peat or silt, and describes their order and contents.

The lowest bed, No. VIII., which rests on the chalk bottom, is the diluvium or drift; broken and rolled flints; ferruginous sand.

Bed VII. (second Celtic period), lying on the diluvium, contained hand-made vases, roughly hewn flint hatchets, knives, etc; trees found hewn and squared without iron tools, and urns rudely made.

Just above these articles, in Bed VI., were ashes, cinders, rude vases, a few pieces of copper (bronze), and large polished stone hatchets, with their sheaths, but no iron.

In Bed V. were found swords and lances of copper (bronze), some iron, and Gaulish coins of gold (B.C. 150 or 200).

Bed IV. Gallo-Roman period: containing marbles, statues, fragments of columns, stone tombs, coins of the consular age; iron, more rare than in higher beds; copper keys, bronze figures, etc.

Bed III. Middle Ages: coins of the first races of the Lower Empire in bronze, zinc, and gold, but little silver, less of iron than copper, etc.

Bed II. Transition from modern times to the Middle Ages: iron, some copper, etc.

Bed I. was modern soil, with arts of civilization; glazed pottery of different colours, porcelain, etc.

We can find pretty nearly the dates of some of the relics. In the third bed the prevailing metal is bronze; it contains

less iron than copper (bronze). Descending to Bed IV. (in the Gallo-Roman period), iron is yet more rare. Bed V. brings us to the Gaulish period, where, along with Gaulish coins, were found swords and lances of copper (bronze). This would be about 150 or 200 years B.C. In Bed VI., just below this, we come to the relics of the neolithic age. Bed VII., consisting of muddy sand, contains hand-made vases, flints hewn into hatchets, trees hewn and squared, and urns ruder than those above. This is often classed with the lowest bed, as forming a layer of gravel and sand, and lies immediately on, or forms a part of, the alluvium or drift. It will be observed that Bed V., which contains bronze swords and lances, together with coins, that carry us back to B.C. 200 years, rests immediately on Bed VI., with its polished stone implements; and between these two lower beds, VI. and VII., M. de Perthes found the layers of dressed wood, or rafters, belonging to a Pile settlement, Bed VII. being often classed with the lowest bed as forming a layer of gravel. And in a diagram which he has given, this bed lies immediately on the chalk, and is marked 'Diluvial Detritus."[19] These Pile villages, or Lake dwellings, when assigned to the stone age (for both bronze and iron are frequently found in them), are assigned to the age of polished stone;[20] and thus, according to M. de Perthes, the dressed wood or rafters of the buildings of a Pile settlement belonging to neolithic times rested on the bed marked 'Diluvial Detritus,' which lay immediately on the chalk.

The rate at which the peat grew supplies like evidence. In a former chapter we have shown that the peat in the Somme Valley would have taken but comparatively a short time for its formation. It lay on the lowest deposit of gravel.

This gravel bed, says Sir C. Lyell, is composed of alternate layers of gravel, marl, and sand, with fresh-water and land shells, a mixture of marine shells, bones of extinct animals, and flint implements; and immediately on this gravel bed the peat rests. The flint implements thought to indicate the presence of man were found in this post-glacial

[19] Quoted from the 'Epoch of the Mammoth,' pp. 140-146.
[20] See Chapter XII.

bed, composed of gravel, marl, and sand, with a mixture of fresh-water, land, and marine shells; with the chalk under it, and the peat above it. It is difficult in the face of this evidence to conclude that the glacial period closed at a date far back in the past.

2nd. There appears to be sufficient evidence to show that in North Europe the glacial period or ice age did not close till it had become the fashion to use polished stone implements; in other words, not until the neolithic period.

'It has been estimated,' says Lyell, 'that the number of flint implements of the palæolithic type already found in Northern France and Southern England is not less than 3,000, besides flakes. No similar tools have been met with in Denmark, Sweden, or Norway, where Nilsson, Thomson, and other antiquaries have collected with so much care the relics of the stone age. Hence it is supposed that palæolithic man never penetrated into Scandinavia, which may perhaps have been as much covered with ice and snow as the greater part of Greenland is at the present.'[21]

According to the Archiv für Anthropologie, 'neither in Scandinavia, nor in North Germany have we yet discovered the slightest trace of palæolithic man.' 'And again, 'Scandinavia and North Germany were then covered with ice.'[22]

This absence of palæolithic man occurs also in Switzerland, with part of Carinthia, and in Styria, in Scotland, in Ireland, and in the north of England. Count Wurmbrandt stated at the Buda-Pesth Congress that 'Switzerland, Carinthia and Styria exhibit two periods of glaciation, but that the caverns never exhibit any proof of the existence of man during that time.' 'The further one recedes from the mass of the Alps, the greater is the chance of finding in the caverns traces of palæolithic man.'

At the meeting of the British Association in 1878, Dr. John Evans stated that no flint palæolithic implement was known to be in Ireland. No example had been found of any imple-

[21] Introduction to Nilsson's 'Primitive Inhabitants of Scandinavia.' 'Principles of Geology,' 10th edit., vol. ii., p. 560.

[22] Archiv. Aug., 1875. Correspondenz Blatts, 18. Meeting of the Anthrop. Soc. in Munich, in 1874.

ments belonging to the age of the mammoth, rhinoceros, and other members of the quaternary fauna. There were gravels containing implements of much later date than the boulder clay.[23]

Professor Dawkins gives a list of the fauna whose remains were found in several caverns in the north of England, as at Kirkdale, the Victoria Cave near Settle, and the Raygill Cave, near Skipton. He adds: 'In none is there any trace of palæolithic man.'[24]

We find then, that in Northern Europe as in Norway, Denmark, Sweden, Switzerland, the elevated portion of Carinthia and Styria, in Scotland, Ireland, and the North of England, which were glaciated in the ice age, there are no traces of palæolithic man. He could not have lived in such a climate, nor could he have found food in countries bound up with ice.

All the implements found are of the polished stone type. Man seems to have followed the retreating ice in what Principal Dawson calls the spring-time of the post-glacial era, and when what are called neolithic tools were in use amongst the settlers. Now if we can find the time when the use of this kind of tools had fairly set in, we have found approximately the time when the ice age had passed away, and the balmy air and pulverable soil attracted man to these now habitable lands.

The exact time when these early men pushed their way into these now temperate regions it would be difficult to find, as the time when this kind of tool came into vogue is somewhat undefined; but we know that the time when polished tools came into general use in Europe was comparatively recent. Their use was contemporary with certain strata of Danish peat and with the older Pile villages or Lake dwellings.[25]

Professor Dawkins describes some of these Pile villages, and shows their relation to 'neolithic' times. A large population, he says, dwelt in houses built on platforms erected in the Lake of Zurich in the neolithic, bronze and iron ages, and some of these were built before the inhabitants had weapons of bronze.[26]

[23] *Geological Magazine*, 1878, p. 410. [24] 'Early Man in Britain,' p. 187.
[25] See 'Pile Villages,' chapter xii. [26] 'Early Man in Britain,' p. 291.

According to Professor Nilsson, he adds, the large domestic ox (*Bos taurus*), was imported into Scandinavia from Southern Europe. The same remarks apply equally to the probable ancestry of the domestic horse. The sheep of the Pile dwellings were horned, and of a fine delicate breed, and the goat possessed keeled horns arching backwards. The remains of most of these animals are found in association with neolithic implements, not merely in Britain and Switzerland, but in Italy, Spain, France, Germany, and Scandinavia, and imply that the same breeds were kept by the herdsmen of that remote age over the greater part of the Continent.

Professor Rütimeyer, Mr. Dawkins states in a footnote, 'adds the ass to the domestic animals found in the neolithic Pile dwellings of Wanwyl.'

Neolithic implements, we learn, were the stone tools used in the Pile dwellings, and both were contemporary with the domestic ox, the sheep, the goat, and the ass, all modern animals.

M. Morlot calculates the age of a Pile dwelling which occurs at the Pont de Thièle, considered one of the earliest of the stone period of Switzerland, at about 6,000 years; and from the time required for the depositions of the cone of Tinière, a torrent which flows into the Lake of Geneva, he calculates the age of the stone period at from 5,000 to 7,000 years.[27] M. de Ferry, from observations made on the valley of the Saône, fixes the antiquity of the neolithic age at 4,000 or 5,000 years, and M. Arcelin, from observations made on the same valley, makes it to range between 3,600 and 6,700 years. M. Worsaae assigns to the stone period in Denmark an antiquity of at least 3,000 years.[28]

In his work entitled 'Old England,' Canon Greenwell says: 'At the date of King Solomon and of Troy, our ancestors were living in the bronze age; before this they were in the neolithic stone age.' Solomon commenced his reign something over a thousand years B.C.

There is considerable variety here, as was likely when it was attempted to fix the date of the neolithic stone age. But we shall be able to show in another chapter that the

[27] 'Antiquity of Man,' 4th edit., pp. 30, 31.

[28] Trans., p. 135. Quoted from 'Epoch of the Mammoth,' p. 339.

long dates deduced from the cone of Tinière and the Pont de Thièle are vague guesses, which cannot be sustained by the facts. We do not propose to fix upon any precise date as giving the time when the occupants of these lake dwellers erected their Pile villages and used neolithic tools and weapons. Nor could we, as they would not all be of the same age. Some that were erected in the south would probably be of earlier date than those of the glaciated regions; but, taking M. de Ferry's estimate of 4,000 as an approximate date, then 4,000 years back Pile villages had been built in Scandinavia and Switzerland in the neolithic period; and at an earlier date, but still within the time when neolithic tools were made, as the ice and snow of the glacial period melted away, man entered upon the newly-opened regions. The close of the glacial period, though the precise date cannot be found did not belong to a remote age, but was an event of a comparatively modern time.

3. Passing to North America, we find the above estimate of the date of the ice age confirmed by the investigations and deductions of American scientists. J. W. Dawson, Principal of McGill's University, Montreal, says, 'I fail to perceive—and I think all American geologists acquainted with the prehistoric movements of the Western continent must agree with me—any evidence of great antiquity in the caves of Belgium and England, the kitchen middens of Denmark, the rock-shelters of France, and the lake habitations of Switzerland. At the same time I would disclaim all attempts to resolve their dates into precise terms of years. I may merely add, that the deliberate and careful observations of Dr. Andrews on the raised beaches of Lake Michigan—observations of a much more precise character than any which, in so far as I know, have been made of such deposits in Europe—enable him to calculate the time which has elapsed since North America rose out of the waters of the glacial period as between 5,500 and 7,500 years. This fixes at least the possible duration of the human period in North America, though I believe there are other lines of evidence which would reduce the residence of man in America to a much shorter time.'[29]

This conclusion to which Principal Dawson refers, which

[29] 'Story of the Earth and of Man,' pp. 295, 296.

was obtained from careful observations on the raised beaches of Lake Michigan, is worked out by Professor Andrews in a paper which appeared in the 'Transactions of the Chicago Academy of Sciences,' entitled 'The North American Lakes considered as Chronometers of Post-glacial Time.' This paper is quoted by Dr. Southall, an American writer, in his 'Epoch of the Mammoth.' From which quotation, as we have not the paper at hand, we shall endeavour to give an outline of the evidence from which the professor draws his conclusion. Lake Michigan is 350 miles long from north to south, and eighty-five miles in width, a sea in fact, compared with which the Sea of Galilee, as it is termed, is a pigmy pool. The waves of the lake are continually in motion, and rapidly erode the drift clay of the shores, and when long periods are taken, at a regular rate. The lake has existed from the close of the drift period, which is sharply defined, because the close of the drift in this region occurred with an unusual suddenness. The last member of the drift is the orange loam, which is a stratified layer, and covers all the drift hills and valleys like a sheet. It is a water deposit lying on the heavy boulder drift below, and displays a few boulders. There is no trace of peat or vegetable mould between it and the drift. The waters at the close of the drift fell with such abruptness, that outside the basin of the lakes (Lake Huron is connected with Lake Michigan) they have left beach lines between the high land of Wisconsin and the Ohio river, a fact attested by railroad engineers and geologists alike. This recession left the basins of the great lakes like so many cups filled with water, and the waves being never still would begin at once to erode their shores, and cast up beaches, which they have ever since continued to do. The history of the lake-shores therefore covers the whole period from the present time to the close of the drift period, meaning by that term, the retirement of the waters that deposited the orange loam.

In Lake Michigan the material washed down by the waves is sorted by the same agency into clay and sand; the clay floating about settles whenever it reaches deep water, where the wave action is too slight to keep it long suspended, while the sand is carried by currents along shore

southward, and deposited in beeches and dunes on the low sloping plain around the south end of the lake. The beaches thus formed have mapped out on the country around the head of the lake, every successive level occupied by the waters, and show by their relative size, the length of time during which each one was deposited, while the same periods farther north are indicated by the ancient bluffs from the erosion of which the sands of the beaches are derived. It is by the combined study of the erosion and the beaches that the total post-glacial time can be deduced.

The personal observations of Dr. Andrews were made mainly on the west shore of Lake Michigan, where, for a distance of about 180 miles, the waters are eroding the shores into drift-clay bluffs, which are caving down under the lashing of the waves. The contour of the lake bottom affords the ready means of determining approximately the original position of the shore, and the distance which the bluffs or deep banks have receded since the water occupied the present level. The waves of these great lakes cease to have any erosive power upon the bottom at the depth of sixty feet. Hence, when these shores are worn back, there is left under the water a sort of shelf or terrace, the surface of which slopes gently outward to the depth of about sixty feet, where the bottom dips down more suddenly to the deep water, below the reach of the wave-action. It is obvious that this terrace is the product of wave-action. Where the shores are of drift clay, the terrace has generally a breadth of from two to six miles. Seven lines of soundings to determine the breadth of this eroded terrace on the west shore of Lake Michigan were taken over a distance of 180 miles by an expedition fitted out by President Burrough of Chicago University, and two more lines by the United States engineers and others. The edge of the terrace of erosion was found to average 3·98 miles from the present bluffs, and the position of the old shore about 2·72 miles. The latter figures therefore represent the total recession of the bluffs of the west shore of Lake Michigan during the period of the lower beach.

'It is obvious,' says Dr. Andrews, 'that the outer edge

of the terrace represents the line where sixty feet of water was when the erosion commenced, and the old shore-line must be somewhere between this and the present bluffs.

The annual rate of erosion varies in single years, but in long periods it appears to be quite uniform for the same region. For shores of boulder drift exposed to the full action of the waves, it appears everywhere to amount to from three to six feet a year, and often much more. At Cleveland, Ohio, for forty years, it has averaged six feet per annum; on the opposite shore, about the same. On Lake Huron the average was six feet. The county-surveyor of Van Buren County, Michigan, judges the erosion to be about six feet a year. Dr. Andrews has through several years accumulated a large number of observations on the west coast of Lake Michigan to determine the rate of erosion, of which he has published a table embracing twenty-three places. At Evanston it reached nearly seventeen feet a year. From Milwaukee to Manitowoc (about eighty miles) it averages four and one-third feet a year, while between Milwaukee and Evanston it averages six and one quarter feet a year. The average of the two is 5·28, which is therefore the average of the whole line.

The total recession of the bluffs from the old shore-line amounted to 14,362 feet or 2·72 miles, and the total age of the lower terrace is 2,720 years. If we compare this with the same beach in Lake Huron we find some variation, but still a confirmation of the general calculation. Taking the east shore (fifty miles), we find that the edge of the terrace is about six miles from the present bluffs, and the original shore-line about 4·02 miles. The erosions there have been less carefully ascertained, but appear to be about five and one half feet per annum, which would give 3,859 years as the age of the terrace.

We must add to this result the amount of time covered by the periods during which the water stood at the highest levels. The antiquity of the lower beach is of necessity the same as that of the lower terrace of erosion. The time required to form this terrace is the time which elapsed during the accumulation of the sand of the lower beach (cubic yards given for upper and middle beaches); that is,

the total lower sands are to the total of the two beaches above nearly as 17 to 16. The time of accretion of the lower beach, as already stated, was 2,720 years; therefore the time required for the deposition of all the sands above must have been 2,570 years, making the combined periods for all the beaches 5,290 years. If we take the results of the Lake Huron erosion as the proper estimate of the age of the lower terrace, viz., 3,859 years, the total time for all the beaches would be 7,491 years.

If the total annual sand drift could be ascertained, an independent calculation could be made by dividing the total amount of sands by the annual drift; but piers have been built on the lake which act as obstructions. In the opinion of engineers no pier stops more than a fraction of the sand. Reckoning that the stoppage by the piers amounts to one-fourth or one-fifth of the whole drift, there is obtained as the probable period for the accumulation of the beaches 5,200 or 6,500 years. 'This maximum,' says Dr. Andrews, 'is useful as showing that it is impossible to allow, even on the most liberal estimates, any such post-glacial antiquity as 100,000 years, as has been claimed. The narrowness of the terraces proves the same thing; for had the erosions gone on, as they do now, for 100,000 years, the lower terrace would have been *forty-nine miles wide*, which, counting the terrace of both shores, is actually more than the whole breadth of the lake; and the places where our west shore towns now stand would have been *in sixty feet of water, and forty-six miles from the nearest land.*'

There are other calculations on which we cannot enter in this short summary. All the calculations are worked out in the professor's paper. The general conclusion arrived at is that the time required for all the deposits is found somewhere between 5,500 and 7,500 years. The agreement of these dates with those employed for calculating post-glacial time in Northern Europe is remarkable. In both cases they are approximative only; but their relation to each other is nearer than appears by a simple comparison of the figures. The American dates are the highest; but they reach directly up to the close of the glacial period. The lower dates refer to the time when man, with neolithic tools and weapons in his hand, passed over into

Northern Europe and took possession of the once glaciated regions.

It will be observed that the dates assigned to the two events vary from 3,000 to 7,500 years, showing that no precise date can be given; but also showing that, if no definite time can be assigned in a term of years, the close of the glacial period was an event comparatively recent.

CHAPTER XI.

EGYPT.

'Egypt throws scorn on the Archæologists' assumed successive periods of stone, bronze and iron.'—DR. H. BRUGSCH BEY.

'There is a deep-seated Semitic element in the Egyptian language, only to be accounted for by some extremely ancient and intimate connection.'—DR. EDWARD B. TYLOR.

'The Jews have a settlement here (Cochin Hindoostan). They are of two classes, the Fair or White Jews of more recent arrival and settlement in the country, and the Black Jews, who reside apart in a village outside the town.'—ENCYCLOPÆDIA BRITANNICA, *ninth edition.*

BY general consent the East has been regarded as the cradle of early man. It is very natural, therefore, that we should look to that part of the world to learn the time of his appearance; and it is presumable that, if the proof of a high antiquity cannot be found there, it cannot be found at all.

Believers in this antiquity have largely selected Egypt as the battle-ground of the question in that quarter; and probably they could not have made a better choice. Its historians, its papyri, its monuments and inscriptions, its chiselled statuary, its tombs with their mummy deposits, and its pyramids, carry its historic period up to the limits of our knowledge of its existence.

From the early civilization of Egypt, and the time supposed to be needful for reaching that civilization, the argument for man's remote antiquity is deduced.

The people of this ancient country, we are told, were in a state of advanced civilization at a very early period; and beyond that time, it is assumed, there must have elapsed a long time during which they were progressing towards this civilization, from an earlier barbaric condition when they lived in the stone age and wrought with flint implements.

And beyond that time, evolutionists, who do not recognise the independent creation of man, require another period still further back in the past, in which beings for which it is difficult to find a name were struggling up by slow degrees from the condition of the mere brute to the lowest, rudest grade of human existence—a dirty craven savage, that expressed his (or *its*, which?) desires by inarticulate sounds, and fought for acorns with nails and clubs.

Now this scheme of savage life, with its stone age preceding the civilization of Egypt, is an ingenious conception for eking out the long period required by the theory of man's remote antiquity; and is a necessity for those who believe that primeval man was a savage. But there is one great defect; it is not true. These tribes of progressive barbarians, struggling through a number of ages towards this advanced civilization, is a foregone conclusion, a must-be argument. They are not *found* behind this civilization, but are *placed there.*

That there were stone implements, and stones that were not implements, in Egypt, is unquestionable. They were laid in the tombs, served as symbols on the monuments, were used for embalming, and were represented by the painter's art; but that there was a stone *age* preceding a time of Egyptian civilization and the use of metals, there is not the slightest evidence. The use of metals was contemporary with the use of stone, and the men who made iron and worked it into tools; who mixed in due proportions copper and tin, or some other alloy, for the production of bronze, and wrought their metals into various forms for use and ornament, were not low savages.

M. de Mortillet states that iron was known in Egypt from the most remote times. The hieroglyphic for iron was recognised in documents of the third dynasty.[1] 'The use of iron,' says Sir J. Gardner Wilkinson, 'was known in Egypt at a very remote period; and if bronze implements continued to be adopted after iron was known, this is no argument against the use of the latter, as we know the Romans and others did the same for ages after they had made arms and common utensils of iron.'[2]

[1] Meeting of the French Association at Clermont Ferrand, 1876.
[2] 'The Egyptians in the Time of the Pharaohs,' p. 100.

'While speaking of the high antiquity of civilization in Egypt,' says Dr. E. B. Tylor, 'the fact calls for remark that the use of iron as well as bronze in that country seems to go back as far as historical record reaches.'

Dr. H. Brugsch-Bey, who spent thirty years in explorations in Egypt, and in the study of inscriptions, says that Egypt throws scorn on the archæologists' assumed successive periods of stone, bronze and iron.[3]

It is evident, then, that the Egyptians themselves, who ought to know better than strangers, who can find no proof of it, do not believe in a *stone age* preceding the use of metals; and consequently that they do not believe that their ancestors were savages. Their scorn is evidently directed against that theory. It is not against the use of stone with the use of metals that they pour their scorn, but against a stone age, which is thought by many modern scientists to imply a degraded condition.

Sir John Lubbock found chipped flints in the valley of the tombs of the kings at Thebes, and at Abydos. He found them 'on the slopes of the hills and on the lower plateaux above the level of the inundation, wherever the flint was abundant and of good quality. This of course would not show that there was a previous palæolithic age. But Sir John attempts to connect the stone implements of Egypt with a palæolithic age from a single remark of M. Arcelin. Put into English, the remark reads: 'The coast-line is prolonged under the modern sediments; but it does not pass into those sediments, where I have found no trace of worked stone.'[4]

Dr. Southall well says on this, 'It appears to us that something more substantial than this is needed as a foundation for a palæolithic or a pure stone age in Egypt. And it is as was to have been expected. The mud which covers (and which covered before the Human period) the Nile Valley would of course spread in some places over the soil containing the native flint on the slopes. It would cover it and bury it up to a certain line. Where this mud deposit ceased, the flint stratum would appear to run under the mud, while the inhabitants of the valley would seek the

[3] *Nature*, 1879, p. 415; and 'Egypt Under the Pharaohs.'
[4] Journal of Anthropol. Instit., vol. iii., No. 3, 1874.

native flint outside of these limits, and up to the line where it ceased to be exposed. The worked flints, the refuse matter, would thus be found exactly where it has been found, on the plateaux and on the higher slopes of the valleys, and occasionally somewhat encroached on by the river silt.[5]

This argument from stone 'implements' under the sediment does not seem to have been recognised by other writers on Egyptian chronology. The reviewer of Erasmus Wilson's late work on 'Egypt' says, 'History has little to seek about the prehistoric races and evidence of an antecedent state of dawning civilization; flint weapons are very scanty and obscure, and do not aid the solution of the problem.'[6] The writer of the article on 'Egypt,' in the outcoming edition of the Encyclopædia Britannica, says that flint implements have been discovered in Egypt, but he finds them in historic times. Indeed, the prehistoric period lying behind the civilization of Egypt, which modern scientists have peopled with generations of savages reaching through a long number of ages, *in so far as Egyptian history is concerned*, is dark and empty.

'It is impossible,' says the writer to whom we have last referred, 'to conjecture the duration of the prehistoric age in Egypt. M. Chabas has proposed a space of 4,000 years before the first dynasty as sufficient for the development of the civilization which had already attained maturity in the fourth dynasty. We are, however, so entirely ignorant of the causes of this civilization, and so unable to decide how far it was native to the soil of Egypt, that it is safe to abstain from any attempt to compute a period of the length of which historical Egyptians themselves do not appear to have any idea.'

If in the fourth dynasty the Egyptians had attained this mature civilization, there is no need for imagining a prehistoric time for this development. Lepsius dates the fourth dynasty at between seven and eight centuries later than the first, which, commencing from the civilization then reached, would give ample time for the attainment of this maturity, without M. Chabas's conjecture, and in the interim there had been men of genius who by their works

[5] 'Epoch of the Mammoth,' p. 321. [6] *Nature*, Nov. 24, 1881.

of skill had given patterns and stimulus to succeeding generations. A monument of the second dynasty from a private tomb in the Ashmolean Museum of Oxford, shows that the civilization of that early time, in some instances at least, had attained the same excellence as the fourth. The pyramid of Sakkarah, with its geometric regularity and its architectural knowledge, it is thought must have been erected under the second dynasty.[7]

The history and relations of this people may be pretty clearly traced without resorting to imaginary dates and ancestors. They would be of the dispersion—men who were scattered abroad to people the earth—and having selected the vicinity of the Nile for their settlement, they built their city in the well-watered plain, and under the inspiration of some man or men of genius and culture, and with probably the patronage and influence of some of those kings who erected pyramids, they advanced towards perfection until their stately city stood out the admiration and resort of other nations.

Evidently, there are no signs of man in a condition of barbarism behind the ripe civilization of early Egypt. Beyond the tombs and monuments, where both stone and metal objects are found, no indications of barbaric races have been discovered. If previously there had existed in long succession rude savages gradually advancing to the civilization which the Egyptians had reached, there ought to have been some traces of that rude condition, and the signs of their gradual advance. All the indications discoverable amongst the Egyptians are, however, of another kind, and point back to conditions such as could not be found amongst savages, but are found amongst that early people whose history is traced in the Mosaic record.

We find, for instance, metals in use amongst the Egyptians as far back as their history will take us. Who would be likely to supply them? Did they come from savage races living in a stone age? Tracing our way back to a very early period in the history of the human family, we find that Tubal-cain, the son of Lamech, was 'an instructer of every artificer (or forger of every tool) in brass and iron.'[8]

[7] Review of Erasmus Wilson's Work on 'Egypt.' *Nature*, Nov. 1881.
[8] Genesis iv. 22.

Reverting to 'The Song of Lamech,'[9] to which we have before alluded, we find him rejoicing in the possession of metal instruments of war with which he could protect himself from the dangers to which murder had exposed him, and which writing François Lenormant thinks the most ancient literary fragment bequeathed to us by any Semitic people.[10]

Were not the Egyptians who tempered brass and made it into arms and implements, more likely to have been the descendants of a people who forged tools and weapons, than of a race of savages of whose existence even there is not a trace?

Another sign of descent from these earlier civilized people is found in the structure of the language of the Egyptians. There is no doubt to some extent a fusion of races in Egypt, and a consequent mixture of words in the language employed, as there is in every thriving community. Other branches of the dispersion, who had been separated for some centuries, would be sure to find their way to the renowned Egypt. Some would go for its learning, and some to share its civilization and prosperity. There would therefore be in their language a mixture of words introduced by several classes of people. Yet Dr. Birch says that 'the Egyptian was a Semitic tongue,'[11] and Dr. Edward B. Tylor remarks that there is a deep-seated Semitic element in the Egyptian language, only to be accounted for by some extremely ancient and intimate connection.[12] In a review of Dr. Brugsch-Bey's work on 'Egypt Under the Pharaohs,' the reviewer says, 'The Egyptians are not to be classed with the African races . . . The language,' he adds, 'appears to have been analogous to both the Aryan and the Semitic.'[13] 'Dr. Brugsch,' says the writer of the article 'Egypt' in the 'Encyclopædia Britannica,' 'strongly affirms the affinity of the Egyptians to the Indo-Germanic as well as the Semitic.'[14] This prevailing Semitic element in the language of the Egyptians points back to a relationship with the family of Noah, rather than to an affinity with savage races.

[9] Genesis iv. 15.
[10] *Contemporary Review*, 1880, p. 570
[11] *London Quarterly Review*, July, 1879.
[12] Address at British Association, 1879, *Nature*, p. 415.
[13] *The Atlantic Monthly Review*, 1880, p. 316.
[14] Encyclop. Brit. article 'Egypt,' ninth edition.

Then the Egyptians built cities, and raised monuments, and so had the earlier generations of the East. Passing up to the history of the first family of the Bible record, we find that Cain went out from the presence of the Lord, into the land of Nod, and built a city, and called the name of that city after the name of his son Enoch ;[15] and at the time of the dispersion, the posterity of Shem, and Ham, and Japheth, the sons of Noah, said, 'Let us build us a city and a tower, whose top may reach unto heaven ; and let us make us a name, lest we be scattered abroad upon the face of the whole earth ;' and they commenced their building, 'and called it Babel.'[16] These Egyptians (not for the same purpose) said one to another, 'Let us build cities, and towers, and pyramids, and tombs ;' and they made themselves a name which stands unerased down to this day. Do we see here the posterity of a savage ancestry ? or the descendants of the city-building sons of Shem and his brothers on the plains of Shinar ?

Moreover, the Egyptians believed in one God, a Supreme Being, as did the Hebrews.

Porphyry informs us, that originally the Egyptians worshipped but one God.[17] Herodotus tells us 'that the inhabitants of Egypt retained the idea of a God, self-existent, and from eternity.'[18]

M. de Rouge states 'that the religious writings of the Egyptians speak of one Supreme Being, self-existent, self-productive, the Creator of heaven and earth, called the double Being, as the Parent of a second manifestation. To the local divinities the attributes of this Supreme Deity are given, though that they were originally so is not certain. Ro, the Sun, is indeed spoken of as the Supreme Being, but this appears to have been a later phase of opinion. It was probably an attempt to substitute a popular materialistic belief, or a philosophic creed.[19] This view of the original belief of the Egyptians is sustained by B. P. Le Page Renouf, in his Hibbert Lectures on 'The Religion of Ancient Nations.' Of a state of barbarism anterior to the monumental period, M. Renouf tells us 'there is no historical vestige. Though there are the names of many gods, the

[15] Genesis iv. 16, 17.
[16] Genesis xi. 3, 4.
[17] De Abstinentia, lib. iv., sec. 6, etc.
[18] De Myster. Egypt.
[19] Encyclop. Brit., article 'Egypt.'

ancient view was monotheism. The word *natur*, used for gods, he says, does not usually mean God, but power, as the Hebrew *El*, and all power proceeded from the supreme power.[20]

There is, too, a remarkable agreement between the writings of the Egyptians about the endowments, struggles, and responsibilites of man, and the history of early man as given in the Bible record. In the last edition of the 'Encyclopædia Britannica,' the writer of the article on 'Egypt' says: 'It is sufficiently clear from the famous seventeenth chapter of the Ritual that the Egyptians *attributed to the human soul a divine origin*, that they held that it was through life engaged in the warfare of good and evil, and that after life its final state was determined by judgments according to its doings on earth.' Turning to the Bible history, we find that when man was created, God breathed into his nostrils the breath of life, and man became a living soul;[21] that when he sinned by disobeying God, he became the subject of a bias to evil, so that when he would do good, evil was present with him, and there was a 'warfare in the soul' between 'good and evil;' and we are told that Enoch, the seventh from Adam, prophesied of a coming time of judgment.

Were these views handed down to them from savage ancestors, or did they inherit them from the conservators of the historic record?

As there is no proof of a stone age, and of savage life behind the civilization of Egypt, so there is no evidence to show that this civilization was of great antiquity. The historic period begins with Menes or Mena, the first king of the first dynasty. Egyptologists have not been able to fix precisely the time when this reign commenced; further discoveries may enable them to agree on the date. The present tendency is to a reduction of the time that has elapsed since then. We may, however, by the several estimates of those who have made a computation of the time, obtain an approximate view of the date.

Of the historical chronology, the chief authorities are, (1) Manetho, who gave a list of thirty dynasties, and the length of each, with, in some cases, the duration of the in-

[20] *Dublin Review*, Oct., 1880, p. 508.

[21] Genesis ii. 7.

dividual reigns; (2) The similar list of the Turin papyrus of kings; and (3) Various data of the monuments. Manetho's list is confused and misleading. As far as appears, he makes up the number of each dynasty (except Dynasty XII.) of the individual reigns, where they are stated, taking no account of the overlapping of some of them. The duration of the dynasties, according to Syncellus, he stated to be 3,555 years, but this number is given apart from the dynastic list. The Turin list is in a worse condition than Manetho's, but is valuable in confirming and correcting it.

The evidence from the monuments is as yet too incomplete to be of great value, but it shows that Manetho's numbers must be reduced, and supplies fragments of historical chronology which may ultimately be united into a complete system.

M. Mariette reckons the first dynasty to have commenced in the year 5004 B.C. He accepts Manetho's numbers with some modifications, and makes all the dynasties but one consecutive.

Dr. Brugsch, following the genealogical method proposed by Professor Leiblein, and the reigns of the Tablet of Abydos, making an exception for the distracted age of the dynasties from XII.—XVII., places the beginning of the Egyptian history B.C. 4400.

Professor Lepsius reckons the duration of the thirty dynasties at 3,555, and dates the historic period 3892 years B.C. He makes some of the dynasties in part, and some in whole, contemporary. M. Chabas proposes with much hesitation the fortieth century B.C.[22] Mr. R. Stuart Poole, of the British Museum, who is one of the highest authorities, makes the reign of Menes to commence 2717 years B.C.

According to Champollion, the dynasties of Egypt, on the largest interpretation, run up no higher than B.C. 2200.[23]

Sir Gardener Wilkinson and Dr. Birch place the reign of Menes about the same time as Poole. Many of the dynasties (mainly those of the first seventeen), according to Poole, were not successive, but contemporaneous; while one dynasty was ruling at Memphis, another was ruling at Thebes.[24]

[22] Encyclop. Brit., art. 'Egypt.'
[23] Dr. Angus's 'Biblical Hand-book,' p. 381.
[24] Dr. Kitto's Cyclop., art. 'Egypt.'

Some of these larger dates are made out by accepting, with few deductions, Manetho's numbers, who, with few exceptions, makes his dynasties successive, and reckoned three kings to a century.

Assuming that Mr. R. Stuart Poole, Dr. Birch, Sir Gardener Wilkinson, and M. Champollion have found approximately the right date, the history of Egypt commenced about twenty-six or twenty-seven centuries B.C.

There is another aspect of the question that has to be considered, which relates to the time needed for the development of varieties of the human family found in Egypt in the time of its early history; especially with respect to that pronounced type, the negro variety.

In one of the Egyptian paintings, Sethos I. is seen with representatives of subject races before him, over whom he seems to possess the power of life and death. Prominent in the group is a negro with black skin, woolly hair, the flattened nose, and projecting lips, who kneels at the despot's feet as if in the act of supplication. Sethos I. was of the eighteenth dynasty, and, according to the Abydos Table, reigned about 1600 years B.C.; but, according to some Egyptologists, he reigned two or three centuries later. There were other representatives of the negro, so far as the black colour was concerned, referable to the twelfth dynasty, to be dated in the eighteenth or nineteenth century B.C.; and about the time of Abraham, we are told, the hieroglyphics mention that an Egyptian king raised negro troops to assist him in a war in which he was engaged.

According to Usher's 'Chronology,' it is urged, the time which elapsed from the flood to the earliest of these dates would be but a few centuries, and it is impossible that a people should, in that short time, have become so changed from the original type of the men who stepped out of the ark. But there were four families in the ark, and there might have been divergent types amongst them. The change may have commenced before the flood. Moreover, we are not limited to Usher's chronology. It is not the chronology of the Septuagint and the Samaritan text, and the calculation of Hales, which is placed beside that of Usher in all our Bibles where dates are given, adds to it

some fourteen centuries—eight centuries of which stand between the flood and the earliest representations of the negro in the tracings of Egypt, and afford some twelve or fourteen centuries from the time of the flood for the development of the negro variety found in Egypt, which would be amply sufficient. Elsewhere we have referred to some historic facts that will probably admit of a further prolongation of Bible chronology, but we need not adduce them here.

The new conditions into which some of the family of Noah passed when they spread themselves over the earth, would be sufficient to account for this development of the negro variety, and it is a mere assumption that the change implied would require long ages of time. The black skin, and probably crisp woolly hair, would be the result of great solar heat, aided by atmospheric conditions. 'Man,' says the eminent naturalist Buffon, 'though white in Europe, black in Africa, yellow in Asia, and red in America, is still the same animal, tinged only with the colour of the climate. Where the heat is excessive, as in Guinea and Senegal, the people are perfectly black; where less excessive, as in Abyssinia, the people are less black; where it is more temperate, as in Barbary and Arabia, they are brown; and where mild, as in Europe and lesser Asia, they are fair.'

This diversity of colour from the influence of climate prevails among the same tribes and nations.

There is a nation called Tauricks, described by the travellers Homemann and Lyon, who inhabit the oases and southern borders of the Great Desert. The western tribes of this nation are white, so far as the climate and their habits will allow; others are of a yellow cast; others, again, are swarthy; and in the neighbourhood of Soudan there is said to be a tribe completely black. All speak the same dialect, and it is a dialect of the original African tongue. There is no reasonable doubt of their being aboriginal.[25]

'The Jews, however slightly their features may have assimilated to those of other nations amongst whom they are scattered, form a striking example as regards the perpetuity

[25] Murray's 'North America.'

of colour. Descended from one stock, and prohibited from intermarrying with the people of other nations, and yet dispersed according to the Divine prediction into every country on the globe, this one people is marked with the colours of all; fair in Britain and Germany; brown in France and Turkey; swarthy in Portugal and in Spain; olive in Syria and in Chaldea; tawny, or copper-coloured in Arabia and in Egypt; while they are black at Congo in Africa.'[26]

In the negro race the epidermis is very thick, and its cells are filled with minute black or otherwise coloured pigment-granules, many of which lie loose among them. Its thickness renders it less penetrable by the rays of heat, so that a negro can bear the exposure of his skin to a degree of solar heat which would blister the skin of a European.[27] This thick black skin of the negro, then, is evidently a merciful provision by which those who labour under a vertical sun are fitted to endure its burning rays.

And from this fact it may be inferred that long centuries would not be required for the development of this impenetrable state of the skin. It is not likely that those who had to labour in this extreme heat should have to wait through a large number of generations for the needed protection.

The actual time required for this development is one of those questions which cannot be definitely decided, just because, as in some other questions, there would be needed for the supply of the facts, observers through successive generations who should hand down their observations; but there are not wanting facts from which it may be fairly concluded that under intense heat the skin may assume the black colour of the negro in the course of a few generations.

'At Cochin, a seaport of Hindoostan, on the coast of Malabar,' says Wolfius, quoted by Kennicott, 'there were, at the beginning of the last century, 4,000 Jews. They had a synagogue in which were carefully kept their records engraven on copper-plate.'[28]

In the 'Encyclopædia Britannica,' now being issued, the

[26] Smith on 'The Complexion of the Human Races.'
[27] Penny Cyclop., art. 'Skin.' [28] Rees's Cyclop., art. 'Cochin.'

writer, in describing Cochin, says: 'The Jews have a settlement here. They are of two classes, the fair or white Jews of more recent arrival and settlement in the country, and the black Jews who reside apart in a village outside the town.'[29]

Cochin is a seaport, and has been in the successive possession of the Portuguese, the Dutch, and the English. A considerable amount of trade has been carried on there, and the Jews were probably attracted thither for trading purposes. They have also, according to the law of their forefathers, kept themselves a distinct people, the older arrivals settling in a village outside the town. They have built a synagogue, and have kept their records. There is no question but that they are Jews, and there is no probability that they settled on the coast before it became a place of trade. Neither would they be so much exposed to solar heat as negroes, who have everywhere worn the yoke of servitude.

'The Spaniards,' says Dr. Mitchell, 'who have inhabited America under the torrid zone for any time, have become as dark coloured as our native Virginians, of which I myself have been a witness; and were they not to intermarry with Europeans, but lead the same rude and barbarous lives as the Indians, they would become as dark in complexion.'[30]

Another writer describing the European settlements on the African coast, observes that there is a settlement of some note at Nutomba, a river in Sierra Leone; the people here, he says, called Portuguese, are principally persons bred from a mixture of the first Portuguese discoverers with the natives, who have now become in their complexion and the woolly quality of their hair perfect negroes, retaining however a smattering of the Portuguese language.[31]

We have further the testimony of M. de Pages, who, speaking of his passage over the Great Desert, states, that the tribes who frequent the middle of the desert have locks somewhat crisp, approximating to the woolly hair of the negro. My own, he says, during the short period of

[29] Encyclop. Brit., art. 'Cochin.'
[30] Rees's Cyclop., art. 'Complexion.'
[31] Philosoph. Trans., No. 476, sec. 47.

my travels in those regions became more dry and delicate than usual, and retaining little nourishment from a checked perspiration, showed a disposition to assume the same frizzled and woolly appearance; my blood was become extremely dry, and my complexion at length differed little from that of a Hindoo or an Arab.[32]

From this evidence we learn that the hair, as well as the complexion, undergoes a change by solar heat, and that under certain conditions of the atmosphere these changes progress rapidly. Whether the projection of the lips of the negro proceeds from the same cause is not so apparent; probably it proceeds from more causes than one. Buffon gives a summary of the causes which he thinks contributed to produce the varieties of the human species. He instances the influence of climate, the difference of food and mode of living, epidemic diseases, and the intermixture of individuals more or less resembling each other.

The haze that invested the early history of Egypt afforded an inviting field for the speculations of the lovers of sensational discoveries, who, with an unmeasured past, have dated far back into prehistoric times the works of this remarkable people.

Among the monuments discovered at the end of the last century, and which had attracted the attention of the French savants, were the zodiacs which are sculptured upon the roof of the Temples of Dendara and Esneh, in Upper Egypt. These, by some authors both here and on the continent, were asserted to be of great antiquity. M. Jourard made the date of one of them at least 1,923 years before the Christian era, and, as a medium, assigned 3,000 years as the most probable period during which they had existed on the occurrence of that event. M. Dupuis made the zodiacs 4,000 years old at the very least, while M. Gori would abate nothing of 17,000 years. They all based their reasonings upon the signs with which the zodiacs commenced, and which they concluded to denote the time of the vernal equinox. They, therefore, by a back reckoning, endeavoured to arrive at the period when the 21st of March

[32] De Page's 'Voyages,' cited by Dr. Eveleigh's Bampton Lect., pp. 276, 292.

was in the lion, as in the zodiac of Dendara, and in the virgin, as in that of Esneh.

They thus satisfied themselves, and many others for a time, that they had found the true date of one of the most modern structures in Egypt, and were quite sure that they had exploded the Mosaic chronology.

Professor Playfair wrote an article on these zodiacs, which appeared in the *Edinburgh Review* for 1811, in which he claimed for them an antiquity of more than 5,300 years. Alas for the laboured calculation! The light came, and the illusion was dispelled.

Dr. Thomas Young, in an elaborate article as a supplement to the 'Encyclopædia Britannica,' embodied the result of a most careful comparison of the three inscriptions on the Rosetta stone, and had been able to assign a probable meaning to a large list of groups of hieroglyphic characters.

Another discovery was soon afterwards made by the diligent labours of M. Champollion. A small obelisk had been found with a Greek inscription on its base, which is a supplication of the priests of Isis to King Ptolemy, to Cleopatra his sister, and to Cleopatra his wife. This was deciphered, and the meaning of other hieroglyphic characters obtained. With the knowledge thus acquired, Champollion read upon the circular zodiac of Dendara the titles of Augustus Cæsar; and upon the square one at Esneh the name of Antoninus. The temple, therefore, which M. Dupuis proved to be 4,000 years older than the Christian era, was built about the time of its commencement, while the temple at Esneh, to which had been assigned by M. Gori an antiquity of at least 17,000 years before that era, should have been dated 140 years after it.[33]

This extravagant method of calculating dates has not been confined to Egypt. Scarcely a nation has existed with any claim to antiquity that has not been cited to prove that its history dates back to a time far anterior to that commonly assigned to man's appearance. It seems to have been the favourite resort of some antiquarians to search for proof of the high antiquity of man in the misty prehistoric times of ancient peoples.

Some years back the Chinese were declared to have

[33] 'Antiquities of Egypt,' pp. 74, 79.

records belonging to a time that went far back of any accepted chronological date of man's creation, and proved it to be a mere fable. 'It was an ancient belief,' says Professor Douglas, 'of Chinese writers that there has existed a period of 2,267,000 years between the time when the powers of heaven and earth first united to produce man as the possessor of the soil of China, and the time of Confucius. This having been accepted as a fact, it became necessary for the early historians to invent long lines of dynastic rulers to fill up the gap between the creation and the period with which the Book of Historic Documents commences. Accordingly we find a series of ten epochs described as preceding the Chow dynasty, the events connected with which are purely fabulous.

From the reign of Yaou (2356 B.C.), continues Professor Douglas, we emerge to some extent from the mist which hangs over the earlier records of China.[34] The reign of Yoa, says Klaproth, the first Chinese emperor mentioned by Confucius, cannot be earlier than B.C. 2500; nor is there any historical certainty till the year 728 B.C. These two dates taking only Hales's calculation would take us back towards the date of Noah's flood, within from 650 to 800 years. It is not wonderful that a people such as the Chinese, who loved to magnify themselves, and accounted other nations barbarians, should claim a high antiquity reaching up to the time when heaven and earth conspired to give them a priority over all other peoples; but that European scientists claiming to be seekers after truth should accept such fabulous inventions as veritable facts is surprising.

A similar antiquity has been claimed for the science and records of the Hindoos. Their 'Surya-Seddhanta,' which they consider their most ancient astronomical treatise, they claim to have been revealed to their nation more than 2,000,000 of years ago; but, says Bentley, it has lately been ascertained that their 'Surya-Seddhanta' must have been composed within the last 750 years.[35] It is now clearly proved, says Count Laplace, that their famous

[34] Encyclop. Brit., ninth edition, art. 'China.'

[35] Bentley on the 'Surya-Seddhanta' in 'Calcutta Memoirs,' vol. vi. p. 537.

astronomical tables from which it has been attempted to assign a prodigious antiquity to the Hindoos, have been calculated backwards.[36] Yet the Hindoos are a most anciently civilized people. Their history seems to go back nearly to the flood. The celebrated chronology of India, says Colonel Tod, reaches no higher than B.C. 2256, and then we have Buddha himself, the representative, perhaps, of Noah.[37]

'As,' says Sir William Jones, 'the first three avatars or descents of Vishnu relate to a universal deluge in which eight persons only were saved, we may for the present assume that the second or silver age of the Hindoos was subsequent to the dispersion from Babel; so that we have only a dark interval of about a thousand years, which were employed in the settlement of nations and the cultivation of civilized society.[38]

Here we find the Chinese and Indian empires, and the Egyptian and Assyrian monarchies, all converging to the one age when early men bespread themselves abroad, and settled down in some region of the East—the cradle of the human family—and built their cities. A remarkable agreement, both with regard to time and circumstances. And if one should be carried up to a remote date, so should the others. They so evidently all belong to the same age, and were so plainly under the same circumstances, that they cannot be separated.

Thus time as it moves on, and throws open the hidden treasures of ancient peoples, instead of confirming the speculations of men who have been building theories of a remote antiquity for man and his works, is teaching them by the logic of facts to shorten their flights into the prehistoric past.

[36] Expos. du Syst. du Monde, p. 330.
[37] 'Bible Hand-book,' by Dr. Angus, p. 381.
[38] Works of Sir W. Jones, vol. i., p. 29.

CHAPTER XII.

MISCELLANIA.

KITCHEN MIDDENS.

'In many of the lakes in Switzerland, Italy, and Austria, a large population dwelt in houses built on platforms, in the neolithic, bronze, and iron ages, in Switzerland as late as the first century after Christ. Similar habitations were used in Asia Minor, on the Apamœan lake, as late as the middle of the fourteenth century, by the Christian fishermen who lived on the lake in wooden huts built on piles.'—*Quoted by* PROF. DAWKINS, *from Dr. Kellar's 'Lake Dwellings.'*

THESE kitchen middens, or shell-mounds, are heaps of shells and bones found along or near the coasts of Denmark and elsewhere, the refuse of the feasts and ordinary feeding of the people. These old folk evidently loved good eating. Sea and land were laid under contribution for their supply. These refuse-heaps show the remains of flesh, fish, and fowl. The bill of fare contained oyster, cockle, mussel, periwinkle, whelk, edible pullastra, cod, flounder, and eel; wild swan, wild duck, wild goose, wood-grouse or capercailzie, and great auk; red deer, roe, boar, urus (*Bos primigenius*), beaver, seal, wolf, fox, lynx, and wild cat. Besides this abundant supply for the larder, there were found pottery, flakes of flint, hammer-stones, flint-knives, and other instruments of stone, and bone, and wood.

When did these old gourmands live who built up the refuse-heaps with the remains of their dainty fare? is, in this argument, the principal inquiry before us. Facts are adduced by Professor Morlet, Sir C. Lyell, T. Rupert Jones, and others, to show that the kitchen middens of Denmark are of great age, and to prove thereby the antiquity of man.

These writers refer principally to the middens in Denmark; we propose to extend our inquiries to the 'shell-mounds' of other countries treated of by other writers.

The argument from these middens for man's antiquity, which Sir Charles Lyell seems to have deemed the most conclusive, and which is adduced by M. Morlot, Professor B. Dawkins, and others, is drawn from the present insufficient supply of salt water for the nourishment and growth of the *Ostrea edulis*, especially the oyster. The oyster, we are told, attained its full size during the accumulation of these shell-mounds; whereas the same *Ostrea edulis* cannot live at present in the brackish waters in the Baltic (except near its entrance, when a north-westerly gale pours in a great body of salt water), which implies, it is thought, a change of the relation of the Baltic to the ocean. The species, too, of the mussel, cockle, etc., now living in the adjoining part of the Baltic, attain only a third of their natural size.[1]

This argument is ingenious, and shows with what diligence evidence for building up the theory has been sought, but it fails to show the antiquity of man. For if changes have occurred by which the flow of salt water from the ocean into the Baltic has been impeded, that gives no proof that these changes occurred at a remote period in the past. Professor Morlot says that even in the course of the present century, the salt waters have made one eruption into the Baltic by the Lym-fiord, although they have been now again excluded. 'It is also affirmed,' he adds, 'that other channels were open in historical times, which are now silted up.'[2] If in historical times, and even in the last century, channels were open for the influx of the sea, why need we go back to a high antiquity to find the time when the sea water supplied salt enough to nourish and fatten the oysters of the Baltic? And if the cockles, mussels, and periwinkles now living in parts of the Baltic do not thrive, but are stunted to one-third of their size in its brackish water, they thrive elsewhere under like conditions. Professor Weiner, in his 'Notes on Shell-heaps,'[3] tells us that the shells of the kitchen-middens on the coast of Peru, South America, consist of a venus, a *large ostrea* (now living in brackish water), and

[1] 'Antiquity of Man,' 4th edit., pp. 12-18.
[2] Bulletin de la Société Vaudoise des Sc. Nat., i., vi.
[3] Journ. Imp. Geograph. Soc. Vienna. *Geological Magazine*, 1877, pp. 28, 29.

arbula. The *ostrea* of these middens not only lived in brackish water, but throve and attained their full size.

It is further alleged that the implements found in these middens were instruments of stone, bone, and horn, but that no bronze or iron was found. The pottery, we are told, was of the coarse kind, and that the capercailzie or woodgrouse may have fed on the buds of the Scotch fir in the times when that tree flourished around the peat-bogs.

The absence of iron in the middens of Denmark can be no proof of their early existence, since by the admission of Danish antiquaries, it was not known in that country until some centuries after the Christian era.[4] And it does not follow that because bronze was not found in the refuse-heaps of these poor fishermen, that it was not known in Denmark. The stone-knives and hatchets found were neolithic or polished implements, and the neolithic age, according to Worsaae, a Danish archæologist, lasted down to the fourth or fifth century B.C. Nor is it likely that if bronze was in Denmark it would be used to any extent by these rude people, or if used that it would be found in their refuse-mounds. It is not usual to throw valuable tools to the dust-heap in any age, and in that age both bronze and iron implements, if possessed, would be too precious to be flung away as rubbish.

If the remains of domestic animals, with the exception of the dog, had not been discovered, the remains of animals of recent times had. The urus (*Bos primigenius*), which seems to have been the favourite food of these men, is mentioned by Julius Cæsar; and according to Herberstein it survived in Germany to the sixteenth century; and Bell, who travelled in Russia and Asia in the early part of the eighteenth century, remarks that the uhr ox is found near Kuznetsky (Siberia), in the woods of Poland, and some other parts of Europe.[5]

The argument from the taste of the woodgrouse for pine-buds is very inconclusive. It is a maybe argument. It may have so fed, we are told, but then it may not. And if it did, there would have been firs for it to pick in Denmark down to a late date.

[4] 'Epoch of the Mammoth,' p. 62.
[5] Bell's 'Travels,' vol. i., p. 212.

But these middens are not confined to Denmark; they are found in Ireland, Scotland, in the Channel Islands, and in America, and give evidence, many of them, of a modern date. A midden at Carrigagower, county Cork, Ireland, examined by R. J. Ussher, Esq., contained bones and teeth of ox, sheep, goat, and pig, with remains of horse, dog, cat, hare, and rabbit; sea-shells, the most common being limpet and periwinkle; shells of the common garden snail; flint flakes, used down to the iron age; flint arrow-head, hammer-stones, and a broken bit of *wheel made pottery*, on which was noticed what looked very like a worn-out inscription in capital Roman letters; two iron knives of antique form, an iron chisel, and a long flat-headed iron nail.[6]

In a shell-mound on the west coast of Herm, one of the Channel Islands, Mr. J. W. Flower found rude stone mullers or chisels, rude stone hammers, hand mills, cylindrical bricks, a bronze pin, an instrument of iron, a fragment of glass; bones of the horse, ox, sheep, pig, and goat, and some pottery of Roman workmanship, some of it Samian ware.[7]

In a kitchen midden at Newnham, in Sussex, have been found along with bones, shells, pottery and flint flakes; two or three objects of metal, including a leaden hook and a small coin. Some of the pottery found below the flint flakes was recognised as Roman.[8]

Evidently the kitchen middens will give no support to the theory of man's remote antiquity.

[6] *Geological Magazine*, 1880, p. 512.
[7] *Anthropological Review*, 1869, p. 115.
[8] *Intellectual Observer*, vol. vii., p. 233.

Pile Villages.

The dwellings of another class of the human family have been discovered in Switzerland, Italy, Austria, France, Sweden, England, Scotland, etc.; the inhabitants of which did not encamp by the seashore, but built their habitations on platforms erected on the lakes.

They built some distance from the shore, from which their huts were reached by a sort of drawbridge. Evidently they considered the surrounding water a defence, the moat of their castles.

These communities, with their tools, have been pressed into the service of the argument which is used to prove man's early appearance. We need not spend much time in showing that these lake-dwellers did not belong to a remote age. Some of the advocates of the antiquity theory do not seem to have their confidence much strengthened by the support derivable from the Pile villages. Professor Dawkins says that in many of the lakes in Switzerland, Italy, and Austria, a large population dwelt in houses built on platforms in the neolithic, bronze, and iron ages, and in Switzerland as late as the first century after Christ; and states that similar habitations were used in Asia Minor, on the Apamæan lake, as late as the middle of the fourteenth century, by the Christian fishermen, who lived on the lake in wooden huts built on piles.[9]

An extract from 'Early Man in Britain,' in which the professor has quoted from Dr. Kellar's work on 'Lake-Dwellings,' will show that the settlements which belong to the neolithic age are of recent date. 'The Pile dwellings of Robenhausen,' he says, 'may be taken as an example of one of these communities in the neolithic age in Switzerland. It consisted of a platform made of timbers and roughly-hewn boards, fastened to upright piles by wooden pins. On this were built wooden huts with thatched roofs, twenty-seven feet long by twenty-two wide, and between

[9] Hitze's 'Supplementa Tabulæ Syriæ;' quoted by Dr. Kellar, 'Lake Dwellings,' p. 497.

them were the cattle-pens, sheepfolds, and pigsties. The remains of six of these huts were exposed by digging a canal, in a space of one hundred and fifty feet long by forty broad. In this, at six different points at equal distances, were little heaps of corn, pieces of woven and plaited stores of raw flax, together with a mealing-stone, and also six groups of stones which had formed the hearths. The litter for the cows was chiefly of straw and rushes, and that for the sheep, pigs, and goats of sprigs of fir and twigs of brushwood. In one place a considerable quantity of ears of wheat and barley was found along with bread; in another, corn and bread with burnt apples and pears; in a third, flax in hanks or skeins, spun and plaited into cords, nets, and mats, and woven into cloth, along with earthenware weights for the loom. The corn had been reduced to meal in mortars or on mealing-stones, and afterwards either made into porridge, or into little round loaves, baked on hot stones or under the embers.

'The villagers of Robenhausen also laid up stores of the walnut and apples, of which no less than 300 were found, with beech-nuts and acorns, as well as the raspberry, strawberry, elderberry, blackberry, the cherry and sloe. Fragments of pottery were very abundant, as well as various implements of stone, antler, and bone of the kind described above, and sometimes with the handles of wood preserved in a perfect condition. Fragments of leather prove that they were acquainted with the art of tanning, and a wooden last, that they were in the habit of making shoes or sandals to measure. The asphalt of the Val de Travers, now so commonly employed for pavements, was used for cementing the stone implements into their handles, and the fires were lighted by means of a flint flake and a piece of iron pyrites, used in the same manner as the "flint and steel" of the present time. The domestic animals, with the exception of the large oxen, were of the same breeds as those kept in neolithic Britain, and of these the swine, the sheep, and the cows were kept in pens close to the huts of their owners.'[10]

This picture of the lake-dwellers' homesteads does not point to a remote past. Their possessions and industries

[10] 'Early Man in Britain,' pp. 291-294.

have quite a modern aspect. They are agriculturists, cattle-breeders, and graziers. They were builders and weavers, tanned leather, and made shoes to measure on wooden lasts. They had corn and bread, and fruits such as are cultivated in our gardens to-day. They were architects, builders, carpenters, and coopers. They struck a light with their flint and metal, as our fathers used to do less than half a century back, and used the asphalt of the Val de Travers, on which we walk at the present day.

Dr. Kellar will help us to some further information respecting this Pile-village at Robenhausen, which has been given as an example of neolithic lake-dwellings. In this settlement, according to a writer in the *Quarterly Review*, there were found earthen crucibles containing bronze that had been melted. They knew, then, how to mix in due proportions the bronze-forming metals, and mould the molten mass into bronze articles.[11] Dr. Kellar further speaks of the cloth found there, as betraying refinement of life and a tendency to luxury. The presence of implements of stone (neolithic) gives no proof of antiquity. If in this, as in many other cases, stone implements and articles of metal are found intermingled, it only goes to show what often occurred, that stone implements and articles of metal were used together.

Even in the oldest of the lake stations situated in secluded valleys of the Alps, the same authority tells us that traces of copper and bronze have been met with in the lower beds of the stone age settlements before the appearance of nephrite.[12] Metal articles were too valuable, and therefore too scarce, to be possessed by all the inhabitants of a settlement, and in some of the settlements they would doubtless be without metals at all. Finding stone implements in them was then no proof of antiquity.

At Concise Station bronze articles seem to have been a luxury and a sign of wealth and position, while stone tools and weapons were in common use. There were found there eighty stone celts, flint arrow-heads, perforated stone hammers, amber, tin, bronze hairpins and bracelets, and two beautiful bronze swords.

[11] *Quarterly Review*, Oct. 1868. Kellar, Lee's trans., p. 46.
[12] Dr. Kellar's work, trans., p. 57.

On the western shore of the Ueberlinger See, Lake Constance, there is a station allotted to the bronze age. At this settlement were found bronze celts, an iron knife, two arrow-heads, a fragment of an iron fish-hook, and flint flakes. Here is found iron in association with both bronze and stone. The three were used together.

We need not pursue this subject further. He must be a shrewd calculator who can find, from the contents of these Pile villages, that they reached back to a remote antiquity.

The Mississippi.

The deposits forming the delta and alluvial plains of the Mississippi consists, says Sir Charles Lyell, of sedimentary matter extending over an area of 30,000 square miles, and known in some parts to be several feet deep. He calculates that taking the mean annual amount of solid matter carried down by the river, it would require 67,000 years to form the delta, which extends over an area of about 13,000 miles, and another 35,000 years for the accumulation of the alluvial plain above. He was, however, induced by representations made by Messrs. Humphreys and Abbot to reduce the whole to 50,000 years, though convinced from other considerations that his first estimate might stand. He says that an artesian well, bored at New Orleans through strata containing shells of recent species, reached the depth of 630 feet, without any signs of the foundations of the modern deposit having been discovered. In a part of this modern delta of new Orleans where an excavation had been made for gas-works, the workmen found some charcoal and a human skeleton sixteen feet below the surface. The skeleton was found in a bed almost wholly made up of vegetable matter beneath four buried cypress forests. Dr. B. Dowler, who informed Sir Charles of the discovery, and who 'described the human skeleton,' is inclined to give to it an antiquity of 50,000 years.[13] If this be an accurate estimate of its age, then 50,000 years ago men of the aboriginal American race lived in America.

We shall hand this case over to be dealt with by American geologists and archæologists, who have made the Mississippi and its deposits their study.

Principal Dawson says, 'The deposits of the Mississippi have been found by Hilgard to be *in great part* marine.'[14] The Rev. Edward Fontaine, a geologist well acquainted with the valley of the Mississippi, referring to these remains at

[13] 'Antiquity of Man,' pp. 44-47.
[14] 'Story of the Earth and Man,' p. 296

New Orleans, remarks that similar specimens of antiquity may be found between the present level and Tamaulipas Street, where the whole area to the depth of more than one hundred feet has certainly been deposited within the period of sixty years. He adds that since the gas-works were constructed, the New Orleans Academy of Sciences were agitated by a report that in making some excavations at Port Jackson, a considerable distance from the Mississippi, and at a depth of from fifteen to twenty feet, a piece of wood had been found which had evidently been shaped by human art, and dressed with tools which indicated the work of a highly civilized race of men. Several members of the Academy examined the matter, and they found that a large piece of poplar had been dug up at a great depth, which had been squared by an axe, bored with an auger, cut with a hand-saw, and was unmistakably the gunwale of a Kentucky flat-boat.[15]

We now cite Dr. Foster and Professor Andrews of Chicago, who have given evidence respecting the New Orleans skeleton and Dr. Dowler's 50,000 years' estimate. Dr. Foster remarks that 'what Dr. Dowler regards as four buried forests which once flourished on the spot, may be nothing more than drift-wood brought down by the river in former times which became embedded in the silts and sediments which were deposited on what was the floor of the gulf.'

Dr. Andrews says that Dr. Dowler is well known in the medical profession as an enthusiastic but unsound investigator, who is very prone to come to startling but erroneous conclusions; but that Lyell should be led astray by such enormous blunders may well excite astonishment. The accretion both of vegetable matter and of river-mud in the region of the lower Mississippi is very rapid; and the United States' army engineers have calculated that the whole ground on which Orleans stands, down to the depth of forty feet, has been deposited within the period of 4,400 years. Lyell himself states that he has seen many stumps of trees standing erect in the banks of the river, a fact that should have shown him that the accretion was rapid enough to cover these stumps to their summits before they had time to decay.

[15] 'How the World was Peopled,' p. 86.

'I have myself,' he says, 'seen in that region young cotton-wood saplings only seven years old, around whose trunks the annual overflow of the river had deposited two or three feet of earth above their original roots. It is possible that the New Orleans man may be one or two thousand years of age; but to claim fifty thousand for him is provocative of laughter.'[16]

[16] The last three extracts from the 'Epoch of the Mammoth,' pp. 387, 388.

Cone of the Tinière.

The Tinière is a river or mountain torrent, which in emptying itself into the Lake of Geneva has deposited at its mouth a mass of gravel brought down from the hills. This delta consists of two 'cones,' one larger and older, the other smaller and nearer the margin of the lake. A section of the smaller one has been exposed by cuttings for a railway. For a description of this cone, most other writers who treat on it are indebted to M. Morlot, who has personally examined it. He says the materials usually found in this section are large and small pebbles and sand. He found also three loamy bands of a few inches thick, which he uses to divide the pebbles and sand into three layers: the first four feet below the surface, a second ten feet, and the third nineteen feet. In the upper layer were found Roman relics, fragments of tiles, and a coin; in the second were fragments of unvarnished pottery, and a pair of bronze tweezers; the lower one yielded coarse pottery, pieces of charcoal, broken bones, and a human skeleton. M. Morlet inferred that these three layers marked three periods of 1,600, 3,850, and 6,400 years each, which he numbered as the Roman, the bronze, and the stone periods, so that the earliest traces of man in the cone ranged from 6,000 to 7,000 years. The age of the whole deposit he estimated at 10,000 years. The same method of computation M. Morlot applied to the deposit of the larger 'cone,' which being ten times as large as the smaller deposit, he set down as ten times its age, viz. 100,000 years.

In this calculation we have two modes of measurement. First, time is measured by the relics found in the several layers, and secondly by the centuries required for the deposition of the materials with which the cones are filled; and in both the calculation is a mere guess, and evidently exaggerated. The claim of 1,600 years for the Roman period assumes that the tiles and coin found their way into the cone direct from the mint and the manufactory, of which there is neither proof nor probability. For two or three centuries, moreover, the deposit has ceased, and from the

careful language of Sir Charles Lyell there seems some doubt whether the so-called Roman relics are Roman. Sir Charles says, 'The tiles and coin were *supposed* by M. Morlot to be Roman. Roman coins are generally readily identified.'

The second period is denominated the bronze age because some relics of bronze were found in that bed; and the time when the bronze tweezers reached the cone is estimated at nearly 4,000 years ago. M. Oscar Montelius says that the bronze age in Sweden probably ended a short time after the beginning of the Christian era; and Professor Worsaae makes it to last even to the fifth century.[17] Assuming that the close of the bronze age in Switzerland occurred somewhere about the same time as in Sweden, M. Morlet has determined the time when the bronze articles reached the cone to be some twenty-five centuries before the close of the bronze age.

The third period is called the stone age, although there 'were no stone implements there.' The 'finds' were 'the bones of man, and of animals, and coarse pottery.' M. Morlot having decided that this third layer belonged to the stone age, allotted to it a term of from 6,000, to 7,000 years. Professor Worsaae fixes the close of the stone age in Denmark at 500, or 600 B.C.[18] This estimate is made up to 10,000 years, required for the deposit of the whole contents of the cone, by adding 3,000 or 4,000 years for the sediment that lay under the relic beds. The contents of the cone are supposed to have required this 10,000 years for their deposition upon the uniformity principle. The Roman layer or bed was four feet thick in depth, and it took so many centuries for the deposition of the *débris* which it contained. The second bed was so much deeper, and at the same rate of increase would require a proportionately large number of years; and at this same rate of increase the lower beds are gauged. Now there are two errors that render this calculation worthless.

1. It is a mere assumption, without proof or probability, that the stream carried down and deposited the *débris* at the same uniform rate through a number of centuries. It was a mountain torrent, and besides the variations in the

[17] 'Antiquities of Sweden,' and 'Primeval Antiquities.'

[18] 'Primeval Antiquities,' p. 135.

water force which would occur in seasons of heavy rain and flood, in its early flow when the stream was making a bed for itself, and washing down the loose and movable material, it would deposit it in much larger quantities, and in much shorter time than under ordinary circumstances.

2. This deposit is a flattened cone, somewhat of the shape of an inverted sugar-loaf, with consequently a constantly decreasing capacity in a downward direction. Assuming for the sake of illustration a uniform rate of deposit, any given quantity of material in cubic feet deposited in the bottom of the cone, would be twice the depth of the same number of feet bespread over the wider diameter of the surface layer.

Reverting to the computation of time required from the position of the relics found in the beds, we must bear in mind that the sediment deposited below the third layer had no relics, and that the 3,000 or 4,000 years required for that deposit has consequently nothing to do with the antiquity of man. He is not represented there.

The whole cone, according to the computation of Professor Andrews and Principal Dawson, would not require more than from 3,000 to 4,000 years for its formation.

There is a second cone said to be ten times as large as the smaller one we have been considering. M. Morlot has settled its age with the greatest facility. It is ten times as large, therefore it must be ten times as old. The sum is soon found. Multiply ten thousand years by ten, and you have a thousand centuries. In other words, this larger cone has required for its formation 100,000 years. This mode of computation carries over to the larger cone the errors by which the smaller cone was estimated. Besides which this cone lies farther back in the stream, so that the heavier material brought down by the torrent would be deposited in this cavity. The age of this cone, however, under any conditions would not show the time of man's appearance on earth, as no relics appear to have been found in it. And if it belongs to an age earlier than that of the smaller cone, it might have been supplied with material very rapidly in that time of heavy rainfall which Mr. Tylor says occurred just before the historic period.

M. Morlot is a dashing calculator. Difficulties and

millenniums of years seem trifles to him. Even Sir Charles Lyell, who was a believer in long dates, hesitated in accepting his conclusions. He thinks more evidence is needed before this long date is accepted.

The writer has now, he believes, examined all the principal evidence on which scientists rely for proving the remote antiquity of man; and he cannot find one fact which will prove that a longer time is required than the Bible chronology will admit. By Bible chronology, however, he does not mean 6,000 years. That is the estimate of Usher, who threaded together the several portions of Bible history; to which Hales, whose calculation appears with that of Usher on the margins of our Bibles, adds fourteen centuries. Nor is it certain that with the longer term we have found the limit of the Mosaic history.

It is doubtful if the Bible was intended to give one continuous unbroken chain of events through its history. At the time of the dispersion, for instance, the threads of history seem broken. Many of the names in the genealogical table are plurals, and several have the formal termination used to designate a tribe. Between, too, the time of Abraham and the flood large populations existed not included in the Hebrew history of families and communities. An extension of some centuries seems to be here indicated.

Under these circumstances it is difficult to fix an exact date in a term of years for man's occupancy of the earth; but if from 8,000 to 10,000 years were required, there would probably be no strain on the Bible chronology, and the writer can find no well-established scientific fact that would require more.

And if the time of man's advent cannot be extended beyond 10,000 years, or indeed ten times that number, the evolution theory, *so far as man is concerned*, cannot be sustained. Ten thousand or 100,000 years would not afford sufficient time for his emergence from the brute, and development into a man such as man now is. Nor is it possible that such a modern transformation should have occurred without some of the intermediate nondescript forms being discovered.

Professor Huxley says that if the glacial epoch were

looked at as a period of durational animal life, the period it occupied would be totally insignificant in regard to that which would be required for the evolution of man to his present state. There could not be the slightest reason for supposing that pre-glacial man was in any way different from post-glacial man.[19]

[19] *Nature*, Sept., 1879, p. 489.

THE END.

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