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1898.

ORDINARY MEETING.*

The Proceedings of the previous Meeting having been read and approved,

The following paper was read by the author :—

PRIMITIVE MAN: I. HIS TIMES AND HIS COMPANIONS. A Sketch by the Rev. J. MAGENS MELLO, M.A., F.G.S., &c.

IF the hidden secrets of the future, into which we so often seek to pry, fascinate our imagination, there is also a fascination, but little less great, in that dim past of the world's history, a few chapters of which we are just beginning to read, as little by little its blurred monuments and half-effaced inscriptions are disinterred, and scrutinized in the light of science.

Of these records of the past there are few of greater interest than those which relate to our own race, and to those early days when man first appeared as an actor upon the world's stage.

The history of those long ages when the earth was being gradually prepared for man's reception, the successive appearance and disappearance of innumerable forms of organized existence, the slow changes and the violent convulsions by which the earth has been fashioned, have a wonderful interest of their own, but after all, "Homo sum!" we exclaim, and it is *man's* history that most attracts us.

By slow degrees we have got to know something at any rate of the conditions, surroundings, habits, and possibly even

* The speeches made, and numerous communications received, in regard to the two divisions of this subject, have been most fully and carefully revised by the respective authors, and were submitted in a perfect state to the author, November, 1897, for his replies.

the physical appearance of our predecessors in North-Western Europe, and the geologist and archæologist, working hand in hand, have been able to reconstruct much of the early history of our race.

Vast changes had taken place in this part of the earth during the later stages of geological history; what we now term Europe, from having been an archipelago of large islands, became a continent with a central sea, but without those great alpine chains of mountains which now form so marked a feature of its surface. Then came the age, not so far removed, geologically speaking, from our own, when the Alps were elevated, and when the tropical climate, formerly prevailing, was by slow degrees becoming temperate; the central sea had given place to numerous lakes, whilst the margins of the continent were cut into by deep fiords. The vegetation of Europe, still partly tropical, was becoming more like that of to-day, but the mammalian fauna was still very different; the existing species had not made their appearance, whilst there were numerous genera now extinct. As time passed on the Tertiary period of the geologist was brought to a close, and its peculiar flora and fauna disappeared, the general temperature sank to a minimum, and what is known as the Glacial period prevailed over a large part of the northern hemisphere. It is difficult for us to realize that there was a time when all this fair and verdant country became submerged beneath the waves of an Arctic sea; when the highest mountain-tops alone stood out above the water as islands, against whose desolate shores the grinding ice-pack and tottering iceberg waged their wild conflict. Then came to pass another change, a gradual elevation of the land took place, these islands of ours rose again from the frozen sea, and we may picture to ourselves almost a new world. No watery channel then separated our land from the neighbouring continent; that which is now Ireland, equally with Great Britain, formed but the North-Western extremity of Europe, the shores of which extended far beyond their present bounds. Where is now the German Ocean was a wide valley, through which swept a majestic river, born far to the south amidst alpine glaciers, and of which our own small streams were but tributaries, and another great river ran through the valley which is now the English Channel, discharging its waters into the distant Atlantic.

In those early days the land stood far higher above the sea level than it does now, and the Arctic cold had not entirely

passed away; many a snow-capped summit might have been seen, whilst glaciers still crept down the upper valleys, in which, to this day, traces of their former presence are to be found.

Such was the condition of England, when, as far as present evidence goes, man made his first appearance here; but he did not originate here, and long before the early wanderers of our race entered this country, there must have been members of the human family in other lands.

But how can we trace this history of man? What are the proofs of his presence at a time of which no written history is in existence? What sort of man was he? What were his habits, how was he equipped for his life-struggle? Can we answer such questions? In a measure we can do so. The answer comes to us from the ancient gravel bed, the floor of the cavern, and from other surface deposits of the earth beneath our feet.

From the gravel pit, and from the cave floor, the works of an intelligent being have been dug, whilst others have been found scattered upon the surface of the soil—stone implements and weapons—in fact, the tools of man; and although in very few instances have human bones been found in conjunction with the oldest of these, it is universally admitted that in these relics we have clear evidence that men were living on the face of the earth at a time far beyond the confines of all written, traditional, or monumental history.

But when did man first appear? Was his advent pre-glacial or post-glacial; if pre-glacial, how far back must we look to discover his earliest remains? Can we assign any probable date to the epoch of his creation? These are some of the questions which we should like to be able to answer definitely, but we cannot do so; all that can as yet be positively said is, that the evidence, especially that derived from subsequent changes in physical geography and climate, proved to have taken place, tends to show that a very great interval, which must be reckoned in thousands, rather than in hundreds of years, intervenes between ourselves and the men whose sole relics are the rude stone weapons so abundant in these islands and on the adjoining continent. Calculations based on such uncertain data as are afforded by the growth of stalagmite or peat, or on the thickness of superficial deposits generally, or on the alterations in the level of streams, can afford us no certain chronological scale, nor can even the present rate of erosion, and consequent alteration of

the physical features of the land. Some of these, it is true, may, here and there, give some slight indications, but we dare not rely upon them; nature is not uniform enough in her operations, and there are many things which give us reason to suppose that during part of the period in question, there were forces at work, amongst others, a highly increased rainfall, which may have brought about changes far more rapidly than those which we now see taking place in the ordinary course of things around us. We cannot then venture to say how many thousands of years have elapsed since man first appeared on earth, nor even when he first set foot upon our own shores; but some of the above considerations may make us hesitate before adopting the extreme views held by some writers upon the antiquity of man.

That man did not originate in Western Europe is a fact to which we must not close our eyes, and however far back in time we may have to place his coming into Europe, we must remember that at a still earlier period he must have inhabited regions which were in all probability further to the East. Ethnology and philology seem to point most convincingly to this, and whatever may have been the halting-places of the various races which entered Europe, or whatever route individual families, Turanian, Aryan, and others may have taken, there do appear to be certain converging lines from each outlying group of mankind, tending to an Asiatic centre, whence, in successive waves and at different periods, the leading families of man were dispersed.

But how far back in time are we to go? Was man an inhabitant of the earth in the Tertiary period?

TERTIARY MAN?

It has been seriously maintained by certain geologists that traces of man's presence have been found, not only in Europe, but also in America, in Pliocene strata; whilst some have even ventured to think that they had obtained evidence of his appearance in Miocene times. But the so-called evidence of the existence of any intelligent being during even the Pliocene age, appears to me to be of a very questionable character. *A priori* it is surely highly improbable that man, who is admittedly the crown of the animal kingdom, should have been in existence at a time when not only not one of the existing species of mammalia was known, but when even most of the genera were

different: he would have been, as M. Lapparent well expresses it, "an anachronism." It is true that M. de Quatrefages urges that "theoretically man, who as regards his body is neither more nor less than a mammal, could have lived on the globe as soon as this could furnish subsistence for mammalian life; man has also certain physiological faculties of adaptation to his surroundings, as well as his superior intelligence, which might have enabled him to survive changes which were fatal to most of his contemporaries." But, after all, what we must do is to appeal to facts. If undoubted proofs of man's existence in the Tertiary period are forthcoming we must accept them, whatever may be the result, however much that result may clash with our old beliefs; but before doing this, let us make sure that the alleged proofs are indubitable.

What then is the nature of the so-called evidence brought forward? As long ago as 1863, M. Desnoyers discovered certain bones, amongst others one of the rhinoceros in Pliocene strata, at S. Prest, bearing incisions on their surface, which he concluded to have been of human origin. Other similar incised bones had been found at a still earlier date at Pouancy, by M. Delaunay, who pictures the primeval savage cutting his way into the putrid carcase of a stranded *Halitherium*, as the Australian aborigines are said to do to this day when a dead whale is found.

Other incised bones have been discovered by M. Capellini at Monte Aperto, in Italy. At S. Prest the Abbé Bourgeois found certain flints, supposed to have been the implements with which such incisions could have been made. Flints resembling more or less closely those known to be shaped by man, as well as others which have been calcined, have been brought from Thenay and elsewhere, from beds of Miocene age. At Otta, near Lisbon, M. Carlos Ribeiro, and M. Rames, at Puy-Courny, near Aurillac, profess to have discovered other flint implements of Miocene age, concerning which M. de Mortillet and M. Quatrefages said that, out of a large number sent to Paris, some bore undoubted traces of having been intentionally worked. A few years ago M. Cels brought forward a number of broken flints from the Eocene beds of S. Symphorien near Spiennes in Belgium, in which he thought marks of design were evident. Again, other supposed relics of Tertiary man have been produced from Castenedolo, near Brescia, by M. Serpi, and from California by Mr. Whitney, also from the Pampas

of the Argentine Republic by M. Ameghino. To discuss in detail all these alleged discoveries of man's presence during the Tertiary period, would occupy too great a space on the present occasion, but we may take note of one or two important facts bearing on the question.

With regard to the cut bones it has been shown by Professor McKenny Hughes, in a valuable paper brought before the Victoria Institute, and also by others, that these cuts could have been produced by natural causes, or by the sharp teeth of such animals as some of the Tertiary squaloids. M. de Mortillet even says that in some of these cuts the traces of the delicate serrations of their teeth can actually be seen. M. de Quatrefages, however, maintains that the incisions could not have been produced by any other agency than the hand of man, adducing, in support of his view, the opinion that the semicircular form of some of the cuts, and also their crossing and massing on the bone, shows that they could not be teeth marks, and he also asserts that whilst one side of the cut is smooth, the other is rough, an effect which he argues could only be produced by an obliquely applied cutting instrument. He observes in addition that the cuts appear on one side of the bone only, whereas, had a fish grasped the bone, marks should appear on both surfaces; but this is an error, the sharks in question have two sets of teeth, differing in character, one set sharp and delicate simply seizes the flesh, whilst the powerful teeth of the other jaw do the cutting. Another point to be noted is that the whales' remains bearing incisions were not found in littoral but in deep water deposits, in which not only sharks but sword-fish abounded.

With regard to the supposed worked flints, and also the calcined ones from Thenay and other localities, and those also from S. Symphorien, what must we say? It is true that numerous flints, which bear a resemblance, more or less great, to those which are clearly of human origin, have been found in these localities; but a careful examination of the conditions under which they occur has resulted, if not in absolutely discrediting the theory of their human origin, a theory still maintained by some persons, yet in rendering such an origin highly questionable. With regard to the supposed implements from the Eocene beds of S. Symphorien, apart from the extreme improbability of an intelligent being, whether man or M. de Mortillet's anthropithecus having existed at a period when most of the mammalia were

marsupials, we may point to the fact that the Eocene beds in question are marine, and contain the remains of an absolutely marine fauna.

M. Arcein has pointed out from personal observation that the Thenay flints come from a bed of water-worn and fractured flints, between which and themselves it is almost impossible to find any difference; whilst atmospheric, chemical, and thermal agencies, which can be shown to have been at work, are amply sufficient to account for various appearances of fracture, supposed artificial chipping, and also of calcination. M. Arcein has shown that alternations of heat and cold may bring about in a perfectly natural way the splitting of the flints, and in places where forest fires were kindled by lightning, calcination would be produced. Many travellers have also recorded the effects of the sun's heat upon flints, after they have been refrigerated by the dew of the early morning, and a similar result of change of temperature has been observed to take place after sunset in hot climates. Dr. Livingstone, the Marquis de Nadaillac, M. Lepsius, and others have stated that they have both seen and heard the flints splitting up into flakes under these circumstances, and similar phenomena have been noticed by M. Delvaux in Belgium. There is, however, one fact stated by M. Rames, with regard to the flints found by him at Puy-Courny, which requires explanation, and that is that the supposed implements are all made out of one particular variety of flint, whilst there are other kinds present in the same bed, bearing no such traces of fracture. This is a matter which ought to be considered, as it certainly would be somewhat strange if only one variety of flint out of several in the same place had been liable to accidental fracture, and M. Rames concludes from this that the selection must have been intentionally made by an intelligent being; but may it not be that the fractured flints were derived from the denudation of an older bed in which they originally occurred.

Much stress has been laid on the presence of what has been termed the bulb of percussion on a flint, as being a clear proof of human workmanship, but it is not necessarily so; such a bulb only proves that the flake has been produced by a single definite blow, but this might be given by a natural shock, the dashing or falling of one stone against another as readily as by the hand of man.

With regard also to chippings on one side only of a flint, another supposed evidence of artificial work, such might

occur naturally in the case of a flint so embedded in the soil as to leave one face only exposed to passing blows.

Bearing such facts as these in mind we may well be very cautious, and pause before at once accepting every example of a chipped flint as being the work of man; and in view of the fact which has been pointed out that the flints from the Maconnais and elsewhere, which have been brought forward as the tools of Tertiary man, occur in localities where hydrothermal and other agencies have been active, and where fractured flints abound, we may at least venture to wait for evidence that is not quite so open to question.

Such evidence we are told has been found in America.

Some supposed traces of Pliocene man discovered in the auriferous gravels of California have been accepted by some of the American geologists as clear proof that man existed there in Pliocene times; and not only so, but in such an advanced state of civilisation that his works were on a level with those of the most cultured neolithic inhabitants of Europe.

Stone pestles and mortars, three-legged and spouted skillets made of lava, stone weapons and other objects have been found, buried some hundreds of feet below the surface, in gravels in which occur bones of the mastodon and of other extinct animals. If it can be proved that the remains of man's workmanship were contemporary with the gravels, as urged by Professor Whitney, and also by Professor O. C. Marsh, then we must agree with them that "the existence of man in the Tertiary period seems now firmly established." But are we compelled to accept this conclusion? If so, we certainly have a most astonishing fact before us, viz., that at a period so remote, that in comparison with it the palæolithic cave-dweller of Europe is but of yesterday, there were men living in America in a comparatively high state of civilisation, and living there surrounded by genera of animals utterly different both generically, as well as specifically, from any which have lived there since the close of the Tertiary age. This question has been discussed before the Victoria Institute by Mr. Southall, and we may well agree with him that it is far more probable that the American geologists have misinterpreted the evidence than that man had attained so high a state of culture as that denoted by the objects found, even had he existed at so remote a period; and Mr. Southall and others have brought forward evidence which renders it most probable that the objects of human workmanship were

carried into the ancient gravels by the Indian miners of far later date than that of the formation of the gravels, these miners would have driven deep tunnels and sunk shafts in them, seeking, as we know they did in this way, in that and other districts for the precious metals. It may, in addition, be noted that Mr. Skertchley doubts the Pliocene age of the gravels of the Sierra Nevada, and considers them to be probably Pleistocene.

As to M. Ameghino's discoveries of human remains in the Pampas, in connection with the bones of an extinct fauna, it is observed that it is impossible to correlate that strange fauna with that of any known beds, and for all that is known as yet, it may just as well be of Pleistocene as of Pliocene age.

Here then we may leave the question as to man's existence during the Tertiary period: as far as present evidence goes, we can surely say this much, that that evidence is not clear enough yet to compel our belief. M. Cartailhac, in his work, *La France préhistorique*, 1889, says that he "has never adopted the views of M. de Mortillet and other friends respecting the bones of Monte Aperto, or the flints of Puy-Courny," and he also states that careful study of the sites where they were found, the discussion to which they gave rise, and various other considerations have, by degrees, caused him to abandon the favourable impression which he had at first formed regarding the flints of Thenay and Otta.

M. Reinach in his *La Préhistorique*, is also an opponent of the believers in Tertiary man. He asks, "Have we any certain traces of the existence of an intelligent being in the Tertiary period?" and he replies, "We think the answer must be No, in spite of the numerous alleged discoveries. Not one," he says, "is of such a nature as to carry conviction to an impartial mind." He agrees with M. Arcelin with regard to the much vaunted Thenay flints, and brings forward four objections to their authenticity: first, their occurrence in a bed of water-worn flints between which and themselves it is impossible to make a distinction; secondly, a calcined flint is unfitted for any purpose; thirdly, atmospheric, chemical, thermal, and geological agencies are sufficient to explain all the appearances of workmanship, splitting, and calcination; and lastly, he says, they are too small to have served any useful purpose. This last objection may, however, be passed over, as very diminutive worked flints have been found in India and elsewhere, whatever may have been the use to which they were put. M. de Mortillet has suggested that the

primitive savages would probably be so infested with vermin that they might have required such implements as scratchers, but it is far more likely that such minute tools would have been mounted in pieces of wood as saws and rasps. The Orinoco Indians made use of such rasps in the preparation of their manioc, inserting flint chips into flat boards.

PALÆOLITHIC MAN.

Let us pass on now to that more recent age termed by ourselves the Pleistocene, the Quaternary of the continental geologists.

We are now on surer ground; the fact of man's existence on the earth is no longer questionable; indubitable traces of his presence abound on every side in the alluvial deposits of our river systems, in the floors of caves, and in other recent accumulations. In the cave floor we find, if not his actual skeleton, which is seldom present, yet undoubted examples of his industry, tools, and weapons in great variety, and not only of stone, but made also out of other materials, such as bone or the antlers of deer; we also find the remains of his feasts, and the first essays of his artistic skill.

Together with such objects occur the remains of the various animals which were his contemporaries, many of which are now extinct species, or at any rate are foreign at the present time to the countries where their bones are found.

These are facts which were much questioned not so many years ago, but are now accepted by all competent judges of the evidence.

Man as he thus first appears before us in the Pleistocene age was in a very primitive state, one denoted, on account of the material from which most of his implements were made—a Stone age; stone and not one or other of the metals being in use, there has been no trace found of any metal in connection with the Palæolithic man of Pleistocene times.

There is no doubt that these men who fished in our rivers, hunted in our primeval forests, and from time to time dwelt in our caves, were utterly unacquainted with the use of metals; whether at the same epoch, in other lands, more highly cultured races were already metallurgists is another question. Some writers, as M. Lenormant, have held the opinion that such may have been the case, that certain members of the human family were from the remotest ages the

inventors and users of metals. But the Palæolithic man, that is, the man of the early Stone age, as he appears, at any rate in Europe, even if we may suppose him to have had ancestors who were metallurgists, was himself totally ignorant of the use of metal.

Now if we look over any typical collection of the implements of primitive man, derived from ancient gravels, and from caves, we are struck with the fact that such implements vary in character, not only in material, but, what is of much greater importance, in form, and in amount of differentiation, and such variation is found to correspond with difference of antiquity; the farther back we go in time, the ruder and less differentiated are the implements. We must not, however, conclude that every rudely-formed implement of a certain type which we may find, is necessarily one of the earliest age.

The mere shape of an implement, although having a certain value of its own, is not an absolute clue to its antiquity. To determine this we have to take note of the bed in which it was found, and under what circumstances it occurred there, also, when possible, what animal remains accompanied it. Type undoubtedly has a value not to be overlooked in the classification of implements, but we must not insist too rigidly upon it.

Bearing this in mind we may recognise the value of the classifications of Palæolithic times given by M. de Mortillet, and yet more recently by M. Cartailhac, in connection with the discoveries in France, which classifications will not, however, altogether hold good for other regions, such as our own, for instance; especially is this the case with regard to M. de Mortillet's Palæontological grouping; he divides the Pleistocene age into four groups, the earliest the Chelléen, with a warm and damp climate, and characterised by the presence of the Pliocene rhinoceros, *R. Merkiti*, the hippopotamus, and *Elephas antiquus*. Man then lived, making use of only very simple forms of implements, the pear-shaped hatchet, and rude scrapers, made from the stone of the locality.

The next stage is the Mousterien, when cold had increased, and glaciers extended lower down the valleys, and the Arctic mammalia, the mammoth, the woolly rhinoceros, musk ox, and other northern forms appeared. Man's implements were still rude in character, but there was greater differentiation in form. This stage was followed by the Solutréen, which was milder; horses were abundant, as well as reindeer and

mammoths, whilst in France the rhinoceros had disappeared. Man had then improved in skill, and had very carefully made flint implements and of many kinds, scrapers, lance or arrow-heads, delicately chipped on both faces; and towards the close of this stage appeared the first implements of bone. These were the characteristic forms of M. de Mortillet's last stage, the Magdalenien, when not only were such implements abundant, but were frequently sculptured; and engraved bones were also produced. The climate of this stage was cold, and reindeer were present in great numbers, but the mammoth had disappeared from France. This classification will not, however, as I have observed, altogether hold good as regards this country, as in our caves we have found both the mammoth and rhinoceros, as well as the southern hyænas and lions, &c., in conjunction with Magdalenien as well as Solutréen art. I should incline for ourselves to a classification approaching the more general one of M. Cartailhac, given in his *La France préhistorique*, which is as follows:—

GEOLOGICAL DIVISIONS.	PHYSICAL PHENOMENA.	FAUNA.	
Pleistocene or Quaternary	Upper... { Cold and dry Cavern period Extension of Glaciers ... }	{ Glutton ... Mammoth ... Rhin. tichorhinus Reindeer ... Horse ... Hyæna ... Lion ... Bears ... Bison ... }	Palæo- lithic
	Lower... { Mild and damp Extension of alluvial deposits }	{ Hippopotamus Elephas antiquus Rhinoceros leptorhinus ... Machairodus... }	
			Magdalenien. Solutréen.
			Mousterien.
			S. Achenléen or Chelléen.

Turning our attention now a little more closely to the implements of man, we notice that the earliest are of a very rudimentary character; they are met with in such river gravels and other alluvial deposits as occur along the course of the Thames and the Ouse in this country, or the Somme in France, and types of a yet earlier date are found in the high-level drifts over the South of England; the chalk plateau of Kent has yielded a remarkable series to Mr. B. Harrison which have been described by Professor Prestwich who has also figured many of them in his papers. These, together with some in the lowest deposits of certain cave floors, are so rudely made that it requires a trained eye to recognise in

them the work of an intelligent hand, and not look upon them as mere chance products of nature, which, as we have observed, can with difficulty be distinguished from these.

At first then we meet with no highly finished implements; but as we rise in the scale of time, we observe a steady improvement in the forms of man's tools and weapons.

Alongside of the simpler forms, others, some of them very skilfully made, appear, and evidences of design for certain definite purposes multiply. The mere flake, which, like the school-boy's knife, might serve a variety of ends, is supplemented by the piercing tool, the drill, the lance, the arrow-head, whilst other implements, bone awls, needles, and harpoons, make their appearance.

Such is the kind of sequence we find when studying these early works of man. This sequence has been clearly proved by the results of careful exploration. Thus in the Creswell caves of Derbyshire, and in those of S. Martin d'Excideuil in France, a gradual but well-defined advance in the character of the implements, was noted in passing upwards through the deposits forming the cave floors; a similar advance has also been observed when examining cave floors of different degrees of antiquity, as those of the Dordogne, more specialised types occurring in the floors of the low level caves than in those of the older high level ones.

At first the local pebble, quartzite or flint, would be used, without any previous preparation, as a hammer; a few flakes struck off would adapt a stone for use as a rough chopper or tomahawk, whilst the flakes would be fashioned into scrapers for the preparation of skins. The elaborate and delicately chipped flint tools and weapons were of later introduction.

At what precise period bone, or the tines of antlers, were first used we know not, but it is reasonable to suppose that it would not be very long before man discovered the adaptability of such materials to various purposes.

We have already noticed that the appearance of the country, both here and in Europe generally, was very different in many respects during the Pleistocene age from what it now is. Dense forests and wild moorlands, and heaths, extensive swamps, as well as green pastures, characterised this country as well as the adjoining parts of the continent, to which we were then attached.

In those early days, during a great part of the time, it is probable that both the winters were far more severe, and the

summers hotter than those now experienced. We picture to ourselves snow-covered mountains, with their glaciers creeping down into the valleys, in which the snow would lie thick, as the winter advanced, whilst the rivers would be sealed up by ice.

It was a period in which man was contemporary with a number of animals no longer present in Europe, some of which, as the mammoth and woolly rhinoceros, are totally extinct, whilst others have retreated to other lands, the reindeer, the musk ox, the glutton and others, northwards, whilst hyænas and lions, hippopotami and various other species have sought a home far to the south in warmer climes.

When these animals finally disappeared from these districts is not easily determined. We know indeed pretty well the date of the extinction of some few species, as, for instance, of wolves from England, but that of others we can but guess. M. Schaafhausen has concluded that the mammoth was in existence at as late a date as 2000 B.C. or 3000 B.C., and if so it is not improbable that its companion, the woolly rhinoceros, may have survived to an equally late epoch. Other animals, such as the bison or aurochs, still live in the forests of Lithuania, and the reindeer, now no nearer than Lapland, was, it is reported, found in North-East Gaul in historic times. In the strange climate of the Pleistocene age might have been witnessed a remarkable intermingling of Northern and Southern mammalia, of animals now widely separated, but which were then living side by side, and which not only lived but bred in the countries where their remains have been left. Thus in the same cave floor we may find the bones of the hyæna and its cub, together with the gnawed bones of the reindeer and its fawn, we may also find those of the young, as well as of the old mammoth and rhinoceros; and with all these animals as well as with many others, such as bears, large felines, horses, gigantic elks, and other species, man was contemporary. His works are found in the closest proximity to theirs, and under circumstances which preclude all doubt as to their having been buried at the same period; in fact, they lived and died together.

The most striking proof of man's contemporaneity with the Pleistocene mammalia is derived from contemporary art. It may seem strange to speak of art in connection with the Palæolithic savage, yet it is the fact that he was an artist, and, considering the poor materials with which he had to

work, one of no mean ability. On fragments of bone or ivory, and on the antlers of deer, he has left behind him numerous most realistic sketches of some of the animals with which he was familiar, his pencil, or rather engraving tool, being doubtless a splinter of flint. Amongst these engravings we may see figures of the reindeer, the horse, the bear, the seal, and even the mammoth itself, all of them depicted with remarkable truth to nature, and with what Professor Boyd Dawkins justly terms "true artistic feeling," the mammoth being represented on its own ivory, the reindeer on its antler. In some instances the human form itself was drawn, thus "the man of the first ages has revealed himself by his works. Man associates himself by his relics with the extinct races, man finally reveals his own existence by the reproduction of his own likeness" (Marquis de Vibraye).

We may in the next place see whether it is possible to come to any conclusion as to the manner of life and the habits of the Palæolithic man, and so get some idea as to what race he belonged.

There can be little doubt that these men were nomads, wandering from place to place, and even from country to country, living the hand-to-mouth existence of hunters and fishermen. We imagine them as at first following the course of rivers, and in winter, when these were frozen over, fishing through holes in the ice, into which now and again the flint hammer or axe would be dropped. We see them penetrating into the bordering forests, where they would continually encounter the wild fauna of the period, and have not unfrequently to meet in deadly strife the formidable beasts of prey, which were then so numerous.

Man's only weapons in his struggle for existence would be such rude stone or bone implements as have been described, the axe or tomahawk, the lance, and at a somewhat later period, the bow and arrow.

But what do we know as to the racial affinities of these early inhabitants of the earth?

Implements of the S. Acheuléen type have been found in every quarter of the world, not only in England and in North-Western Europe, but also in Spain, in Italy, in Algeria and Egypt, in Syria and Arabia, and even in India and America. Were these men, whose industry was so similar in all lands, all of one race? We cannot tell; it is only when we come to the consideration of the later stages of the Palæolithic age that we are able to form an idea, at any rate

with regard to the cave dwellers of Europe, as to their probable connection with a race of man now in existence.

We have gathered from what has already been observed that the Palæolithic man was a hunter and a fisherman. He had not as yet learnt the art of taming any of the wild creatures around him, unless we may venture to suppose that some of the numerous reindeer were, as they are to-day amongst the Laplanders and Esquimaux, in a domesticated state, but apart from these, and in the absence of dogs, it is very doubtful whether they could have been tamed; none of those animals which we now term domestic appear in the cave deposits of Pleistocene age. But the man of those days made use of portions of the animals, such as the reindeer and the hare, which he killed, clothing himself, we may believe, in their skins, which he prepared with his flint knives and scrapers, and sewed together with the tendons of the animals, using such needles of bone as are so often found. It is possible also that horse-hair may have been used as thread, for in one of the Belgian caves, the Trou de Chaleux, a very large number of the caudal vertebræ of horses were found, the corresponding bones of the other animals being absent, a fact which seems to suggest that the tails of the horses were preserved for some special purpose; either the hair was used, or the tail itself, it has been suggested, may have been worn, as amongst certain American tribes as well as by the Kaffirs, as an ornament. We know also that the antlers of the reindeer, as well as other bones, were ground or cut into various shapes, such as lance heads and harpoons; some of these latter were remarkably well made, and very closely resemble in form those in use amongst the Esquimaux of to-day, as do also certain other implements, some of which indeed may have been symbols of tribal authority (*bâtons de commandement*), but some seem undoubtedly to have been similar to the arrow straighteners of the Esquimaux and of some of the Siberian tribes.

The Palæolithic cave dwellers were not altogether without ideas of personal adornment, fragments of red oxide of iron or ruddle being frequently found in the caves, and we may well suppose that this may have been used as amongst the American tribes mixed with grease as a paint. In the cave of La Biche-aux-roches, near Spy, in Belgium, a small hollow bone filled with ruddle was found: we may look upon this as the earliest paint-box in existence.

Ornaments of various kinds have been found, such as

pierced shells and teeth, as well as the vertebræ of fish, and fossils, together with fragments of jet and amber. Some of these objects testify to a certain amount of wandering amongst the primitive inhabitants of these countries, and possibly to the existence of some traffic. Some of the materials in use could only have been brought from a distance. Thus in the Belgian caves, flint implements occur of a sort which could only have come from Champagne or Touraine in France; and the amber and jet must have been brought from the coast, as well as marine shells; some Mediterranean species were found in the caves of the Dordogne.

That many of the tribes must have wandered far afield is also proved by the discovery of engravings on bone of the seal in the cave of Gourdan (Haute Garonne) and in other French localities.

The question has been discussed whether Palæolithic man was acquainted with the potter's art? It has generally been assumed that he was ignorant of it, or else if he practised it, it must have been in such a rudimentary stage that every vestige of it had perished. But in the cave of La Biche-aux-roches, previously mentioned, it is said that in an undisturbed bed containing Pleistocene remains, three fragments of hand-made and burnt pottery were found; if these were really, as is supposed, contemporaneous with the mammalian bones and Palæolithic implements discovered with them, then we must push back the art of the potter into an age in which it has been hitherto thought to have been unknown; but there is considerable uncertainty as to the exact circumstances under which this pottery was found; other examples of supposed Palæolithic pottery are equally doubtful in character.

We can form very little idea as to the moral condition of man in the Palæolithic age; some writers have supposed him to have been of a peaceful disposition; certain authorities have held that he practised cannibalism; but M. Cartailhac considers the evidence has been misinterpreted. He says, "I think I can again declare that Europe does not furnish us with a single proof of prehistoric cannibalism" (*Materiaux*, t. xix, 133).

We should like to know something of the social organisation of the early tribes, but unfortunately this cannot be discovered. Then again, had Palæolithic man any religious ideas? M. de Mortillet tells us that two things were characteristic of the Palæolithic cave dwellers, viz., that they did

not bury their dead, and therefore had no respect for them, and from this he assumes that they had no religion, for had they any, it would have led them, he concludes, to fear death or the dead, and so to practise funeral rites; but it appears to me that this is a very questionable conclusion on his part, besides which, although we may allow that as a rule the dead were left unburied, it is open to question whether this was the invariable practice. M. Cartailhac and also M. Reinach say that there have been found instances of Palæolithic burials, certain finds at Solutré, Laugerie basse, Cro-Magnon are cited as examples. It must, however, be noted that Professor Boyd Dawkins has thrown some doubt as to the age of some of these interments, and is sceptical as to the practice of burial during the early Stone age; but in the cave at Spy, previously spoken of, it is said two human skeletons, which had evidently been buried, were found in connection with the Pleistocene fauna, under conditions which absolutely precluded the hypothesis of later introduction. A good deal of stress has also been laid on the discovery of interred skeletons at Broussé-Roussé, near Mentone. One of these, it is said, was found in 1876 in one of the caves, at a depth of $6\frac{1}{2}$ metres, and it was urged that no Neolithic interment could have been made at such a depth. However, Professors W. Boyd Dawkins, McKenny Hughes, MM. de Mortillet and Cartailhac, all doubted its being of Palæolithic age. Still more recently, in 1884, another discovery was made in an adjoining cave by M. Julien, where beneath beds containing a large assemblage of characteristic Pleistocene remains, and implements of Magdalenien type, together with marine shells, a human skeleton was found apparently interred beneath a large stone block at a depth of over 8 metres. With this skeleton were found implements of Palæolithic type. Mr. Wilson together with MM. Julien and Bonfils, the discoverers, maintained that the position of this skeleton was such as to exclude "all idea of disturbance," so great was the depth at which it was found, and there being also that large mass of stone above it. In a long article in the *Revue des Questions Scientifiques*, 1886, the Abbé E. Vacandard argues strongly in favour of the Palæolithic age of this find, which was disputed by M. de Mortillet and others who have regarded it, as they did the previous ones, as Neolithic. As lately as the beginning of the present year, 1892, three other skeletons, one at least 7 feet in height, were found close to where the 1884 one was discovered,

necklaces of perforated teeth and of fish vertebræ, together with shell or bone ornaments, also some large flint implements, roughly chipped, thin and curved, were in the hands or close to the skeletons. Mr. A. Vaughan Jennings, who has described these finds (*Nat. Science*, No. 4), is inclined to look upon them as of Palæolithic age, but at the same time admits that they may well belong to the Neolithic age, or perhaps to a transition period. However these disputed questions may be settled, we may perhaps rightly assume that the cave men were nearly as careless of their dead as are the Esquimaux, who leave the bodies of their relatives unburied, the bones of man having been often seen mingled with those of the walrus, the seal, the dog, and other animals in their refuse heaps.

Now this oft-repeated reference to the Esquimaux leads us directly to the question, have these old Palæolithic hunters any living representatives? As we have seen, many of their implements, especially those of bone and of carved antler, as well as the engravings on some of these, very closely resemble the corresponding tools and weapons of the Esquimaux and of some allied tribes of the far North. When we also call to mind the habits of life, as revealed to us by the remains left in the caves, and consider what must have been the state of their dwellings, very charnel houses in fact, when we see few, if any, traces of formal burial of the dead amongst them, the only race of man presenting anything analogous to all this is that race almost lost amongst the Polar snows and ice. M. Dupont, the Marquis de Nadaillac, Professor Boyd Dawkins, and others have dwelt upon these analogies, which, as they justly observe, are too numerous to be merely accidental, and they conclude that there is an actual blood relationship between the Palæolithic man and those Northern tribes to which the Esquimaux belong. These men retreated with the reindeer. How and when that retreat was brought about, and the causes which led to it, are as yet involved in the greatest obscurity.

We find no intermingling of their remains with those of the succeeding age, as we do in the case of these latter with those of the age which followed it, a mingling witnessing to the pressure of invading tribes, and I cannot agree with M. Dupont, Dr. Verneau, and other writers, that there has been a direct derivation of the Neolithic civilisation, from that which preceded it; or that the two were at any time found side by side, as contemporaries, in these regions of the earth,

as valley and hill tribes respectively; the latter being by degrees exterminated, or absorbed, by their more civilised neighbours. Nor is it possible to agree with Dr. Karl Penka who in his *Origines Ariacæ* derives the Aryan race in part from the Palæolithic men of the Magdalenien or even earlier Canstadt types.

No, as far as actual evidence goes, the Palæolithic age of man, as the Pleistocene age of geology, seems to end abruptly. There is an intervening and mysterious blank, then we pass at once, without any apparent connection with the previous age, as far as man at any rate is concerned, into Neolithic times. We pass from the age when man hunted the reindeer, and contended with the mammoth and rhinoceros, the lion and the hyæna, into that in which a new race of men appear in this quarter of the world; men with new habits and manners of life; and when animals more familiar to us than some of those earlier forms replace many of those which were so numerous in the Pleistocene age; when the Arctic mammalia and their Southern contemporaries had vanished, and with them the last lingering tribes of Palæolithic man.

The CHAIRMAN (Professor E. HULL, LL.D., F.R.S.).—With regard to the valuable paper of the Rev. Mr. Mello; all must recognise that he has evidently drawn it up with great care, and with an earnest wish to place on record an exact, impartial statement, as to what is known of the interesting and important subject of the origin and early appearance of man on this globe. The discussion will be appropriately commenced by reading a communication which has been received.

The HON. SECRETARY then read as follows:—

Sir J. W. DAWSON, C.M.G., F.R.S., writes :—

The paper of Rev. J. M. Mello seems to me to be a very good summary of what we know of primitive man, from his remains in the caves and gravels. There are, however, some points on which I think it well to make a few remarks, but they are not intended to be of a critical character.

1. As a matter of classification ; while I fully believe that we are living in the later part of the great Tertiary period, and that there is properly no such thing yet as a Quaternary period, I think the term Pleistocene should not be extended to the Post-Glacial Age. The close of the Glacial period—introducing great physical and climatal changes, many changes in mammalian life and man himself—should be regarded as the end of the Pleistocene, and the introduction of what some French geologists have called the *Anthropic* period, which I have elsewhere divided into Palanthropic, corresponding to the so-called Palæolithic age, and Neanthropic, corresponding to the later stone and metal ages.* These may be termed respectively the earlier and later stages of the Modern period as distinguished from the Pleistocene Tertiary.

2. I have more faith than Mr. Mello in our Geological Chronometers for the measurement of the date of the Glacial Period. The rate of recession of Niagara Falls, for example, proves conclusively that the close of the glacial age is removed not more, probably less, than 10,000 years from this nineteenth century. As is well known many other measures of denudation and deposition correspond with this.

3. Like Mr. Mello, I attach merely local value to the changes from rude and simple to more perfect and varied implements observed in the caverns of Europe. New settlers in any locality always have rude surroundings, even in our comparatively polished age, and it must always have been so ; while it is well known that contemporary tribes in a rude condition may differ very much in this respect according to circumstances. A tribe situated in districts remote from those affording good flint for implements, and prevented from access to these perhaps by hostile neighbours, must have been inferior in their tools till they could obtain better material. Many other reasons might be adduced for assigning a merely local value to such differences.

4. At the same time several reasons, in connection with faunal

* *Modern Science in Bible Lands*, chap. iii. p. 110.

changes in the Post-glacial period, induce me to believe, with Cartailhac and Mr. Mello, that the early part of the Post-glacial or Palanthropic era was characterised by a milder climate than its later period; and I think this has much to do with the change in implements and weapons. The earliest men *probably* subsisted merely on natural fruits and other vegetable productions. To secure these in a mild climate they would require no implements except perhaps to dig for roots, or to crack nuts. If they migrated into a colder climate, or if the climate became more severe, they might be obliged to become hunters and fishermen, and would invent new implements and weapons, not because they had advanced in civilisation, but, as old Lamech has it in Genesis, "because of the ground which the Lord had cursed," and which would no longer yield food to them. At the same time they might contend with one another for the most sheltered and productive stations, and so war might farther stimulate that very questionable advance in civilisation which consists in the improvement of weapons of destruction. We have much to learn as to these matters; but we must, if we have any regard to physiology and to natural probability, start from the idea that the most primitive men were frugivorous and fitted for a mild climate. In this case we should expect that these most primitive men would leave behind them scarcely any weapons or implements except of the simplest kind, and that their apparent progress in the arts of war and the chase might in reality be evidence, up to a certain point at least, of increasing barbarism. Primitive as well as modern men present in these respects strange paradoxes. This subject I have discussed in my work, *Fossil Men*.

5. I fully agree with Mr. Mello that there is a decided physical break between the Palanthropic and Neanthropic ages, and am surprised that any geologist should doubt this. We have not only the remarkable change in the races of men and in their animal associates, but when we know that the whole geographical features of our continents have changed since the Palanthropic age, and that not only are our continents reduced in size since the continental Post-glacial period, but that there is evidence of re-elevation as well as subsidence, and this within a short period, say 10,000 years, less the historic period on the one hand, and the early Palanthropic period on the other, it seems impossible to doubt the greatness and suddenness of the physical break that divides the Anthropoc age into two distinct portions. If we suppose, for example, that

primitive man appeared in Europe shortly after the close of the glacial age, and resided there for say 2,000 or 3,000 years, and if on the other hand our view of historic peoples in the Mediterranean region extends back say 5,000 years, then within a space of less than 2,000 years there must have occurred continental depression and elevation of the most stupendous magnitude, and which must have affected in the most serious manner every form of land life in the Northern Hemisphere. All this may be held to be certainly known as geological fact; and it would be folly to overlook it in any discussions as to primitive man, or in any comparisons of the evidence afforded by his remains with that of early human history or tradition.

I am glad to observe that Mr. Mello refers to the admirable work of Dr. Prestwich in the Pleistocene and modern deposits of the south of England. This veteran worker brought out with great clearness the evidence of the recent date of the Glacial Period to which American facts bear so strong testimony. He also perhaps obtained some indications of that primitive state of humanity in which the invention of lethal weapons was less a necessity than in later times. He established for England, as for other parts of the northern hemisphere, that great submergence which separates the Palanthropic from the Neanthropic age, and constitutes a dominant fact in the history of early Man.*

The CHAIRMAN.—I am sure we are much indebted to Sir William Dawson for his communication. (Applause.)

I am happy to say that we have here this evening a number of men of science, some of whom are very distinguished geologists, and therefore I look forward with great confidence to an interesting discussion which will probably render any observations from myself unnecessary. We have here Professor Seeley, Mr. A. S. Woodward, Professor Blake, Mr. Allen Brown, but we by no means wish to exclude others who may desire to take part in the debate.

Professor H. G. SEELEY, F.R.S., etc.—It is with some diffidence that I speak upon this subject, which has been treated from so many points of view by the Rev. Mr. Mello. Mr. Mello's own researches would have justified him in dwelling in detail upon

* Raised Beaches and "Head" of the South of England, *Journal of Geological Society of London*, 1892. Also a paper in *Victoria Institute's Journal*, vol. xxvii, p. 263.

several of its aspects. Any little differences that may exist in interpreting facts will not hinder our endeavour to obtain the truth which we all strive for.

I would suggest to Mr. Mello that it is just possible that there may be evidence of greater antiquity for man than he has this evening suggested to us. I do not think that this, from a theoretical point of view, is of importance. We know nothing of the measure of antiquity in the terms of common historical expression, when we deal with geological terminology. Whether man dates back to the early Tertiary period, or is limited to the Pleistocene period, seems to me to be of small importance theoretically, but very important as an ascertained matter of fact. Mr. Mello alluded to the researches of Professor Prestwich, carried on with admirable perseverance over the central region of the North Downs. It has been my pleasure to go over some portion of that ground with that remarkable man, Mr. Benjamin Harrison, of Ightham, whose persistent researches carried on over the Kentish hills, enabled him to bring together the most surprising collection of Palæolithic implements from the hill gravels which was ever gathered—more than 1,200 specimens—every one carefully catalogued and noted as to the position of its occurrence, and as to the points in which it differs from others. Those specimens are all from what Professor Prestwich called the Hill Gravels, and he regarded that gravel as being pre-glacial. What that means is that man spread over this part of Kent (according to Professor Prestwich's view) before the great glaciation came on which covered the country northward with ice. We have long been accustomed to believe that these glaciers do not give any conclusive evidence of having penetrated far south of the Thames. Evidently there is no proof of the Boulder Clay having spread far south of the Thames or over the gravels which contain these flint implements. Hence we are compelled to follow them northward beneath the Boulder Clay, and that position shows that they are pre-glacial. This evidence is not conclusive upon the Kentish Hills, for those who require absolute demonstration of fact in local sections, but in the absence of boulder clay no such sections can exist. Nevertheless these beds of hill gravel have in their Palæolithic flints, evidence of early stages of human skill and art, developed through multitudinous modifications, the work of people who spread over the country before the hills were broken up and diversified to their present forms. The great valley at

the foot of the Escarpment of the chalk hills—and all the valleys which run at right angles to it northward, over the Chalk, have been excavated since the days in which this hill gravel was formed, and man lived and fashioned those implements, according to Professor Prestwich; and I must say, as taught by him and by Mr. Benjamin Harrison, it seems to me that there is good ground for adopting this conclusion. There is, therefore, an interesting possibility that Palæolithic man may date back to a period antecedent to the Boulder Clay. I know of no certain evidence of greater antiquity for man in this country.

There is one other matter that I would say a word upon, because it is of the nature of a generally accepted proposition, but not so completely proved as its general acceptance should require, and that is the meaning of the close correspondence between man of the cave and gravel ages, and the Esquimaux of the north. Palæolithic man in many ways had similar habits to some Esquimaux tribes. He carved pieces of ivory and bone in the same way as the Esquimaux. There are battle axes, and harpoons, fashioned in bone, which when put side by side show scarcely an appreciable difference between the work of pre-historic man of the Palæolithic age and that of the Esquimaux. I venture to suggest that there is something to be said in favour of the influence of climatic change in the development of this art, skill, and industry. It is quite possible that that correspondence may be the effect of climate in Europe during a period of intense cold, though it has led to the inference that man migrated northwards from Britain and Europe, and survives in the Esquimaux as representative of the Palæolithic period. The reason I ask you to pause before accepting this conclusion is that animals, with which man in the far north is associated at the present day, are found as fossils in gravel beds in our own country, mixed with a large number of animal types which are found living in the present day in Africa. The one group of animals is inferred to have migrated north, and the other is inferred to have migrated south. If man is supposed to have migrated north and to survive in the Esquimaux, we turn round to see if there are no Palæolithic men who migrated southward, who survive amongst the Africans; and if there be no evidence of incisive art amongst people of the North of Africa which might be compared to those forms of incisive art which you meet with amongst the Esquimaux. And I think there may be a certain possibility of comparison

between the magnificent evidence of Egyptian civilization in its incised stone work, and the early phases of carving which were prevalent amongst the Palæolithic people of Central France. Southwards, over Africa, as far south as Cape Colony, stones are carved with pictures of animals. The bushmen are reputed in prehistoric times, and in some cases in historic times, to have carved the rocks amongst which they lived. There is a curious analogy to this incised work, in the kind of carving, on a much smaller scale, which was executed by prehistoric man in Europe. If we adopt the hypothesis of man migrating northwards, there is the counter-hypothesis to be considered whether he did not also migrate southwards.

On the other hand, we may infer that as Palæolithic man developed skill as a hunter, he probably exterminated the animals of the gravels in Europe which are extinct. Then the genera which survive in the north have no necessary connection with those of the south which could be attributed to migration in opposite directions, since they have not been killed off in those areas. Those of the south may have been modified somewhat from the ancient European fossil types by the influence of climatic circumstances in Africa, since the gravels were deposited, just as Egyptian or Assyrian civilization varied with time from the oldest known type of Western Europe, but there is no proof known to me that the mammals of North Africa were not inhabitants of Africa when our gravels were formed.

Professor J. F. BLAKE, M.A., F.G.S., etc.—It is some time since I paid much attention to this subject, though I did so some few years ago.

Some of the points which Mr. Mello raised struck me as being very fairly put. The first question which I would say a word upon is with regard to the possible greater antiquity of man than he appears inclined to admit. I could never find that there was any very valid reason to believe him to be of the Miocene age. The flints and other things that represent him do not seem to prove it in my own mind; but I was always struck by the arguments brought forth by Charlesworth,* not mentioned by Mr. Mello, but never, I think, really overcome, that in the deposits of Suffolk you find bored teeth in which the bored hole has a

* An interesting discussion on these took place on the occasion of Mr. Charlesworth bringing the discovery of sharks' teeth, of which some were found bored, before a meeting of the Victoria Institute.

conical form on both sides, and is exactly the same kind of hole that is made by the South American Indians at the present time in sharks' teeth which are used as a kind of ornament or mounted in a stick as a saw. These holes are said to be done by boring animals, and in some cases they no doubt were so, but in other cases the holes have apparently been bored by sharp flints, and seem to me to differ from the boring of animals. This is, I think, very fair *primâ facie* evidence that man might have been here at that time. Then the bone which Professor Capellini describes always struck me as an important one. These flat cetacean bones have marks crossing each other. Now, if a shark got hold of a bone of that sort, all the scratches would be parallel to each other.* Furthermore, the scratches are semi-circular, and that is exactly the shape they would be if they were done by a carving instrument turning round a centre and the amount of curvature of these scratches is just about the amount that it would be necessary for a man, turning his hand round, to make; a large shark would probably make them of a different curvature, but here is exactly the same curvature that I should make if I took the bone and scraped it from the edge holding the knife in the hand, and the radius is about the proper length.

The CHAIRMAN.—But they had no knives.

Professor BLAKE.—No, but they had flint instruments. They would work them round and the centre would be about the middle of the hand. If the bone is scratched without that curvature, it seems to me to be very little evidence, as in the cases brought forward to show that animals might have done it, but looking first on the slanting side which is on the shorter radius, and secondly on the amount of curvature that a man would make on the bone, I think it is fair evidence of their being done by man. With regard to their being found in marine strata, it seems to me possible that man might have been able to live on the sea at that time; *i.e.*, in boats or something of that sort. In beds of about the same age in Italy there were found what appeared to be the remains of father, mother and children together, which showed a certain amount of family life in this early period. These appear to show that the men of that period may have got to sea. There is also a skull, found in British Columbia, which had curious pieces of it cut out such as we now call trepanning the skull.

* Professor T. McK. Hughes, F.R.S., has dealt very fully with this question, see *Transactions of Victoria Institute*, vol. xxiii, p. 209.

This was a Quaternary later skull and it has been accounted for on the supposition that these savage tribes had some sort of idea that when they were mentally afflicted, or when children had convulsions, there was an evil spirit in the brain, and they cut a hole for the spirit to escape by, and that has been taken, therefore, as an example of their belief in demons. That is a Frenchman's account of the matter, but whether it is accepted by Mr. Mello, or whether he thinks anything of it, I should be glad to hear.

Those are the only points that I can bring forward. We must all accept Mr. Mello's statements as being unbiased and carefully drawn up, and as giving us a good idea of the nature and antiquity of man, and I thank him very much for his paper.

Mr. J. ALLEN BROWN, F.G.S.—I ought not at this late hour to take up much of your time, and yet I feel it is impossible to pass by this very able and elaborate paper without a few remarks. First, let me observe that it is a very useful contribution to the subject, inasmuch as it refers to the papers of continental geologists and other works which are not generally known to English readers. The special remarks I wish to make to-night have no reference to the points raised by those who have already spoken. I would state briefly the effect which a long study of the Thames Valley and other valley deposits, which contained implements, has had upon me; and herein I find myself somewhat differing from many of those who have written upon the subject.

It has generally been understood that a great gap or hiatus lies between the Palæolithic people and those we call Neolithic; that opinion, I think, is now becoming untenable. I think further investigations will soon bring us to the conviction that man has occupied, *continuously*, parts of England and North-West Europe for a very considerable period and without break between the Palæolithic period and that of polished stone, a period which may be indicated as commencing with the epoch at which the rudest chipped flints, discovered by Mr. B. Harrison on the Chalk range or plateau in Kent overlooking the Thames Valley, were made, and continuing through the relics found in the valley drift, and into still more recent times, by the contents of such superficial deposits as rubble, head, etc., the result of the latest physical alterations in the surface of the land.

In all these changes there is evidence of the continuity of the

Palæolithic and Neolithic periods; there are two lines of evidence which it is necessary to consider as bearing upon it, both of which have been alluded to to-night: one is the form of the implements and the evolution of the so-called Neolithic instruments from older forms, and the concurring changes in the fauna. It appears to me that the forms of the implements constituted as true an index to the relative ages at which they were made, as fragments of pottery indicate the relative periods and the stage of art which prevailed when the potters lived. Those who are acquainted with the composition and ornamentation of pottery can fix the age to which it belongs, and those who are versed in the forms or types of stone implements can arrive at general conclusions as to the relative period at which they were fabricated. It is from this point of view, confirmed by such evidence as the remains of the contemporary fauna afford, that I have become convinced of the continuity of the Stone age, and of the occupation of Southern Britain from the earliest period of which we have any record to the present day.

The rudely chipped pebbles and nodules from the Chalk plateaux form the commencement of the series, the next stage of which (that of the valley drifts) affords evidence of increased specialization of form, and generally speaking of greater skill and knowledge, on the part of the flint workers. In these more specialized forms, indicating an increasing inventive faculty, a chapter of human history is presented to us of the deepest interest. When the investigation is continued into the more recent accumulations, we meet with implements which may be classified as Mesolithic, or intermediate between the Palæolithic and Neolithic, as at present defined. With these progressive modifications, in the form of stone weapons and tools, may be traced corresponding changes in the animal life which existed in these regions, where the fabricators lived, from the extinction of the old elephants and rhinoceroses, and the retreat of the reindeer and other animals, to the later disappearance of the *Bos urus* and bison on the verge of the historical period.

The caves of France and Belgium, as well as England, afford us very good testimony of the changes when taken together; take the case of Rents cavern, we find the remains of the cave bear, one of the oldest creatures in the most ancient deposit, and associated with them are nodular-formed implements of the rudest kind, intended for use in the hand; while, in the upper

cave accumulations, the implements found are of a higher order, and they are formed from flakes and not natural nodules, and these are associated with the remains of animals of later date, until in the most recent deposits the relics of the polished stone and bronze period, and domestic animals, are met with.

The most ancient men took up a naturally shaped stone and simply chipped it, as nearly as they could, into the form they required, and such flakes as they produced were made without method, and so they continued to work for a long period. By-and-bye somebody more clever than the rest found out that if he selected a suitable nodule and trimmed it so as to form a plane at the top, and then struck it vertically with a rounded hammer-stone, he could produce long slender flakes, which he could, by secondary work, convert into spear-heads, knives, borers, and other tools. There is evidence of such an advance in the later part of the Palæolithic period, though the older forms still continued in use. This method of working flint was in fact the same as that of the gun-flint maker of to-day. At the Palæolithic working-place which I discovered at Acton, I found a large number of implements almost all of which were formed from flakes. There may be some persons here who have tried to strike off a long flake, but let me say until you have watched a gun-flint maker at work, and adopted his method, you will not succeed in making one. It is very interesting to trace the development of human ingenuity from distant times, and to notice how man learnt in time to make long flakes and more specialized instruments.

In the Thames Valley we find evidence of all these stages of human progress, and there is a great deal of interest still attaching to flint implements and much to learn from them.

The CHAIRMAN.—I would only just make one remark, and say that putting aside other considerations, which, to me, have great weight, *i.e.*, the appearance of higher and higher races from the early Tertiary down to the human period, when man, admittedly the highest work of creation, came upon the scene, if there had been Pleistocene or Miocene man either in Europe or America, where the deposits alluded to are abundantly developed, and where those remains have been studied with the greatest care, we should have found, not an odd, suspicious-looking, and doubtful implement of art but we should have found hundreds or thousands of them, because these flint implements are imperishable in their nature; and that is one reason why they

are found so abundantly in deposits which have a distinctly human origin. If works of art had been made out of hard flint in the early Tertiary period, why should we not have found them in equally abundant numbers with those of the more modern Post-tertiary period? I will not ask for a reply this evening. I only ask Mr. Mello to make any observations he may think fit in reply to the observations made on his communication, although I suppose there is not much to reply to, as the paper is so generally approved.

The AUTHOR.—I am extremely obliged to you for the very kind way in which my paper has been received this evening, but it is so late that I do not like to say anything to detain you longer. I have been a good deal interested by much that has been said by those who have taken part in the discussion, and I think the point raised by Professor Seeley with regard to the probability of a southern, as well as a northern migration, is one that has not come to my notice. It is well worthy of consideration. I do not see any reason why man, if he went north, should not have sought something more of a genial climate in the African district or somewhere south.

With regard to the connection between man and the Esquimaux it is only an idea based on a certain amount of analogies, and it is probable, as Professor Seeley said, that man would under similar conditions develop similar habits and customs. At the same time, the points that seem to connect him more closely with the Esquimaux are the arts of graving and the ornamentation of bones and so on, which would scarcely, perhaps, develop from a man's surroundings. There seems, therefore, to be some connection between them to lead to a similar development of art.

As to what Professor Blake said, I have no technical acquaintance with bored teeth, and I am not prepared at present to say anything about them, as I have not seen specimens myself, nor do I remember, at the present moment, where any particular discussion is to be found on them. I know they have been discussed, and that some opinions have been brought forward to account for them and in a natural way.

With regard to incised bones, I do not know that we are driven to the conclusion that those bones must have all been incised by sharks, but by sword-fish also, and it has been suggested that it is not impossible that bones may, in those localities, have been driven over sharp flints, and sharp flints over the bones, and such

sharp flints have been found in beds where bones have been found. There are various ways in which those signs can be accounted for, and I do not accept them myself as the work of an intelligent being.

With regard to trepanning, I do not think that that has a bearing on the present paper. It is a subject I have alluded to in a paper, and I may some day have an opportunity of bringing it before you. I consider it touches the subject of Neolithic man, but that may be dwelt upon at a later period. It is undoubtedly interesting and of great importance in some respects.

With regard to Mr. Allen Brown's remarks, they have great value; but I must say I do not agree with him that there is no break between the Palæolithic and Neolithic periods. I do not say it is impossible that they ran into each other; but I cannot see at present that there is any sign of their overlapping such as the Neolithic and the Bronze age. I am sorry there is not time to dwell on a subject upon which much more might be said.

I quite agree with Professor Hull that we certainly should expect, had man existed in the tertiary period, to have found his remains in far greater numbers, whereas we have only such doubtful specimens.

The meeting was then adjourned.

COMMUNICATIONS RECEIVED IN REGARD TO THE PRECEDING PAPER. I.

Professor T. RUPERT JONES, F.R.S., writes:—

I am too heavily engaged to hope to be present to hear the Rev. J. M. Mello's very interesting and conscientious *résumé* of what is known about early man. The several evidences of man's existence in Europe during Pliocene (Tertiary) times certainly seem to still require to be substantiated. Mr. Becker, however, has carefully re-examined Prof. Whitney's evidences of early man in California, and sees no reason to suppose that the relics have been introduced subsequently to the formation of the gravels in which they are found; but he believes that they were certainly deposited with plant remains like those of Tertiary age, with a now extinct rhinoceros (*Rh. hesperius*) and a mastodon—that great lava-flows

covered the gravels in valleys—that glaciers from the sierra succeeded and wore down what had been hill-ranges between the old valleys, and in time left the hard lava-beds as ridges with the protected gravels beneath them. The only possible reduction of the time apparently necessary for the extinction and burial of the great Pliocene quadrupeds mentioned—for the lava-flows—and for the subsequent denudation of the lines of country not protected by lava, is the suggested continuance of Pliocene conditions of life to a late period on the borders of the Great Valley of California when it was a Pleistocene gulf, that is, while elsewhere Pleistocene conditions had come in force; and that glacial conditions followed there later than elsewhere. The great lapse of time required for the climatal changes, and the resulting alterations of the land, may well have equalled any calculable period for the changes in Western Europe connected with the appearance of man and the disappearance of the great quadrupeds—probably not much less than 20,000 years ago.

For my part I do not see the necessity for regarding the Pleistocene as very widely separated from the Pliocene times (speaking geologically), nor the existence of Neolithic man from that of his Palæolithic forerunners; and, although the majority of known Palæolithic implements are larger than the Neoliths, and somewhat differently prepared, I prefer to think that they do not indicate very different races of men.

The Rev. A. IRVING, D.S.C., B.A., F.G.S., writes:—

Having perused with much interest the excellent paper (in proof) by Mr. Mello, I am inclined to regard the question of the evidence of the presence of man upon this globe in Tertiary times as the most important point in it. Mr. Mello may be said to have effectually disposed of most of such alleged evidence as has been brought into court up to the present; but he finds, and candidly admits, an apparent difficulty in the statement “by M. Rames with regard to the flints found by him at Puy-Courny . . . that the supposed implements are all made out of one particular variety, whilst there are other kinds of flint in the same bed.” M. Rames, it appears, “concludes from this, that the selection must have been made intentionally by an intelligent being.”

With all due deference to the judgment of M. Rames, who has the advantage of having seen and handled the fragments in question, I may be allowed to urge that there are several considerations which appear to make such a conclusion altogether

unnecessary. If, as Mr. Mello suggests, "accidental fracture" were the only factor concerned, it might be so; but what has been urged by M. Arcelin (p. 239) from his own observations, as to the operation of other natural agencies, strengthened by the observations of Dr. Livingstone, the Marquis de Nadaillac, M. Lepsius, and others, shows that that is not the case. Besides the action of forest fires in splitting flints, we have to allow for the sun's heat; and it so happens that I have in my possession specimens of a variety of tabular flint, obtained by my former pupil, Captain H. G. Lyons, R.E., F.G.S. (now on the staff of the Egyptian Army at Wady Halfa), during a recent tour in the desert between the Nile and the Red Sea, which have undergone fracture *on the upper and exposed side only* (as the specimens lay on the desert sands), and that to such an extent that the whole surface is in several specimens converted into a series of saucer-like depressions, some of which contain a little mammilla-like elevation in the centre. Similar specimens were, I believe, given by Capt. Lyons to Professor Judd. If, as seems most probable, such forms were produced by the alternations of powerful heating during the day by the sun's radiation, and the rapid cooling which results at night-fall from the powerful terrestrial radiation, which takes place always under the clear sky of the desert, it is more than likely that cracks would be formed in this manner, and that little rough segments of spheres easily broken would in this way flake off. A true flint, it must be remembered, is more or less composed of colloid silica, and such silica (as my own observations recorded elsewhere show) does actually assume, in some cases, the character of a *glass*; the molecular structure of which lends itself readily to the formation of shrinkage-cracks. This is as true of a silica-glass formed by an aqueous process, as it is of a vitreous rock (like perlite) produced by what are commonly known as igneous agencies.

Again, it is a matter of observation, that when a crack has been once started, whether by a blow or by molecular action, iron under favourable conditions may be carried in solution into it by natural solvents, and that with subsequent desiccation, this iron may undergo oxidation into the peroxide by taking up atmospheric oxygen, with a corresponding increase of bulk. The molecular forces set up in this way must act as a powerful wedge to widen and extend even the closest fractures. I have in my possession a flint pebble from the Reading beds which shows this. Flints, too,

under certain conditions tend to undergo molecular change at the surface (to a depth sometimes of a quarter of an inch) inducing a kind of porcellanic texture, which, with inequality of expansion and contraction between it and the flinty interior for changes of temperature, is very likely to split off in places without the application of a mechanical blow. Lastly, the considerable variety of intimate molecular structure which flints display, and the varying proportions found in them of crystalline and colloid silica, not to mention the presence at times of mineral impurities in the flint itself, show how under the action of solvents (especially in old volcanic regions) conditions favourable to fracture may be induced.

I have dealt with the petrology of flints more fully in my little work on *Metamorphism of Rocks* (Longmans, 1889), and need not therefore treat the matter more at length here. Enough, I venture to think, has been said, to show that Mr. Mello's difficulty is more apparent than real; since it is at least as easy to account for the fact observed by M. Rames by a process of natural selection through the operation of known laws of nature among the varieties of flint, as by an "intentional selection made by an intelligent being."

Captain H. G. LYONS, R.E., F.G.S., writes :—

In this very interesting paper on Primitive Man the author includes Egypt as furnishing implements of the S. Acheuléen type, and no doubt rightly as in the instances given by General Pitt Rivers, Professor Zittel, Dr. Schweinfurth, etc., but at the same time there is a large quantity of flint implements which are certainly of a much later age. Surgeon-Major Archer collected a number of flakes and other implements from Wady Halfa near the Second Cataract, and these cannot, I think, belong to any very remote date. From the same district I have collected a considerable number of flakes, scrapers, portions of a dagger-shaped implement worked on both sides, diorite hatchets, etc., but all are from ancient Egyptian sites of temples or of their frontier fortresses. A single instance of a roughly chipped arrow-head occurred where no such ancient settlement could be traced, but not under conditions justifying the conclusion that it belonged to the "Stone age." Here certainly the amount of finish is no guide, and the roughest flakes and worked scrapers occur side by side with polished diorite hatchets.

Wady Halfa.

*FURTHER REPLY BY THE AUTHOR.**November, 1897.*

In reply to Professor Rupert Jones, I must say that I have not seen the account of Mr. Becker's re-examination of the supposed Californian evidence of man's existence in Pliocene times, but it still seems to me that it would be very difficult to prove that the objects found in the gravels in question might not have been introduced by Indian miners at a much later date than that of the formation of the gravels; the very nature of gravel beds would tend to obliterate any traces of such late introduction. I see also that in his Toronto address, Sir John Evans still adheres to his verdict of "not proven," with regard to Tertiary man. I can scarcely agree to the statement that the differences between the Palæolithic and Neolithic forms of implements are so slight as to be of little importance as affording a mark of distinction between the races who made them; the Neolithic type of axe or celt is very different to the earlier both in form and workmanship, but apart from the implements there are great differences manifested in connection with the habits and manner of life of these races, which appear to denote a marked change, which is not apparently bridged over, as having come in with the Neolithic inhabitants of these countries, and which shows that they were not the direct descendants of Palæolithic forefathers in this part of the world. Dr. Irving's observations upon the Puy-Courny flints are very interesting, and I am glad that he has been able to remove the difficulty that I felt respecting their origin.

In connection with Captain Lyons' remarks as to the Egyptian implements, we may note the discovery made a few years ago by Professor Flinders Petrie of flint implements of Palæolithic type found in Egypt and said to belong to the time of the XVIIIth Dynasty; might not these have been the work of an earlier age, found, and perhaps used, by the men of a later one?

SECOND DIVISION OF THE SUBJECT.

PRIMITIVE MAN: II. NEOLITHIC MAN. A Sketch
by the Rev. J. MAGENS MELLO, M.A., F.G.S., &c.

WHEN man first appeared in North Western and Central Europe, he was a contemporary of a large and remarkable fauna, the greater part of which is no longer in existence in these regions of the earth ; some of the animals of which it consisted, having become extinct, whilst others have emigrated to other lands. Amongst the animals with which man must have been familiar, were certainly two species of elephants, one of these being the mammoth ; also two species of rhinoceros were present in large numbers, one of which lived on to a comparatively late period in conjunction with the mammoth. During the earlier part of this age the hippopotamus was not unfrequently to be seen in the rivers, even as far to the north as Yorkshire ; the larger carnivora also, lions, leopards, hyænas, wolves, and bears haunted the forests ; whilst innumerable reindeer, horses, and bison, were preyed upon by them, and also furnished man with food and probably with clothing.

We call this age of the world's history the Pleistocene ; it is the latest of the great Geological ages, and as far as all sound evidence goes it was during this age that man first appeared.

The men of Pleistocene times were, as far as we can judge, not very far advanced in culture: in fact, their civilization was that of the savage tribes of Australia, and some other countries at the present day. The only implements and weapons which they possessed, appear to have been made out of stone, flint being the most common material; rude in the extreme were these at the beginning, but as time went on there are evidences of improvement and differentiation, the roughly chipped flint being replaced or supplemented by others elaborately and skilfully fashioned; these were themselves towards the close of the Pleistocene age in a large measure displaced by others made of bone, or of the antlers of the reindeer, some of these being carved into representations of animals, whilst engravings were at the same period made on various materials which show that these early men were endowed with artistic talent of a high character, and very remarkable powers of observation. It is to be specially noted that none of the stone implements were polished or ground, but simply broken and chipped into shape. No metal either, of any sort, seems to have been known to the men of those days in this part of the world. From the character of the implements chiefly in use the age has been called the Palæolithic or old stone age.

These Palæolithic men seem to have been nomads, hunters, and fishermen, who followed the courses of the rivers and streams, and penetrated the forests in pursuit of game, from time to time making their home in caves, or under sheltering rocks, where they have left behind them the traces of their former presence, buried, together with the bones of the animals, in the accumulations of gravel or soil which have formed during the long ages which have elapsed since they lived.

During the Pleistocene age, which must have been a greatly protracted one, the climate, at first temperate, became gradually colder, and with the increasing cold the arctic mammalia made their appearance; the prevailing conditions seem to have been severe winters, and correspondingly hot summers. During all this time man was passing through slow stages of culture, but never emerged from his wandering existence as a hunter and fisherman. He was possessed of no domestic animals, not even the dog; he was not acquainted with the art of making pottery, and he did not as a general rule bury his dead.

Now a time came when the conditions which prevailed

over this part of the world during Pleistocene times, underwent a great change. It is difficult to say precisely what was the immediate cause of the change, or what was its exact nature, but the result was that the old fauna had mostly disappeared, some of the animals became, as has been said, extinct; whilst others sought new homes, some in the colder regions of the north, others in the warmer climates of the south. But not only had the animals changed, but Palæolithic man himself also disappeared with them. It has been thought, as I have previously shown, that with the reindeer his retreat was northwards, and that amongst the Esquimaux and allied tribes, we may yet trace his descendants. However this may be, at the beginning of the age which is now to engage our attention, men of a different race, or races, and differing much in their culture and manner of life, made their appearance; and we find this part of the world occupied by certain races of men whose representatives may probably be found even now amongst the populations of Europe.

As we look into the history of this age we shall find that we have no longer to deal with mere wandering tribes of hunters, but with peoples who, if still to some extent nomadic, were pastoral, and partly settled in communities, who had also learnt to domesticate certain animals, such as the ox, sheep, goat, dog, and pig, as well as others; and who were also in possession of the rudiments of agricultural knowledge, and cultivated the cereals together with certain other plants, and some of which had advanced so far in civilization as to construct regular dwellings. These people also buried their dead sometimes in caves, but yet more often under cairns, in mounds, and in those remarkable erections known as Cromlechs.

These men were still in what we term the Stone age of human culture, they had no acquaintance whatever with metallurgy, but from the fact that they were no longer content with the mere roughly chipped tool or weapon of their predecessors, but often ground and polished their stone implements, the age during which they lived is called the Neolithic, or New Stone age, it has also been termed Pre-historic, but as this would apply equally well to both the Palæolithic and the Bronze age of later date, the term Neolithic seems to be the most characteristic. As far as present evidence goes there appears to be a remarkable break between the Palæolithic and the Neolithic age, there

does not appear to be any clear overlapping of the two, such as one would expect to find if the change was brought about simply by the invasion of the regions occupied by Palæolithic man, by other races. It almost looks at first as though the Pleistocene age and Palæolithic man, together with the wild fauna of the period had disappeared abruptly, and that there was an interval between their disappearance and the coming of their successors, which we cannot as yet bridge over.

Some continental writers it is true do not allow that there was any break, and hold that the Neolithic men came in amongst the Palæolithic cave dwellers as a conquering race, driving them before them, as later races have been driven by invaders, and either exterminating or absorbing them.

There must have been at the close of the Pleistocene age, a culmination of various terrestrial changes, and consequent changes in climatal conditions, which very deeply affected the fauna of Europe, the increased temperature would drive the arctic species northwards, and amongst these the reindeer, and if the men followed the reindeer, there may have been, as de Mortillet supposes, an interval during which man may have nearly disappeared from Central Europe. During this age various accumulations formed, some of which covered more or less deeply the traces of the pre-existing age. Then in course of time other races of man made their appearance, coming into Europe from the East, or as some suppose, at any rate with regard to one branch of these immigrants, from the North-east; and now we see new manners and customs, a new form of industry, and a new mode of life introduced. If any of the original inhabitants were left, they would be so merged in the overwhelming tide of new comers, as to have left no trace of their existence, unless it may be found, as some think, in certain physical characteristics which may from time to time be detected amongst the later populations, occasional reversions or atavism, reproducing some of the features of the old Palæolithic stock. But apart from this there is as yet little or nothing to link Palæolithic man with his Neolithic successor.

The climate of the period on which we are now entering, was pretty much that of the present day; the great cold had passed away, the glaciers had retreated far up the mountains, the rivers for the most part had shrunk to their present volume, and the only evidence now left of their former level and of their great work of denudation is to be found in the deposits of gravel and clay distributed on the flanks of the

valleys high above the channels which the rivers now occupy. Not only had a change come about in the fauna, but an equally great one is observed in the flora; as the climate became warmer, new plants made their appearance, a curious evidence of this change has been found in Denmark, where in those great mosses which are there called "skovmoses," the pine tree is seen to have preceded the oak, whilst the oak appeared before the birch and the beech, the alder, and the hazel.

Let us now turn to the men and see what traces they have left behind them of their presence in these countries, and what we can learn as to their manner of life; and also endeavour to discover to what existing race or races of mankind they may have belonged.

The Kjökkenmöddings.

At various points on the Danish coast are heaps of refuse, consisting largely of oyster and other shells, the bones of animals, and the flint implements of man; these accumulations are termed Kjökkenmöddings, literally kitchen-middens, they are beyond all doubt the remains left by the men who then dwelt on the shores of Denmark, and whose relics are also found in the great mosses of that country. These men appear to have been the earliest to enter Scandinavia, and although classed amongst the Neolithic populations, their culture was not so advanced as was that of the Neolithic men generally; no polished implements have been found amongst the shell heaps, nor any trace of agricultural knowledge, they were not a pastoral people, but lived entirely on the products of the chase or of the sea, and had no domestic animals save the dog, the marks of whose teeth are abundant on the bones present in the Kjökkenmöddings. Amongst the animals whose remains are found were the Urus, the great wild ox, which was familiar to the Palæolithic hunters, the red deer, the reindeer, which had not entirely disappeared from this part of Europe, the fox, the lynx, the wild cat, the goat, the wild boar, the wolf, the badger, the beaver, and the seal, and there were also certain birds, such as the wild swan, the goose, the duck, the grouse, and the penguin. Many bones of various species of fish, and enormous quantities of oyster shells, as well as other shells help to swell the heaps. The traces of man's presence are also abundant, such as unpolished but chipped stone implements, and many made out of bone or antler, such as needles, awls, fish-hooks, and combs; fragments of pottery are also met with.

Whether the dog was actually domesticated and used by these men in their hunting expeditions, we cannot know for certain, but that it was sometimes eaten is evident from the traces of cuts on the bones, they may, however, have been driven to use their ally for food in times of scarcity.

A somewhat curious difference between the mode in which these early inhabitants of Denmark ate their food and our own, has been revealed by the condition of the teeth found in some of the human jaws, the front teeth as well as the back were made use of in mastication, clear evidence in the worn and flattened crowns of the incisors shows that these were used as grinders as well as the molars, this peculiarity is said still to be found amongst the Greenlanders, and it also existed amongst the ancient Egyptians.

That they cooked their food is evident, as amongst the shell heaps remains of hearths with charcoal and calcined stones occur.

It is reasonable to expect that where men inhabited the sea coast similar habits of life should be prevalent, and therefore it is not surprising that ancient Kjökkenmöddings should be found in all parts of the world; examples are met with on the Swedish coast, in Cornwall, I have also seen traces of them in Glamorganshire and Carnarvonshire, others have been found in Ireland, on various parts of the French coast, in Portugal, and Sardinia. Shell heaps of a similar character containing the works of man occur also here and there on the shores of the United States, as well as in Brazil, and even in Japan and Australia.

In Portugal and also in Brazil the Kjökkenmöddings contain the skeletons of human bodies which had been interred, often, if not always, in the doubled-up position so characteristic of the Neolithic burials.

In discussing the shell heaps of Denmark and Portugal, and dwelling upon the fact that polished stone implements were apparently unknown as yet, and that no traces of domestic animals except the dog are found, and also that no agriculture was practised, Dr. Verneau concludes that the men who accumulated the heaps were really the remnants of the old Palæolithic race, and mark the transition between the Palæolithic men and their Neolithic successors.

I shall refer again to the question of the races present in Europe during the Neolithic age, when I have passed in review the principal evidences of their existence.

Caves.

Caves were still frequently made use of as dwellings, as well as for burial places, and in the upper part of the floors of many of those which contain remains of the Pleistocene age and of Palæolithic man, we find the bones of a more recent fauna, and also the implements and pottery of Neolithic times. Many of the French, Belgian, and British caves, as well as others in Italy, Spain, and elsewhere, are rich in remains of this age, but the most interesting relics of Neolithic man are found amongst dwelling places of a different character, and in tombs of a special type.

Houses and Forts.

We have observed that when Neolithic man made his appearance in Europe he brought with him domestic animals, and that he was also to some extent an agriculturist. This implies that his manner of life must have been of a more sedentary nature than that of his predecessors, and we have facts to prove that this was really the case ; that families or tribes gathered together in settled communities, and built houses, or huts, which they inhabited for a length of time. Sometimes fortified stations were formed on high ground within which circular pits dug in the soil and roofed over with wattled huts were the dwellings of these people. At Fisherton, near Salisbury, a number of such pits have been found containing the relics of their Neolithic occupants ; these prehistoric dwellings were bottle-shaped, having a depth of from seven to eight feet, with a narrow circular opening of about three feet at the surface, and widening at the bottom to from five to seven feet. Very similar dwellings occur in France as well as in many other localities. On the elevated plateaux of Chassey (Saône-et-Loire), also at Campigny (Seine-Inferieure) such pits are found, at the bottom of which were seen the hearth-stones with ashes in the centre, and also the remains of the food and the implements of their former inhabitants.

In some parts of Scotland, as in Caithness and Shetland, the remains of Neolithic habitations of a different character occur, these, which antiquaries term burghs, are built of rough stones and must have been of considerable strength, for some of them, or very similar ones, were occupied as fortified posts in the 13th century.

That intertribal war was no uncommon occurrence is evidenced by the fact that human bones still transfixed by flint arrow heads have been found in several localities in France, amongst others by M. Prunières in the Lozère.

On the chalk downs of the south of England may be traced the lines of old fortified stations which are proved to have been Neolithic by the presence of numerous stone weapons such as lance and arrow heads, and axes, and within them are also found the old pit dwellings previously described. Similar forts and camps are found in many other parts of this country, and also in Belgium and in France. In Belgium a notable example is that of Hastedon at Namur, it is situated on a flat-topped hill, and surrounded by a rampart of rough stones, within its area great quantities of flint weapons and implements as well as pottery have been found.

General Lane Fox has observed that these Neolithic forts were constructed with considerable military skill, so as to defend the rich pasturages, and afford shelter and protection against raiding attacks; their great number seems to show that the population must have been numerous, and was probably split up into rival and often hostile tribes.

Lake Dwellings.

Amongst the most remarkable remains of the Neolithic age are those of lake dwellings, which have been discovered in various places, more especially in Switzerland. In the shore deposits of many of the Swiss lakes, or still beneath the waters, have been found vast numbers of ancient wooden piles driven into the mud, and amongst these the relics of the men whose habitations were constructed on the piles, in a similar way to those which are still in use amongst the natives of New Guinea, South America, and of the Malay Archipelago. According to Herodotus such lake dwellings existed in his time in the lakes of Roumelia, and similar constructions were in use in Italy, Bavaria, France, Scotland, and Ireland, etc., during the Neolithic and the succeeding ages. Amongst the most noted for the abundance of the antiquities found in them, are the stations of Robenhausen on Lake Pfeffikon, Wangen on that of Constance, Moosseedorf, Concise, and S. Aubin on the Lake of Neuchâtel, and Meilen on the Lake of Zurich.

The labour involved in the erection of such villages must have been immense. At Wangen, for instance, it has been

calculated that no fewer than 40,000 piles must have been driven into the bed of the lake, and as many as 100,000 at Robenhausen, this latter station covered an area of at least 120,000 square feet. As means of felling the great number of trees required, the only implements the men could have had would have been the stone axe or wedge, and fire, then the piles had to be driven into the bed of the lake, sometimes at as great a distance from the shore as forty or even ninety yards, and if the bottom of the lake was rocky, the piles were held in position by great masses of stone being dropped between them. On such piles platforms were made, on which the huts were erected, and thanks to the fires which so frequently destroyed these pile-built villages, we are able to form a very good opinion as to how the huts were made, and what their appearance must have been; amongst the debris buried in the mud and ashes found at many of the lacustrine stations, flat masses of burnt clay occur, smooth on one side but bearing marks of interlaced branches on the other, leading us to the conclusion that the houses would have been made of tree trunks bound together by wattle-work, and lined with clay, the curved forms of the burnt clay which has been found also show us that the huts must have been circular, and with conical roofs.

These lake dwellings would in those days have afforded a fair amount of protection against human foes, as well as against the attacks of wild beasts. Canoes laboriously hewn and hollowed with the aid of fire, made of single trunks of trees, have been found which would very probably have helped the lake dwellers in their fishing expeditions. Similar vessels would have enabled the Neolithic people to cross the channel between this country and the continent from which England was now severed.

The lake stations are wonderfully rich in antiquities, and shed a very considerable amount of light upon the life and civilization of the Neolithic age. Metal was not yet in use, but a great variety of tools, implements, and weapons, were made out of different sorts of stone, and also out of bone, and antlers of deer; amongst these were arrows, javelins, harpoons, needles, fish-hooks, pins, hammers, picks, daggers, combs, spindle whorls, and numerous other objects, pestles, and mortars of granite, and whetstones. Then hand-made pottery of a coarse character was in use. As far as has been discovered the men of Palæolithic times were unacquainted with the potter's art. It is true, one or two

more or less doubtful instances of the occurrence of pottery amongst Palæolithic remains have been brought forward, but until further evidence has been found we may venture to credit Neolithic man with the honour of introducing pottery into Europe. The vases and urns which have been found are often very rude in character, and the clay of which they were made contains crushed stone, spar, or broken shells, the potter's wheel was not in use, and the baking was of a somewhat superficial kind. Some of the pottery was ornamented with lines and indentations, fingernail marks and cross hatchings.

Articles of personal adornment occur in large numbers amongst the piles, such as perforated shells and teeth; necklaces, bracelets, and head dresses were formed out of them, and have been found in connection with skeletons in some Neolithic interments. Bone, and also stone rings and bracelets have been discovered, both in the lakes and also amongst objects of this age in other localities. Beads of bone, shell, amber, jade, spar, jet, rock crystal, and even turquoise have been found, and also buttons.

Agriculture.

I have referred to the fact that the Neolithic men were to some extent agriculturists; this is proved by the remains of various plants, which, thanks to their carbonisation by fire, have been preserved in the mud of some of the lacustrine stations. Not only did these people eat such fruits as they could procure in a wild state, but they apparently cultivated the apple, and made efforts to improve it, they also used to cut the fruit in halves or quarters and dried it as a provision for winter. From the presence of great quantities of the seeds of the raspberry and blackberry which have been found, M. de Mortillet thinks that the Neolithic lake dwellers were actually in the habit of preparing from these fruits a fermented drink, if so, we find here the trace of the most ancient alcoholic liquor known. This need not surprise us as we find many of the existing uncivilized races in all parts of the world in possession of some form of intoxicating drink.

The cereals were known and cultivated. Three varieties of wheat were grown, one of these being the Egyptian (*Triticum turgidum*). Oats and rye were apparently unknown during the Stone ages, but millet and also two kinds of barley have been found, cakes or biscuits made of coarsely

ground flour were amongst the articles of food used by the lake dwellers. Flax was cultivated and spun into thread or twine, out of which coarse tissues were woven, which may have been used for clothing, but it is probable that the principal articles of dress were still made from the skins of animals.

Stone Implements.

To refer once more to the stone implements of this age, many of these were carefully ground and polished, admirable axes having been thus made, which as well as other stone tools and weapons, were fitted into handles made from antlers of deer, and also of wood. The stone axes or celts, as they are often called, were amongst the most common implements in use during the Stone age, and are found of different sizes, ranging from one or two inches in length up to as much as twelve or more. The stone axe was in fact, as Sir John Lubbock has well said, "pre-eminently *the* implement of antiquity, it was used in war and in the chase, as well as for domestic purposes." It is not therefore surprising that great numbers should have been found, not only in connection with the lake dwellings, but wherever man, not having metal at his command, was present, and it is a noteworthy fact, that such axes, almost identical in form, have been met with in almost every part of the world, not only in the so-called old world, but also in America, as well as amongst the inhabitants of the Oceanic Islands. Various kinds of stone, as I have said previously, were made use of for the manufacture of weapons and tools, but flint was that most commonly employed, wherever it could be got, and great pains were taken to secure a sufficient supply of this material. In various places, where beds containing flints were found, regular workings were sometimes undertaken, pits of considerable depth sunk, and levels driven through the chalk rock, whilst important manufactories of the implements were established round these mines. Amongst the best known of the Neolithic implement factories are those of Mur-de-Barrez (Aveyron) in France, that of Spiennes, near Mons, in Belgium, and others in this country, at Cisbury, and near Grays Thurrock in Essex, also at Grimes Graves near Brandon; in these old workings and around them, not only have flint implements in every stage of manufacture been found, but also the picks made from the antlers of stags, as well as massive celts and wedges, which had been evidently

used in the work of extracting the flint nodules. At Brandon little cups of chalk have been discovered, which, when filled with grease and supplied with a wick, were probably the lamps used by the prehistoric miners in these subterranean workings.

The implements made at these factories appear to have been very seldom polished on the spot, that part of the work being left to the purchasers; this is pretty evident, the polished specimens found are very few and far between, and are also often merely broken tools, at such great manufacturing centres as Spiennes or Cisbury. A yet earlier factory, which is thought to have been a centre of distribution during part of the Palæolithic age, as well as during the Neolithic, is found at Grand Pressigny in France. From this locality, not only implements, but the unworked flints themselves appear to have been exported far and wide, as tools and weapons made of the peculiar flint of Pressigny have been found in far distant places, not only in France, but also in Belgium, and doubtless an extensive trade in flint implements as well as in other articles was carried on throughout the Neolithic period all over Europe.

In Denmark several factories of implements have been discovered, one of these was on an elevation or islet in the Vestermosen Bog in Laaland, this bog was in ancient times a lake, and on the islet were found an enormous number of flint implements similar to those met with in the Kjökkenmøddings, flakes or knife-like forms and awls, scrapers and saws, more than one thousand arrow-heads, and hammers, also a great quantity of waste chips. The hearths and the broken bones of animals left by the makers of the implements, as well as worked stags' antlers, and bone tools and needles, also some remains of ottery, were found in the same locality.

In other places, implements of a still higher type have been found, thus in the Island of Anholt in the Kattegat, flint crescents, and triangular lance heads occurred. In the wood of Bakkebølle Fredskov near Vordingborg, a factory of polished implements was met with as well as of others.

Many of the finest of the Neolithic flint implements have been obtained from the tumuli of Denmark, in which, beside the remains of the dead, weapons of flint, most marvellously made, have been found, similar ones have also been discovered in some of the bogs, magnificent lance heads, and daggers of quadrangular section and zigzagged edges, which

have been chipped into shape with extraordinary skill, stone axes of most perfect and graceful form, some of which were pierced for the reception of the haft, are amongst the treasures of Neolithic workmanship, which are the admiration of all who have seen them.

Burial.

The tumuli or dolmens in which the Neolithic people buried their dead were constructed with great masses of rock, forming a funereal chamber or vault, which was then buried under a great amount of soil. As a general rule the bodies were interred in a crouching or doubled up position, sometimes many of them together in a single tumulus, and with the bodies numerous weapons and ornaments were buried.

Some have thought that the custom so generally prevalent during this age, of burying the dead in a doubled-up attitude, was symbolical, the body being returned to mother earth in the attitude of the unborn child in its mother's womb, an expression of a hope that from the womb of earth they should one day be born again. It is curious to note that the ancient Peruvians practised a similar mode of burial.

Burial in tumuli, dolmens, or cromlechs seems to have been practised in prehistoric times all over the world; varying in mode of construction and form, yet the idea is similar everywhere, some of these date back to the Stone age, others belong to the Bronze age, whilst some are as recent as to come within the range of history.*

In Denmark amongst the Chambered tumuli some of the funereal chambers are approached by a passage, formed out of blocks of stone, "Ganggraben" or "passage graves," these bear a striking resemblance to some of the dwellings constructed by various races, and it has been surmised that some of them may actually have been dwellings, but as sometimes the ordinary houses were used as burial places, amongst existing peoples, so may it have been during the Neolithic age. Professor Nilsson thought that the Danish "Ganggraben" were in fact "a copy or development or

* Many of the great stone circles met with in various parts of this country, as well as on the continent, have been considered to have been originally the burial places of important chiefs and used afterwards as temples, thus consecrated to the memory of the dead.

adaptation, of the dwelling house, that the ancient inhabitants of Scandinavia, unable to imagine a future altogether different from the present, or a world quite unlike our own, showed their respect and affection for the dead by burying the house with the owner, and the grave was literally the dwelling of the dead. When a great man died he was placed on his favourite seat, food and drink were arranged before him in earthenware vessels, and his weapons and ornaments placed by his side," and all buried together.

Religion.

I have alluded to the probability that the Neolithic burial customs denoted a belief in a future existence.

There can be little doubt that Neolithic man had some of the elements of religion, whatever may be said as to his Palæolithic predecessors. This elaborate burial of the dead in conjunction with his arms, ornaments, and domestic appliances seems surely to denote a certain amount of belief in a future existence after death. Occasionally what appear to be only models of some of the implements, such as axes or celts were buried with the corpse, such miniature weapons being sometimes made of jade or of amber, in some instances these have been found pierced as if for suspension, others intentionally broken in half have also been found.

In France sculptured figures of stone celts or hammers have been found on some of the stone blocks at the entrance of sepulchral chambers, such sculptures are not infrequent in Brittany, suggesting the thought that here, as amongst some of the ancient Eastern peoples, the axe was on account perhaps of its great utility an object of veneration.* Besides these figures there are others cut in the stone, such as spirals and various geometrical designs which may or may not have been symbolical.

M. Cartailhac and others have called attention to certain curious cup-shaped hollows evidently of artificial origin, and found in groups on rocks in Brittany and in the Pyrenees, and other parts of France, and also in Switzerland and in India, which have been objects of superstitious observances from time immemorial, whatever may have been their original significance.

* This we can well believe, as at a far later date we find that the Rajpoots in India were in the habit of worshipping their swords.

But of all the facts bearing upon the religious ideas of Neolithic man one of the most remarkable is the practice of trepanation, and the manner in which this very critical operation was performed shows that these early men were possessed of no slight amount of surgical skill. Trepanation was, as far as the evidence goes, frequently practised amongst them, and this apparently not as an operation after an accident to the head, but it was performed upon the living subject, sometimes even more than once, and most frequently on the young, even on children. This was certainly a most extraordinary practice, especially when we consider that the only surgical instrument available must have been the sharp flint flake.

The mode of operation seems to have been to scrape the skull gradually until an oval perforation was produced, a similar operation is we are told still carried out amongst some of the natives of the Pacific islands in a similar manner with a piece of glass; and Dr. Verneau says "with such skill that it is very seldom that it is not successful." That the skull was trepanned during life by the Neolithic men is evident, and also that it did not prove fatal, since the wounds and the edges of the perforated bone had healed.

Various surmises have been made as to the object of this strange custom. M. Broca supposed that in cases of epilepsy and such like diseases the skull was thus pierced in order to set free the evil spirit to whose presence such complaints were attributed; if this was the case then we have, as Dr. Verneau well says, another proof in this practice of belief in the supernatural, amongst the Neolithic races. He also mentions some other facts, viz., that whilst trepanation during life was performed by scraping down the bone, the skulls of the dead were also sometimes trepanned by sawing, a method which would have proved fatal to the living subject. The fragments of bone thus removed have been found and were sometimes placed inside other skulls than those from which they have been cut; they were also occasionally pierced with a hole and were probably regarded as amulets.

The conclusion to which we are brought is that trepanation was practised with a view to freeing the individual from evil spirits, and that probably persons who had been thus treated may have been regarded with superstitious veneration, and after death pieces were also cut from their

skulls to be worn as talismans or amulets. M. Sören Hansen rejects this latter view, and believes that those perforated skulls in which there is no sign of healing having commenced, are simply those of persons to whom the operations had proved immediately fatal, but however true this may be in some cases, it does not apply to those where, as we have seen, the hole in the skull was made with a saw, an implement that would probably have been never used on a living subject.* But there is yet another view of the matter suggested by M. Broca in presence of the fact that the individuals who had been trepanned were almost always the young, and therefore in such cases the operation may have been of a ceremonial character, a rite of initiation into some sacred caste. M. de Mortillet has traced a reflection of this prehistoric rite in the tonsure of the Roman priesthood. Anyway, whatever view we take there seems to be good reason to see in this Neolithic practice, as well as in other usages amongst the prehistoric races, some evidence that they were not quite devoid of religious ideas.

Neolithic Race.

Having thus reviewed some of the chief facts ascertained in connection with the Neolithic men, and having made ourselves acquainted with their manner of life, their varied ornaments, and dwellings, as well as their burial places and customs, we have in conclusion to make an effort to discover, if possible, who these Neolithic people were, and whether it is in our power to connect them in any way with the existing populations of Europe.

This part of the subject is involved in much difficulty, for we have little to guide us, save such anthropological data as have been furnished by the human skeletons and especially by the skulls in the burial places of this age, and also by such indications as may be furnished by some of the works of these men.

As far as can be gathered from the evidence before us, the Neolithic race was not simply the old Palæolithic race advanced to a higher state of civilization during the course of long ages; the facts which we have seen seem to show that after the disappearance of the Palæolithic men, together with

* M. de Mortillet, however, says that sometimes the flint saw was used on the living subject without fatal result.

the Pleistocene fauna, a new race of men entered Europe, and did so probably from the East. We have noticed incidentally amongst the various ornamental objects of the Neolithic age certain beads made out of turquoise, a material which was known to the ancients under the name of "Callais," the precious stone described by Pliny, and which in his time was derived from the Caucasus, and from even more Eastern localities than this; beads of this material have been found in tolerable abundance in the dolmens of Brittany, in Southern France, and also in Spain and Portugal; but no European source from which turquoise could have been obtained is known. Another stone which was frequently used during this age, and which occurs very sparingly in Europe is jade, and implements of this material, which is common in certain parts of Asia, are met with all over Europe, and were evidently much valued. Another thing which points towards the East is the oriental origin of the cereals, and also of some of the animals which were introduced by the Neolithic race, and which were domesticated by them. Amongst the animals was the dog, which M. de Mortillet is inclined to connect with the wild species still found in India. The goat he derives from the wild "*Capra egagrus*" an oriental species, whilst the sheep and the pig also find their representatives in oriental regions, the former being closely connected with the "*Musimon musimon*" or Moufflon sheep of Corsica, Sardinia, Cyprus, and Asia Minor, and probably also with the allied Tartar species the "*Musimon argali*." M. de Mortillet thinks the domestication of these animals, as well as of the horse, and the ox, originated in that region where all of them, together with others, were to be found assembled as they were not elsewhere, viz., the area comprised by Asia Minor, Armenia, and the district to the south of the Caucasus. It seems on the whole probable that migrations amongst the human family took place, as I have said, towards the beginning of Neolithic times, and it is also probable that more than one race took part in this movement, as there is evidence derived from the different types of skulls met with, that together with a Dolichocephalic or long-headed race there were numerous representatives, and especially towards the close of this age, of a round-headed or Brachycephalic race. It was thought many years ago now, by Dr. Thurnam that Britain was inhabited during the Neolithic age by a Dolichocephalic race which towards the

end was invaded by the Brachycephali, who were the first to introduce bronze into Europe. There is no doubt that in this country the long-headed race was the earlier of the two, but when we turn to France we find both races in close contact during Neolithic times, thus in the "Trou de L'homme Mort" near Vialle (Lozère) M. Prunières found a number of skulls belonging to a Dolichocephalic race with small features and of short stature, whilst in other caves in the same district as well as elsewhere, both types of skull have been met with, as well as some of an intermediate character, denoting a probable intermingling of the races. The oldest Neolithic skulls found in Spain are of the Dolichocephalic type, and recent discoveries have shown that there as well as in France and Britain the Brachycephali were the later comers. Can we identify any of these men with those of modern times?

A considerable number of eminent authorities, amongst which are Professors W. Boyd Dawkins, George Busk, Huxley, Dr. Thurnam, M. Broca and others have considered that the long-headed small race, with black hair, and dark eyes, found in Western Europe, and represented they say by the Basques of the North West of Spain, and South West France, as well as by a similar featured people met with in Brittany and in our islands, are directly connected by blood with the Neolithic Dolichocephalic race. M. Broca thought the Basques were identical in race with the Kabyles and Berbers of Northern Africa, the ancient Lybians being of the same stock, and to these have also been joined the Guanches of the Canary Isles, whose manner of life and civilization was said to be similar in very many respects to that of the Neolithic age. Dr. Verneau would however carry us further back, and holds that the Guanches were refugees belonging to the old Madeleine race of the Palæolithic age, which he calls the race of Cro-Magnon, although the Cro-Magnon skull has been shown to be Neolithic by M. de Mortillet who however looks upon the so called Cro-Magnon race as being directly descended from that of the Madeleine epoch.

But now we are met with various difficulties in connection with these race questions; there appears to me to be some confusion amongst the different authorities as to what are the true characteristics of some of these races. As we have seen, a number of authorities describe the Basques as a long-headed, small, and black-haired, black-eyed,

swarthy race ; and also tell us that the Lybian or Kabyle-Berber tribes and the Guanches of the Canaries were all of the same blood. This is the Cro-Magnon type of M. de Quatrefages, the Silurian of Professor Rolleston, the Berber or Iberian of others, and amongst their representatives these writers class the Welsh of Denbighshire, the Irish of Kerry and Galway, some Scotch, the Spanish Basques, the Corsicans, Sicilians, Berbers, and Guanches, and their pre-historic remains are found, we are told, in the long barrows, as well as in the Genista Cave (Gibraltar). Their physical characteristics being Dolichocephalic orthognathous, with an oval face and swarthy complexion, and dark curly hair. Their stature was short, averaging 5 feet 4 inches ; and their muscular development is described as feeble. The languages of this stock have been classed as Hamitic. But then we also find another short and dark people with black straight hair and dark eyes, but with distinctly Brachycephalic skulls (c. index 84). This is the race which M. de Quatrefages calls that of Furfooz or Grenelle, which is also Broca's Keltic, the Lapponoide of Prüner Bey, M. Rütimeyer's Dissentis type, also the Ligurian ; to this type I find attached by these authorities the short dark people of Central France, the Auvergnats, and Savoyards, and also the French Basques as well as the Lapps. Their language is said to be represented by the Basque. M. de Quatrefages' theory is that the Cro-Magnon race which, according to him, buried in caves, was overcome and incorporated by that of Furfooz or the Auvergnat race, which buried in cromlechs, and imposed their language upon the conquered tribes. These dark short Brachycephali are termed dark Kelts by Professor Sayce. Drs. Prüner Bey and Carter Blake both observed the peculiar formation of the skulls of this Furfooz or dark Keltic race, to use Professor Sayce's name, and they dwell upon the angular contours, and lozenge-like shape of the face, and the high cheek bones. Very different are these skulls from those of the Aryan stock with their oval contours, and both the above writers class these Brachycephali with the Mongol or Turanian ; they also, as well as Le Hon, consider them to have been represented by the Ligurian or Iberic race found in Hungary, the Tyrol, Liguria, and in the Pyrenees amongst the Basques, as well as in Finland and Lapland. Professor Sayce separates them, however, from the Euskarian or Basque, who were, he says, Dolichocephalic. Professor Boyd Dawkins, as we have seen, identifies the short dark Dolicho-

cephali of Neolithic age with the Basques on either side of the Pyrenees, and with these he and others have connected the Lybians, Kabyles and Berbers, as well as the Guanches. But we are now told by Professor Sayce that the Guanches, the Lybians, and Kabylo-Berbers belonged to a blond, tall, Dolichocephalic race, with fair golden hair, blue eyes, and a clear freckled skin like the fair Kelt, and also like the Riffs of Morocco. Professor Sayce identifies all these with the Amorite race of Old Testament history. The typical skulls of this race are met with in the Neolithic cromlechs, which we find ranging from North Africa through Western Spain and France to Great Britain and Scandinavia, and which are also met with in Saxony, Mecklenburg, in Circassia, and in the neighbourhood of the Dead Sea. It may be added that the Guanches have been described as "a tall, handsome race of men, with yellow hair reaching below their waists."

There appears then to be some amount of discrepancy and consequent confusion with respect to some of these races. With regard to the Basques there must be, according to the above views, at any rate, two different races represented by the peoples who now pass under this name, viz., the Cro-Magnon of de Quatrefages, Dolichocephalic and dark, and the Furfooz race of the same author, which was Brachycephalic.

The tall, blond Amorite race of Professor Sayce seems to be equivalent with de Quatrefages' Canstadtian, which is the Scandinavian of Dr. Penka, who identifies it with the primitive Aryans, the Robenhausian lake dwellers of de Mortillet. The theory of Dr. Penka and other authorities who support his views is that the blond Dolichocephalic Scandinavian race "spread southwards during the Neolithic age, imposing its yoke on other populations, carrying with it the dialects which developed into the Aryan tongues," and at a still earlier period the same race formed part at any rate of the older Palæolithic inhabitants of Western Europe, leaving as traces of their presence the well-known skulls of Engis and Canstadt. Dr. Penka attributes the blanching of the skin to the prolonged residence of the race in their Northern home, but were this the case, may we not ask how it is that the Esquimaux and other dwellers in the Arctic and Sub-Arctic Zone, have for unnumbered ages retained their dark complexion and hair? We have on a previous occasion found reason to connect this Northern race with the Palæolithic age. Dr. Penka has also made reference to the

animal remains found in the Kjökkenmöddings, the names of which he says are common to the Aryan languages of Europe, whilst the human skulls found in the prehistoric graves of Scandinavia are said to be identical in type with those of the existing inhabitants.

But there are, it seems to me, certain difficulties in admitting the identity of the Neolithic men, especially the lake dwellers of Switzerland, with the primitive Aryans; these, we are told, had not domesticated the horse, or the pig, nor had they become acquainted with the sheep; yet the remains of these animals are found amongst the lacustrine dwellings; both the pig and the sheep are common in all the Neolithic settlements, although the sheep occurs later in time, and does not appear to have been so abundant as the other animals; Professor Rüttimeyer thought that the pig was not domesticated in Switzerland till the Bronze age. Then there is another curious thing to be noted in this connection, which is that whilst there is abundant proof that the lake dwellers were acquainted with, and made use of flax, yet the old Aryans do not seem to have known it, whilst at the same time they were familiar with hemp from the very first, and hemp has not been met with amongst the Neolithic remains. Another important point for us to consider is that the Neolithic lake dwellers were certainly unacquainted with the metals, but it has been asserted that the primitive Aryans were familiar with some of the metals before their migrations, and they had learnt the art of metallurgy from a non-Aryan race before their separation. How is it, then, that they are found, as Dr. Penka tells us, in Central Europe in Neolithic times utterly ignorant of metals in any form? It appears to me to be more probable that the Aryans should have been the introducers of bronze into Europe than that they should have been at first ignorant of it, and learnt their metallurgy there as the Neolithic age drew to a close.

The general conclusion to which I am inclined is that at the beginning of the Neolithic age Europe was occupied by a dark non-Aryan race, or races, which gradually overspread it, the general course followed being from eastwards towards the west, and that both the fair-skinned races, the Dolichocephalic blond type, as well as the Brachycephalic redhaired Kymric, made their appearance at a somewhat later date. Professor Sayce, who says the tendency of modern research is to identify the Aryan type with the first of these, is

careful to point out that by this term Aryan is only meant the speakers of the parent speech, whilst the race itself may have been of a mixed character.

In conclusion I may notice a curious fact which tends to show that the darker races did, as a fact, precede the lighter in Europe, and that is the well-proved tendency of the blond type to die out. When two different races encounter one another and intermarry, one might be inclined to suppose that an intermediate type would be the result; but this is the case to a limited extent only, the real tendency is to perpetuate the stronger type of the two, and the final result is Atavism, or reversion to the older stock, which, through its long occupation of the soil, has become the stronger as a general rule. Now it has been observed that the fair races of Western and Southern Europe are slowly disappearing, whilst the dark stock is reasserting itself; so that the old Neolithic type, swarthy in complexion and short in stature, will, at some future no very distant date, have overcome the last vestiges of that blond type now present, although present in a minority, over a large part of Europe. This seems to show very clearly that the blond race was the later to make its appearance here, and their original home is not therefore to be looked for in Europe, at least in Western Europe. Whether the Aryan cradle was, as some now think, to be sought in North Eastern Europe is still an unsettled question; whilst a considerable number of facts may be adduced in favour of this view, there are various points which seem to oppose it, and there is a good deal yet to be said in maintenance of the older opinion that the blond Aryans, in common with the other races of mankind, had their original seat in Asia, and it seems to me this view would not be inconsistent with the idea that when the first separation of the human family into its different stocks took place, one portion may have entered North Eastern Europe where it would acquire its fixed characteristics and develop its own forms of speech, whilst at the same time it might, through long absence, forget various things once familiar in the Eastern home, such as certain animals and other objects, which would account for certain philological difficulties.

That metallurgy did not originate in Europe as an original invention of the indigenous Aryan peoples as they slowly emerged from the Neolithic conditions of life appears to be certain. The originators, or, I should rather say, the intro-

ducers of metallurgy amongst the Neolithic populations, whether these were Aryan or non-Aryan, were, as far as can be ascertained, that Brachycephalic race, the remains of which are now to be found in the round barrows, and which are also found mingled with those of the older Dolichocephalic men of Neolithic age. These Brachycephali came from the East, they are described as a tall reddish-haired race, with a freckled skin, prognathous features, and prominent cheek bones; Professor Sayce's Kymric and Belgic, in agreement with Professor Rolleston and M. Broca; it is the Sion race of Rüttimeyer, and, according to Drs. Thurnam and Prüiner Bey, Turanian and Mongoloid. It was this race which probably introduced the Keltic languages into Europe, and with its advent the Neolithic history is brought to a close. The Neolithic races as time passed on, became more and more intermixed, the old civilization was supplanted by one of wider culture, and the stone of early times replaced by metal; the peoples and languages of Europe, as we now know them, were emerging from the dim twilight of prehistoric times.

The PRESIDENT (Sir G. G. STOKES, Bart., F.R.S.).—I will ask you to return thanks to the author of this very interesting paper. (Applause.) I believe there are a good many present who are desirous of taking part in the discussion.

Mr. A. SMITH-WOODWARD, F.G.S.—I am sure we have been greatly interested in all that Mr. Mello has said, especially as it is a great advantage to science to have some one to put together in an authentic manner the precise state of our knowledge of the subject. Unfortunately, the majority of those who take a general interest in science and are not able to refer to original works, have to trust, in many instances, to ordinary compilers who are able, perhaps, to make things a little more readable than those who go deeply into the scientific aspect of the subject. It is really astonishing how some of those works, which are intended to be a *resumé* of our present knowledge, are extreme exaggerations; and, indeed, when those exaggerations are once started, there is no way

of stopping them. We go from text-book to text-book until it seems hopeless to correct any error that may have gone forth. Only lately the papers and journals have been recording the discovery of the grizzly bear in the caverns of Malta. It is true that there have been found teeth and fragments of a lower jaw which certainly belonged to a bear, and a bear very like the grizzly bear; but as a matter of fact no one can tell what species of that animal it was. It is quite hopeless to say exactly what it was, and just because the scientific people who examined it made a suggestion that it was more like the grizzly bear than anything else, that goes forth as an ascertained fact, and no doubt it has been used by many who try to draw definite conclusions from such a result.

To turn, then, to the subject immediately before us. Of course the great question is whether the Palæolithic people, of whom Mr. Mello has spoken, have evolved, on the spot, into the Neolithic people, or whether the explanation of all the phenomena we see is, that the Neolithic races are the new horde which came from the East and displaced the earlier ones. So far as I understand from Mr. Allen Brown's results, he is inclined to think with certain continental authors—as Mr. Mello has said—that the Neolithic are derived by evolution on the spot, so to speak, from the Palæolithic, and that is borne out by a comparison of the implements. It is very difficult from the implements alone to be quite certain, but I believe (and perhaps Mr. Mello will explain) that even yet, notwithstanding all the intermediate gradations, there is found one fundamental difference between the stone implements of the Neolithic times and the Palæolithic. So far as I know, these axe-shaped implements of Neolithic times were all held by the narrow end placed in some kind of handle, whereas amongst the Palæolithic implements, the pointed end was invariably used, while the butt was held in the hand. Whether that difference in the two types of implements has been bridged over I do not know. Perhaps Mr. Mello will inform us. I have seen Danish, Russian, Swedish and American examples, but I have never seen anything to bridge over these types. Again, with regard to the state of finish of these implements; no doubt it is perfectly certain from discoveries in caves and other places that the more elaborate types belong, as a rule, to the later periods; but at the same time it ought to be remembered that extremely elaborate implements do not always indicate superiority of race.

One finds instances of that kind of thing among the modern savages. When Mr. Woodford came back from the Solomon Islands he said he was struck by the way in which the natives of one of those islands had arrived at a remarkable state of perfection in regard to their ornaments, implements and tools; and he found that this was not due to superiority of race, but was rather a kind of outburst of genius on the part of a single member of the race, that, in fact, the whole of the ornaments peculiar to that part of the islands were due to the superior powers of a single man.

Then in regard to domestic animals, with that subject I have a good deal more to do. In the accumulations I have examined there is no difficulty whatever in recognizing the remains of domestic animals. The skeletons were in a remarkable state of preservation and so numerous, and the skulls so good, that there could be no doubt; but I cannot help thinking that in many other instances there is yet room for doubt as to whether the people connected with the so-called Neolithic types really had domestic animals to the extent that is sometimes said, while the Palæolithic peoples had none whatever. For instance, take the case of the dog. It is almost impossible, unless the remains are extremely good, to distinguish large dogs from the ordinary varieties of wolf; and it is extremely difficult in those remains that are found in the refuse heaps in Denmark to be quite certain that these may not belong to some of the wild races of wolves that wandered about at night and nibbled these bones in the way they are nibbled. Again, it is impossible to say whether some of these canine remains in the Neolithic deposits are not the remains of domestic dogs. Lately, evidence of a very curious nature has been accumulating in regard to the Celtic short-horn, that small race of cattle which is said by many people to be peculiarly characteristic of the Neolithic time, and to have been brought into this part of the world by this supposed immigration of the Neolithic people. Several instances have come lately from the London district of doubtful remains of small oxen indistinguishable from the typical Neolithic short-horn; but only recently we have found the very first evidence that seems likely to prove conclusive, and that has been discovered by Dr. Leeson, of Twickenham, who has been watching large excavations in that neighbourhood. Under the true Thames gravel deposits, in a bed of loam containing the bison, the reindeer, and the horse, Dr. Leeson has found bones which he cannot dis-

tinguish from those of the short-horn. It is thus not unlikely that the supposed evidence of the Neolithic people having come from other quarters and brought these short-horned animals with them may break down. I should not like to say that any of these matters are settled, or that those who advocate local evolution are right. I merely mention some of these points to show that there is still a good deal of doubt on many matters that has to be cleared up. I think Mr. Mello has done very great service to those who investigate these subjects, by placing before this Society such an impartial and admirable *résumé* of what is known. (Applause.)

Rev. F. H. WOODS, B.D.—Any remarks I may make on this most interesting paper are rather with a view to information than criticism

1. With reference to the supposed gap between the Palæolithic and Neolithic culture and therefore race distinction, Montelius, a Swedish writer, shows, I think, very clearly that the "Kitchen-middens" must either be regarded as intermediate or as belonging to the Palæolithic age. Excepting the domestication of the dog, and the use of fish-hooks, and probably fishing boats (for there are remains of deep-sea fish) their state of culture agrees with Palæolithic man and differs from Neolithic man, who had all the important animals of the present day and practised agriculture. Again, the difference in the tools between the people of the "Kitchen-middens" and of the Dolmens is as marked as possible. The tools of the first were extremely rude; the latter showed the greatest delicacy of workmanship. If, therefore, we are to divide off sharply the two main divisions of the Stone age, we must put the dividing line between the people of the "Kitchen-middens" and the "Dolmens."

2. With reference to the religion of the Neolithic people, Montelius lays great stress on the "cup-shaped hollows," maintaining that they were certainly used for offerings either "to or for" the dead, and says that some of those in Sweden also are still used for offerings by the superstitious. As to the sitting posture, I should be inclined myself to suppose that was adapted as the most comfortable posture for the departed in a future state. Montelius suggests that the earthenware pots now only filled with earth, contained food for the use of the departed in another world.

3. As to the races of the Neolithic peoples. Montelius observes that in Sweden the dolichocephalic race very largely predominated

and thinks that the brachycephalic skulls belong to the Lapps who were gradually driven north, but continued even in the south of Sweden for a long period, even after the close of the Neolithic age.

4. I think there is an error on p. 273. I cannot lay my hand on Axel Blyth's able essay on the migrations of Flora founded upon his study of the peat-bogs (of Denmark?), but I am morally certain that Mr. Mello is wrong in classing the birch with the beech. In latitude the birch occupies an intermediate position between the mountain willows and the Scotch fir, and its belt is far above that of the oak, *e.g.*, the most northerly beech tree in Europe grows at a point in Alvesta a few miles north of the southern extremity of the Vetter Lake in Sweden. The oak grows in a stunted form on the Hardanger Fjord in Norway, where I have seen it frequently. The birch certainly grows abundantly about Trondjhem, and, if I remember right, much further north. I am almost certain that I have seen it within the Arctic circle. A few birch trees occur in Iceland, some near the northern extremity.

The PRESIDENT.—If no one else desires to speak I will call upon the author to reply.

The AUTHOR.—Before making my reply I must thank you for the extremely kind way in which my paper has been received. I regret that it has not been more criticised and that some discussion did not take place as to these contradictory races, which I must say are an extreme puzzle to myself, and I was not at all sure as to how I was to enter on this question of skulls and races, and upon which there are still such various opinions.

As to what has been said to-night, I am afraid there is not much that I can add. I might mention, in regard to the question that was asked as to the different shapes of the axes of the two periods, it has generally been considered that the Palæolithic axe, as one of the speakers said, has what I may call its *business* end at the point, but taking this Neolithic one, it has been said that the broad cutting end is characteristic of the Neolithic, whereas with the Palæolithic axe this broad end of the axe would be left in the rough, and the axe would be held in the hand in Palæolithic times, or it might be inserted in a holder and the sharp point used. With the Neolithic axe the narrow end would be inserted in a haft and the broad end used, but amongst the Spiennes implements there seems to be what might be thought to be a transition form,

and Mr. Allen Brown, in a paper that he kindly sent me the other day, points out what he considers a transition form between the Palæolithic and Neolithic types both at Spiennes and also at Cisbury; but I think it is the exception.

I do not think the break between the Palæolithic and the Neolithic ages can be bridged over simply by implements, because we find such a marvellous similarity in implements in the case of countries widely separated, as I have already pointed out. We have these celts, so similar, all over the world, and not only in the New World, but also the old world, and yet I suppose one would hardly say that the American forms were directly derived from those of Europe. Man seems to have hit on similar modes of fashioning his implements in almost all parts of the world.

As to the question of the break, although I am inclined to think that at present there is no clear evidence that there is a gradual passing of the Palæolithic into Neolithic civilization, yet, of course, it is very probable indeed that at some points in Europe, Neolithic man may have come into direct contact with the older Palæolithic races which I have assumed to have retreated, with the reindeer, to the north, and to be represented by the Esquimaux and other tribes of the present day. I might just give you a contrast as drawn up by Mons. de Mortillet between the Palæolithic and Neolithic ages. “End of (1) Pal.—Cold climate, dry, extremes of temperature; Neo.—Temperate and much more uniform climate. (2) Pal.—The mammoth, the last of the great extinct species, is present; Neo.—Mammoth extinct. (3) Pal.—The chamois, marmot and roe in the plains; Neo.—The marmot, etc., retreated to the mountains. (4) Pal.—The reindeer, saiga antelope, wapiti, glutton, grey bear, etc., found in mid-Europe; Neo.—These animals have retreated to the north. (5) Pal.—The hyena and large felines present; Neo.—These have disappeared. (6) Pal.—No domestic animals present; Neo.—Domestic animals abundant.” We have had the question raised this evening as to the find by Mr. Woodward of the Celtic short-horn. That was unknown to me, I did not know it had been found, and if so, I shall have to classify the short-horn amongst Palæolithic animals. “(7) Pal.—Man of one type; Neo.—Types of man various. (8) Pal.—Population nomadic; Neo.—Population settled.” It seems to me that that is an important distinction we find in the Neolithic age, that people were in fixed dwellings practising agriculture, whereas in Palæolithic times all seem to be nomads

and hunters without exception. “(9) Pal.—Men are hunters and fishermen—no agriculture; Neo.—Agriculture developed. (10) Pal.—Stone implements unpolished; Neo.—Many implements polished. (11) Pal.—No pottery; Neo.—Pottery in use.” Pottery is also found in the Kjekkenmøddings. “(12) Pal.—No monuments of the dead; Neo.—Cromlechs, etc. (13) Pal.—No formal burial or respect for the dead; Neo.—The dead are carefully buried.”

There is one other thing I did not allude to in my paper which Monsieur de Mortillet points out, viz. :—that in the Palæolithic age the artistic sentiment, towards the close of the Madeleine epoch, was highly developed. The Palæoliths were undoubtedly artists and artists of great feeling, whereas in the Neolithic times the artistic element appears to be absent from amongst the people. The question as to whether the bones found were bones of dogs or wolves is interesting, but I have not gone into it. Large dogs would be difficult to distinguish from wolves. I rather fancy, from what I have read, that the Kjekkenmøddings dogs are, most of them, too small to be mistaken for wolves; but I am not perfectly certain as to that. The question of the implements of the Kjekkenmøddings being unpolished I do not think bears much on the question as to their age, because the polishing of the Neolithic implements, although it is very characteristic of the state of human culture, is not essentially characteristic—for instance, you might find hundreds, I might say thousands, of unpolished specimens against a few polished; yet no one could possibly mistake implements of that type for palæolithic implements. Their forms are essentially Neolithic in character though unpolished. Polishing does not prove very much. With regard to the sitting or crouched posture in burial, of course what I stated as to its meaning is a mere speculation. It is a funny idea to put people in that position to be comfortable. If so, there is still a feeling that there is to be an after existence, and that they wanted a position in which they could feel happy, and it seems to show a kind of idea on the part of those who buried them that consciousness was not extinct and that there was a spiritual existence. An allusion has been made to the cup hollows. I might say that there is one of the Creswell caves—a particular cave called “The Pinhole,” in which is one of these cup hollows, where to the present day the inhabitants are in the habit of dropping pins with the superstitious idea of its bringing them luck.

A note has been handed up to me without a name to it. It is headed "from a visitor for the author to refer to if he sees fit." It refers to an interesting fact. This gentleman says—"Would it be interesting, in connection with the identification of races to mention that the inhabitants of Brandon in Suffolk (to which reference has been made) are supposed to be the direct descendants of primitive man, being a quite distinct race of people from the Saxon or Norman? They are short, swarthy, and black-haired, but of which type of skull I cannot say. Some few years ago the British Ethnological Society journeyed to Brandon and photographed a typical group of this people." Brandon is one of those places of extreme interest where the flint industry has been carried on from Palæolithic times down to the present day, and he goes on to say that they still make a vast number of gun-flints for the savage or semi-savage tribes of Africa. That is very interesting—that they have there that dark, swarthy race which was driven to the extreme west—so to find these people still pursuing their industry, as this gentleman has pointed out, is a matter of very great interest.

I fear I dare not touch on the Aryan question. It would take a very long time to enter at all into a discussion as to other races.

The meeting was then adjourned.

COMMUNICATIONS RECEIVED IN REGARD TO THE PRECEDING PAPER. II.

Sir J. W. DAWSON, C.M.G., F.R.S., writes:—

I thank you for sending me the Rev. Mr. Mello's paper on Neolithic man, which I have read with much interest, and which gives useful suggestions.

I naturally object to "Palæolithic" man being classed as Pleistocene after all I have written to prove the contrary. This may be a mere matter of classification, but it is misleading, unless the term Pleistocene be extended to include the modern, in which case we are still living in the Pleistocene period; of which, indeed, you have had some remains in a recent winter, in the *bordage* ice

on the Thames having sufficient development to transport gravel and stones, as it did when the mammoth lived in England.

I also doubt as to the continued use of the terms "Palæolithic" and "Neolithic," after it has been shown again and again that they have no value except in a very limited local sense. See Holmes's recent papers in *Science* and elsewhere, with reference to supposed American examples.

I also think it unwise to assume so many negative statements respecting Palæolithic men, on points respecting which we are still ignorant, but may know more hereafter.

I am glad that Mr. Mello recognises the break between the Palanthropic and Neanthropic ages, but surprised that, like most other anthropologists, he does not refer to the great physical changes which closed the Palanthropic age, and which were so long ago insisted on by Lyell. The idea also of Palanthropic man migrating northward "with the reindeer" is, I think, very improbable. He might do this to a limited extent in summer; but if he had half the intelligence of modern Esquimaux and North American Indians, he would wait till the winter cold drove the deer to the south, which it must have done down to very modern times.

These remarks relate to the introductory pages. As to the main subject of Paper II, I have nothing to say, except that the remarks on "Neolithic" races seem to me contradictory to many well-established facts; but they relate merely to racial classification, which at present, in this part of human history, has been reduced to a mere chaos, by the exclusive use of certain physical characters as grounds of classification, instead of the adoption of broad general views of all the characters of each race, mental, linguistic, and physical.

Professor E. HULL, LL.D., F.R.S., writes:—

I regret to be unable to be present to hear Mr. Mello's paper and to take part in the discussion. I would only venture to refer to the question regarding the change from the Palæolithic to the Neolithic age. If I mistake not Professor James Geikie offered an explanation which seems to me sufficient. The break in the continuity of the human race in Europe seems to have its counterpart in that of the physical conditions. Assuming Palæolithic man to have been contemporaneous with the epoch of the Lower Boulder Clay, or Till, and Neolithic man to have been contemporaneous with the Upper Boulder Clay, we have (as it

seems to me) a sufficient cause for the change of race in the great depression of the land areas of Northern and Western Europe which intervened between these two epochs. This depression amounts in some parts of the British Islands to 1,300 feet below the present sea-level, but in the south of England and the adjoining parts of the continent it amounted to several hundred feet. In Scotland the depression was over 510 feet, and in Norway it reached about 600 feet. The British Isles were converted into an archipelago of islets, and large tracts of the continental low ground must have been submerged a the period when the high-level gravels of the valley of the River Somme were being deposited. Attempts have recently been made to minimise, or even to deny, the great extent of the interglacial submergence, but as it seems to me with very little success. The evidence is too overwhelming—consisting of the presence of stratified shelly gravels at various levels above the sea. A general depression which caused a large tract of Northern and Western Europe and the British Isles to be converted into sea for a prolonged period may well have caused the breaking up and dispersion of the Palæolithic tribes—and their final extinction or absorption by the more civilized Neolithic races, which as the land rose from beneath the sea-bed spread themselves from the far east—and introduced a higher state of culture than that prevalent amongst the early race.*

Mr. J. POSTLETHWAITE, F.G.S., writes:—

I have read Mr. Mello's paper with much pleasure and profit. Here, in our lake country, we have evidences of the presence of both Palæolithic and Neolithic Man. Of the former, in the shape of rudely chipped stone weapons and implements, and of the latter, in weapons and implements elegantly formed and beautifully polished; also houses, forts, places of sepulture and places of worship. A small collection of both rude and polished weapons and implements may be seen in the Keswick Museum of Local Natural History, while others have found a home in private collections. These weapons and implements have not been manufactured from flint, but from the compact lavas of the volcanic series of Borrowdale, showing that the ancient artificers

* In my *Physical History of the British Isles*, Plate XIV, Fig. 1, I have endeavoured to represent the condition of the British Isles at the period of greatest submergence.

who formed them could adapt themselves to their surroundings, and make use of the most suitable materials at hand. The lavas of the volcanic series would probably be tougher and more durable than flint, but would not be capable of being ground to such a fine cutting edge, nor of receiving such a high polish.

So far as I know there are no traces of lake dwellings in our district, but there are numerous relics of stone built villages and forts on the mountains. Some of the so-called villages may be recognizable as such by experienced archæologists, but it requires the eye of faith to enable ordinary observers to see in them remains of human dwellings; others, however, are undoubtedly the ruins of stone-built houses that were clustered together within a walled enclosure. The sites of some of the fortified villages are exceedingly well chosen for defensive purposes, and where necessary the natural features have been supplemented by one or more deep trenches.

Stone tumuli, or cairns, and barrows, or mounds of earth, which have been used as places of burial, also occur; these ancient monuments and their contents have been described in detail by local archæologists. In the so-called Druid's Circle, near Keswick, and possibly one or two more, we have examples of pre-historic temples for the purpose of worship, although doubts have been expressed on this point. There is, in the Keswick Museum of Local Natural History, a rudely chipped stone club, which may have been used for the sacred purpose of slaying the animals offered in sacrifice. This club, which was found at the stone circle near Keswick, has been formed out of a fragment of St. John's quartz felsite, and consists of a handle about 9 inches long by 3 inches in diameter; at the end of this handle there is a bulb-shaped knob, about 5 inches in diameter, and a well directed blow from such a weapon would no doubt be sufficient to smash the skull of an ox. The fact that stone axes or celts have also been found in the same locality as the above mentioned club, the existence of an inner enclosure, within the stone circle, and the entire absence of evidence that the circle was ever used for the purpose of sepulture, prove, I think, that it was used for worship alone.

Mr. S. R. PATTISON, F.G.S., writes:—

Mr. Mello, as is usual with him, gives much more for us to learn than to object to. In the present timely, comprehensive, and quasi-judicial summary of the known facts of the earliest

British folklore, I venture to differ from his conclusions on one point only, viz., in regard to the totality of the break between the Palæolithic and the Neolithic periods. I have recently inspected in Picardy some of the stone tools and their localities, now so numerous there, and have paid some attention to the philosophic discoveries made and described by Prestwich, and have formed an opinion that the two periods are, *quasi man*, only one, and that there has been in the history of man's work a continuous progress. There can be no doubt of the prodigiousness of the physical events referred to, nor of their long continuance, but on the other hand, it is equally certain that the tools of the first period were fabricated by man, and that the tools of the second period are precisely similar to these. This similarity could not have been from instinct (although such tool-making appears to be nearly co-existent with the race), nor could it have arisen from imitation, for man imitates, but never exactly copies, and must therefore have arisen from the resumption, in the given locality, of the art which had elsewhere been carried on in the interval. It is not so difficult to believe that men retreated to other parts of the country, whilst the tremendous changes were going on here, or that some other inhabited spots in the same stage of occupation furnished suitable ground for emigration, as to suppose a totally different race taking up the manufacture, on precisely the same lines, in exactly the same places, and displaying the same fashions as their predecessors, I saw in Picardy, in the museums and collections there, fine specimens of intermediate forms of stone implements, and was thereby induced to minimize the difference as a chronological datum.

The effect of the break in the fauna and of the topography of a district, amongst a roving population without buildings or baggage does not, as it seems to me, require any anthropological division. It would appear from geological considerations that the era of the first flint implements was about contemporaneous with the rising of the land, so that long warning was given before the rupture of the chalk and the denudation which accompanied submergence.

REPLY BY THE AUTHOR.

November, 1897.

In reply to Sir J. W. Dawson's communication, I may say that the reason that has led me to adhere to the term Pleistocene, in connection with Palæolithic man, is because, even in Post-Glacial times, we find the great Pleistocene mammalia, such as the mammoth, tichorhine rhinoceros, and others, still in existence; whilst also it is yet a question whether man did not appear in these northern regions before the Glacial period set in; and it seems reasonable that we should class the earlier race amongst that Pleistocene fauna, with part of which, at any rate, he was contemporary. Those great physical changes which brought about the great alteration of conditions, both geographical and climatal, which preceded the appearance of the Neolithic race, seem to give us a convenient line of demarcation between the Pleistocene and the Recent age.

As to the complaint that I have not referred to those changes which closed the Palanthropic age, it will be seen by reference to page 272 of my paper, that I have briefly alluded to them, and I fully recognise their importance, since I look upon these as having brought the Pleistocene age to its close.

As to the Neolithic races, the many, and often conflicting opinions regarding them, render any very definite conclusion impossible as yet. I have only ventured to give an outline of some of the views that have been expressed, and the difficulties which these have suggested; endeavouring, as far as I could, to arrive at some sort of a general conclusion, as to the probable sequence of the different races, which inhabited Europe in pre-historic times; although I am deeply conscious that to do this satisfactorily requires far greater knowledge of racial distinctions and ethnology than I possess.