

Thames, Ouse, Wiltshire Avon, and in fact in all the river-gravels and brick-earths of the south and south-east of England; and in those of the Somme,



FLINT HACHE,
From Hoxne.
(Half the actual size.)

From Lubbock's "Prehistoric Times.")

Oise, Seine, Loire, and all the principal river systems of France; and only in less numbers, probably because they have been less looked-for, in similar situations over an area extending from Central and Southern Europe to the Far East. It is a remarkable fact about these river-drift implements that they are all nearly of the same type and found under similar circumstances, that is to say, in the gravels, sands, brick-earths, and fine silt or loess deposited by rivers which have either ceased to run, or which ran at levels higher than their present ones and were only beginning to excavate their present valleys. Also they are always found in association with remains of what is known

as the Quaternary (as distinguished from recent or existing fauna) represented by the mammoth or woolly-haired elephant, the thick-nosed rhinoceros, and other well-known types of extinct animals. The general character of these implements is very rude, implying a social condition at least as low as that of the Australian savages of the present day. They consist mainly of the flake; the chopper, or pebble roughly chipped to an edge on one side; the scraper, used probably for preparing skins; pointed flints used for boring; and by far the most abundant and characteristic of all, the *hache* or celt, a sharp or oval implement, roughly chipped from flint or, in its absence, from any of the hard stones of the district, such as chert or quartzite, and intended to be held in the hand and used without any haft or handle.

These *haches* are evidently the first rude type of human tools from which the later forms of the axe, adze, chisel, wedge, etc., have been derived by a very slow and lengthened process of evolution. They differ, however, in many essential respects, from the more perfect stone celts of later periods and of modern savages. The chipping is very rude, they are never ground or polished, the pointed end is that intended for use, the butt end being left blunt, showing that the *hache* was not hafted but held in the hand; while the converse is always the case with the finely-chipped or polished stone celts and hatchets of the Neolithic period, which, in its later stages, are to all intents and purposes similar to modern implements, only made of stone instead of metal. But these Palæolithic *haches* are only one step in advance of the rude natural stone which an intelligent orang or chimpanzee might pick up to crack a cocoa-nut with, or to grub up a root from the earth, or an insect from a rotten tree.

At the same time there is not the re-



POLISHED STONE AXE.
Neolithic.
(Half the actual size.)
(From Lubbock's
"Prehistoric Times.")

motest doubt as to their being the work of human hands. When placed side by side with the rudest forms of stone hatchets actually used by the Australian and other savages, it is difficult to detect any difference. If placed in an ascending series, from the oldest and rudest, to the finely-finished axes and arrow-heads of the period immediately preceding the use of metal, the progress may be clearly traced by insensible gradations. The blows given to bring the block to the desired shape by intentional chipping have left distinct marks; and archæologists have succeeded, with a little practice, in fashioning similar implements from modern flints. In

river drifts, since they have been formed under conditions where the preservation of such remains would be very unlikely. In fact, as Sir John Lubbock (now Lord Avebury) points out, the bones found in the river-gravels are almost invariably those of animals larger than man, such as the mammoth and rhinoceros. Still a few human bones have been found, sufficient to show that these river-drift men were probably a dolichocephalic or long and narrow-headed race, with prominent jaws, massive bones, and great muscular strength, but still, although rude and savage, of an essentially human type, and going a very little way towards bridg-



FLINT ADZE,
From Danish Kitchen-middens.



MODERN STONE ADZE,
New Zealand.

(From Lubbock's "Prehistoric Times.")

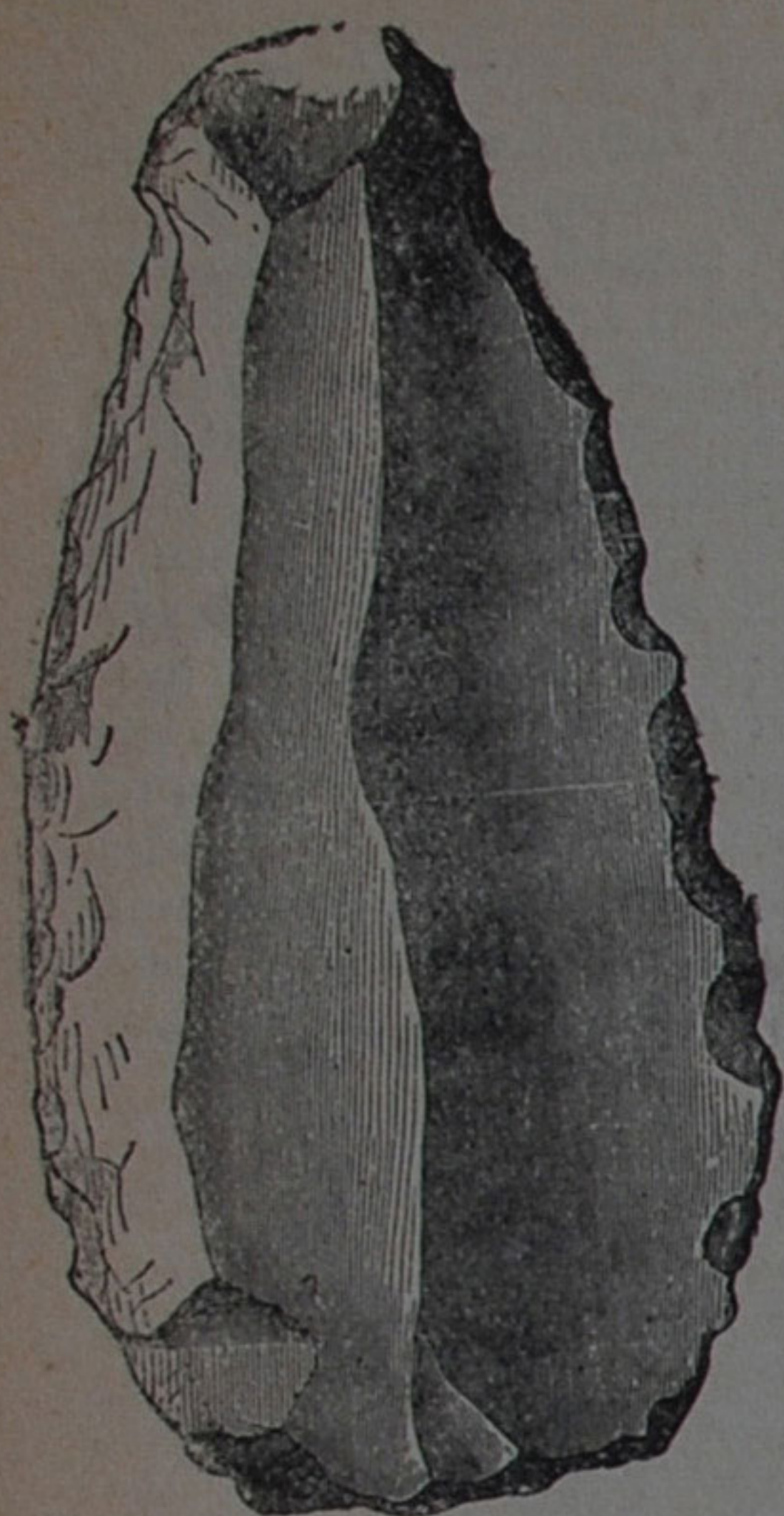
fact, forgeries have been made by workmen in localities where collectors were eager and credulous, though fortunately such forgeries are easily distinguished from genuine antiquities by the different appearance of the old and recent fractures, and other signs which make it almost impossible to deceive an experienced eye. The conclusion, therefore, of one of our best archæologists may be safely accepted, that it is as impossible to doubt that these rude stone flakes and hatchets are works of human art, as it would be if we had found clasp-knives and carpenters' adzes.

The remains of human skeletons are, as might be expected, very rare in these

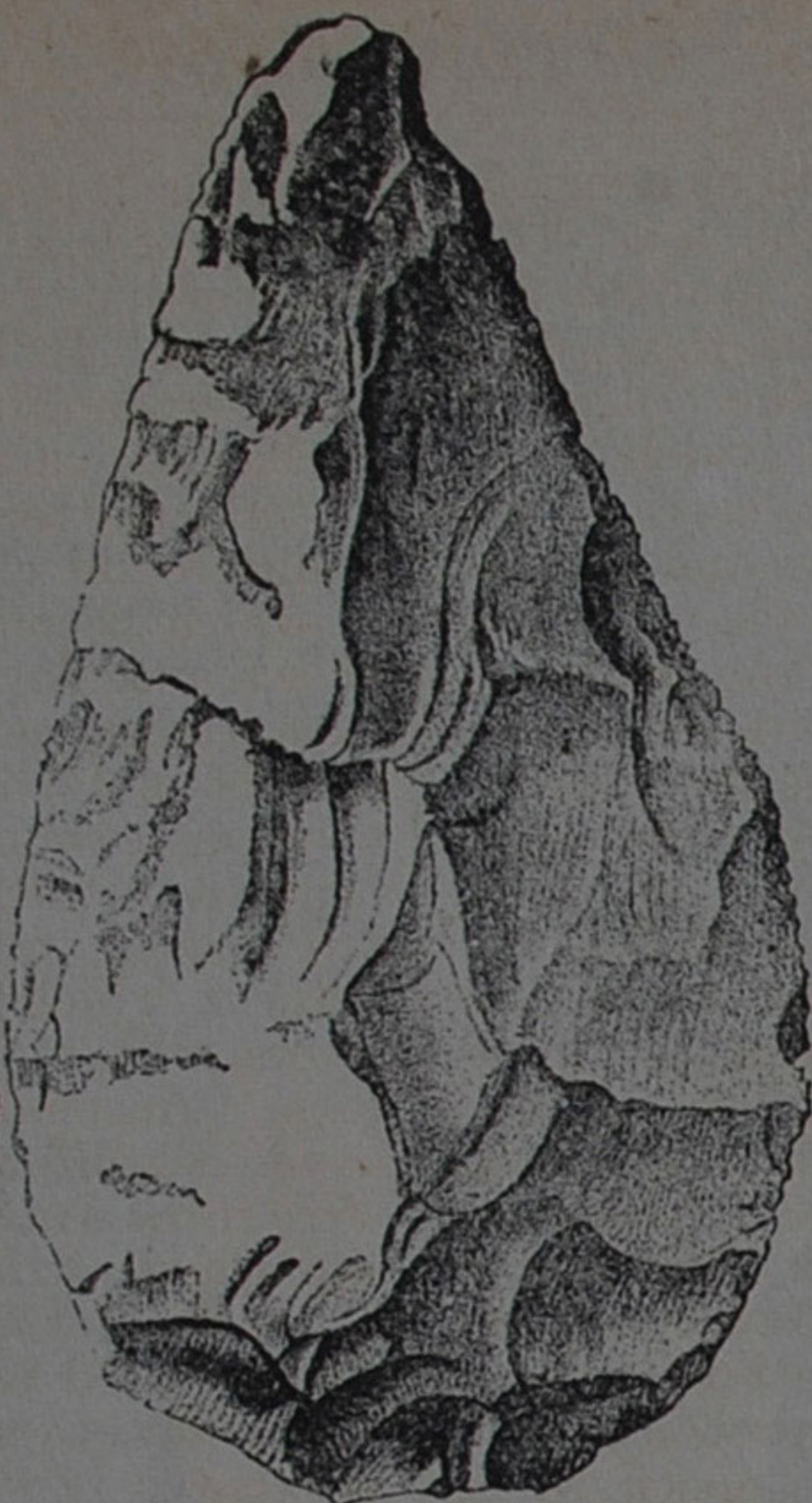
ing over the gap between the savage and the ape.

A more complete view, however, of the conditions of human life at these remote periods is afforded by the evidence given by caves, where naturally the remains of man are more abundant and much better preserved. Before entering, however, on the examination of this class of evidence, it may be well to give an instance which may help to familiarise the imagination with the vast periods of time which must have elapsed since Palæolithic man left these rude implements within reach of river floods.

Among the gravels in which Palæolithic *hâches* have been found, are some which



PALÆOLITHIC.
Mammoth Period.



PALÆOLITHIC.
Mammoth Period.



PALÆOLITHIC.
Mammoth Period.



PALÆOLITHIC.
Reindeer Period.



EARLY NEOLITHIC.



LATE NEOLITHIC.



From Lubbock's "Prehistoric Times.")

cap the cliff at Bournemouth at a height of about 130 feet above the sea. This gravel can be traced in a gradual fall from west to east, along the Hampshire coast and the shores of the Solent to beyond Spithead, and was evidently deposited by a river which carried the drainage of the Dorsetshire and Hampshire downs into the sea to the eastward, and of which the present Avon, Test, and Itchen were tributaries. But for such a river to run in such a course the whole of Poole and Christchurch bays must have been dry land, and the range of chalk downs now broken through at the Needles must have been continuous. To borrow the words of Evans in his "Ancient Stone Implements," "Who, standing on the edge of the lofty cliff at Bournemouth, and gazing over the wide expanse of waters between the present shore and a line connecting the Needles on the one hand and the Ballard Down Foreland on the other, can fully comprehend how immensely remote was the epoch when what is now that vast bay was high and dry land, and a long range of chalk downs, 600 feet above the sea, bounded the horizon on the south? And yet this must have been the sight that met the eyes of those primeval men who frequented the banks of that ancient river which buried their handiworks in gravels that now cap the cliffs, and of the course of which so strange but indubitable a memorial subsists in what has now become the Solent Sea."

Any attempt to assign a more precise date than the vague one of immense antiquity to these early traces of primeval man, had better be postponed until we have examined the more detailed and extensive body of evidence which has been afforded by the exploration of caves, to which the great discovery at Abbeville at once gave an immense impulse, and which has since been prosecuted in England, France, Belgium, and Germany, with the greatest ardour and success.

The caves in which fossil remains are found occur principally in limestone districts. They are due to the property which water possesses, when charged with a small quantity of carbonic acid, of dissolving lime. Rain falling on the earth's surface takes up carbonic acid from contact with vegetable matter, and a portion of it finds its way through cracks and crevices in the subjacent rock

to lower levels, where it comes out in springs of hard water charged with carbonate of lime from the rock which it has dissolved. It has been calculated that the average rainfall on a square mile of chalk thus carries away about 140 tons of solid matter in a year. In this way underground channels are formed, some of which become large enough to admit of streams flowing through them, and even rivers, as is seen in the limestone district of Carinthia, where considerable rivers are swallowed up and run for miles beneath the surface. In this way caverns are formed, or sometimes a series of caverns, which represent the pools of the rivers which formerly flowed through them. Accumulations of whatever may have been brought down by the stream were formed at the bottom of these pools, and when, owing to changes in level or denudation of the gathering grounds, the rivers ceased to flow in the old channel, the pools became dry and were converted into caves, in which wild beasts and man found shelter and left their remains. The *débris* thus formed accumulated with a mixture of blocks which fell from the roof, and of red loamy earth consisting of the residue of the limestone rock insoluble in water, and of dust and mud brought in by winds and floods, and occasionally interstratified by beds of stalagmite, composed of thin films of crystalline carbonate of lime, deposited drop by drop by drippings through the rock forming the roof of the cave. These drippings form what are called stalactites, which hang like pendent icicles from the roof of caves, and as the drip falls from these it forms a corresponding deposit, known as stalagmite, on the floor below. The formation of this deposit is necessarily extremely slow, and it only goes on when the drops of water charged with a minute excess of carbonate of lime come in contact with the air; so that whenever the floor of the cave was under water no stalagmite could be formed. The alternations, therefore, of deposits of stalagmite represent alternations of long periods during which the cave was generally dry or generally flooded. During the dry periods, when the cave happened to be inhabited, the treadings on the floor would prevent the accumulation of an unbroken deposit of pure stalagmite, and the crystalline matter would be employed in forming a solid

cement of the various *débris* into what is known as a breccia.

Another class of caves, or rock-shelters, has been formed along the sides of valleys bounded by cliffs, where the stratification is horizontal or nearly so, but the different beds vary much in hardness and permeability to water. The softer strata weather away more rapidly than the others, and thus form shallow caves or deep recesses in the face of the cliffs, with a floor of hard rock below and a roof of hard rock above, which afford dry and commodious shelters for any sort of animal, including man. In other respects they resemble the first class of caves in having their contents cemented into a breccia by the dripping of water charged with carbonate of lime from the roof, and, if the cave happened to be deserted for a long period, this deposit would in the same way form a bed of stalagmite and seal up securely everything below it. In some cases, also, the roof would fall in, and thus preserve everything previously existing in the cave for the investigation of future geologists.

With these general remarks readers will be able to understand the evidence afforded by the remains of man found in caverns. I will begin by taking as a typical case that of Kent's Cavern, near Torquay, because it is one of the earliest and best known, and all the facts concerning it have been verified by explorations carefully conducted by a committee appointed by the British Association in 1864, which comprised the names of the most eminent authorities in geology and palæontology, including those of Sir Charles Lyell, Sir John Lubbock, Mr. Evans, Mr. Boyd Dawkins, Mr. Pengelly, and others.

The cave is about a mile east from Torquay harbour, and runs into a hill of Devonian limestone in a winding course, expanding into large chambers connected by narrow passages. The following is a series of deposits in descending order in the large chamber near the entrance:

1. Large blocks of limestone which have fallen from the roof.
2. A layer of black, muddy mould, three inches to twelve inches thick.
3. Stalagmite one foot to three feet thick.
4. Red cave-earth with angular fragments of limestone of variable

thickness, but in places five to six feet thick.

In the black earth above the stalagmite were found a number of relics of the Neolithic or polished stone period, with a few articles of bronze and pottery, some of which appear to be of a date as late as that of the Roman occupation of Britain. Associated with these are bones of ox, sheep, goat, pig, and other ordinary forms of existing species, and there is an entire absence of any older fauna, or of any of the ruder forms of Palæolithic implements. When we get below the stalagmite into the underlying cave-earth, the case is entirely reversed. Not a single specimen of polished or finely-wrought stone, or of pottery, is to be found; a vast number of celts or *hâches*, scrapers, knives, hammer stones, and other stone implements, are met with, which are all of the rude Palæolithic type found in river drifts, with a few bone implements such as harpoon-heads, a pin, an awl, and a needle, like those frequently met with in the caves of France and Belgium. Associated with these are a vast number of bones and teeth, all of which belong to the old Quaternary fauna, of which many species have become extinct and others have migrated to distant latitudes.

The following is a list of the mammalian remains which have been found in this cave-earth below the stalagmite:

ABUNDANT.

- The Cave Lion, a large extinct species of lion.
- Cave Hyæna, a large extinct species of hyæna.
- Cave Bear, a large extinct species of bear.
- Grizzly Bear.
- Mammoth (*Elephas primigenius*).
- Rhinoceros (*Tichorinus*), woolly or thick-nosed extinct species.
- Horse.
- Bison.
- Irish Elk.
- Red Deer.
- Reindeer.

SCARCE.

- Wolf.
- Fox.
- Glutton.
- Brown Bear.
- Urus.
- Hare.
- Lagomys, tailless Arctic hare.
- Water Vole.
- Field Vole.

Bank Vole.

Beaver.

And one specimen of the *Machairodus*, or Great Sabre-toothed Tiger, which is one of the characteristic species of the upper Miocene and Pliocene formations.

These constitute a fauna which is characteristic of the Pleistocene, Quaternary, or Palæolithic period, and essentially different from that of the prehistoric or Neolithic period, which is practically the same as that now existing. Wherever remains of the mammoth, woolly rhinoceros, and cave bear are found, Palæolithic implements may be expected, and conversely. In fact Palæolithic man is as essentially part of the characteristic fauna of the Quaternary period, as the *Palæotherium* is of the Eocene, or the *Deinotherium* and *Hipparion* of the Miocene.

A large number of other caves have been explored in England, notably the Victoria Cave near Settle, in Yorkshire, the Cresswell Caves in Derbyshire, the Gower Caves in South Wales, the Brixham Cave in Devonshire, the Woking Cave in Somersetshire, and King Arthur's Cave in Herefordshire, and the results have been everywhere practically the same as those at Kent's Cavern. The same class of implements have been found and the same fauna, with the occasional addition of a few species, among which the hippopotamus and *Elephas antiquus* are the most remarkable.

So far as the river drifts and British caves are concerned, all that we could say of the Palæolithic period is that it is of vast antiquity, and must have lasted for an immense time, as it was in force for the whole time requisite for rivers like the Somme or Avon, which drain small areas, to cut down their present valleys, often two or three miles wide, from the level of their upper gravels, which are in many places 100 to 150 feet above the level of the highest floods of the present rivers.

But the caves of France and Belgium supply us with more evidence, and enable us to trace the history of long periods of Palæolithic time, and study in detail the succession of changes that have occurred, and the habits, arts, and industries of the various tribes of primitive men who occupied these caves and rock-shelters at these remote periods. In fact, it may be said with truth that we know more about

the men who chased the mammoth and reindeer in the South of France perhaps 50,000 years ago, than we do about those who lived there immediately before the classical era, or less than 5,000 years ago.

In certain provinces of France and Belgium it happens fortunately that there are extensive districts of limestone, in which caverns and rock-shelters are extremely abundant and full of Palæolithic remains in an excellent state of preservation. The abundance of such caves may be estimated from the fact that the cliffs, bounding one small river, the Vezère, in the department of Dordogne in the South of France, contain in a distance of eight or ten miles no fewer than nine different stations, each of which has given a vast variety of remains embedded in the breccias and cave-earths of their respective floors; and the small river Lesse in Belgium has been scarcely less prolific. Of the abundance of the human and animal remains found in such caverns it may be sufficient to say that one alone, that of Chaleux in the valley of the Lesse, is computed by Dumont to have yielded not less than 40,000 distinct objects.

The great abundance of remains thus collected, both of human bones and implements, and of animals contemporaneous with them, have made it possible to classify and arrange, in relative order of time, a good many of the subdivisions of the Palæolithic period. This has been done partly by the order of superposition and partly by the greater or less rudeness of the implements of stone and bone, and by the greater or less abundance of those animals of the Quaternary fauna which appeared first and disappeared soonest. The result has been to show that the period when vast herds of reindeer roamed over the plains of Southern France up to the Pyrenees was not the earliest, but was preceded by a long period when the reindeer was scarce, and the remains of the mammoth, cave bear, and cave hyæna were more abundant than in the following ages. The implements of this period are of the earlier river-drift type and extremely rude, and there is an almost entire absence of instruments of bone.

Gradually as we pass upwards, the more Southern forms of elephant, rhinoceros, antelopes, and great carnivora disappear, and the mammoth and cave bear

become scarcer, while the reindeer becomes more and more abundant until at length it furnishes the chief source of food, and its horns one of the principal materials for the manufacture of implements. Concurrently with this change we find a progressive improvement in the arts of life, as shown by stone implements more carefully chipped into a greater variety of forms, and arrow and lance-heads, barbed harpoons, awls, and needles for sewing skins, made chiefly from the antlers of the reindeer.

At length we arrive at one of the most interesting facts disclosed by these researches, that during one of the later or reindeer periods of the Palæolithic era, many of the caves in the South of France, and also in Switzerland and Southern Germany, were occupied by a race who, like the Esquimaux of the present day, had a strong artistic tendency, and were constantly drawing with the point of a flint on stone or bone, or modelling with flint knives from horns and bones, sketches of the animals they hunted, scenes of the chase, or other objects which struck their fancy. These are exceedingly well done, so that there is no difficulty in recognising the animals intended to be represented, among which are the mammoth, cave bear, reindeer, wild horse, and wild ox. The sketch of the mammoth which is engraved on a piece of ivory, from the cave of La Madeleine in the valley of the Vezère, is particularly interesting, as it corresponds exactly with the mammoth whose body was found entire in frozen mud on the banks of a river in Siberia, and it sets at rest all possible question of man having been really contemporary with this extinct animal in the South of France.

The drawings and carvings of other animals, especially of the reindeer, are often extremely spirited, and one especially of a reindeer engraved on a bit of bone from a cave at Thayngen, near Schaffhausen in Switzerland, would do credit to any modern animal painter. A very few human figures are found among these primeval drawings, but strangely, while the animals are so well drawn, those of men are very inferior and almost infantine in execution. They are sufficient, however, to show that the naked savage of Périgord, armed with a stone lance or javelin, pursued and slew the formidable aurochs. To these may

be added rock-carvings in Denmark, and figures on limestone cliffs in the Maritime Alps, while if, as some authorities, among them Arthur Evans and Sergi, think, they point to a primitive script, still more important are the characters painted in peroxide of iron on pebbles discovered by Piette in the Mas-d'Azil cave, in the South East of France.

We do not, however, depend on these drawings for evidence of the sort of men who inhabited these caves in Palæolithic days. A large number of skulls and complete skeletons have been found in different caves, some of which have served as sepulchral vaults for families and tribes, while in others individuals have been crushed by falls of rock, or otherwise interred, and in a few cases skulls and bones have been found at great depths in river drifts, and in the loess, or fine glacial mud which fills up the valley of the Rhine and other areas over which the great Swiss glaciers when melting poured their turbid streams.

From among the more important discoveries of remains of man himself, there may be chosen as typical: 1. those from the Spy cavern; 2. from the Neanderthal cavern; and 3. from the pliocene deposits of Trinil, Java.

1. The Betche aux Roches cavern at Spy, Belgium, yielded two nearly complete skeletons of a male and female, associated with a large number of implements of a character somewhat above those of the Drift. The skulls had enormous superciliary (eyebrows) ridges, receding foreheads, massive jaws, and other apelike features to which the general character of the rest of the skeletons approximated. These remains were discovered in 1886.

2. Thirty years earlier there was found in a Quaternary deposit in the Feldhofen cave of the Neander Valley, Rhenish Prussia, a calvaria, or brain-cap, indicating similar features to those of the Spy skulls, and pronounced by Huxley "as the most apelike" yet discovered to that time, although not approaching the assumed special features of the "missing link."

3. More remarkable than either of these specimens are the brain-cap, thigh-bone, and two molar teeth, found in 1891-92 by Dr. Eugène Dubois in the upper pliocene beds at Trinil, on the banks of the river Bengawan, in Java.



PORTRAIT OF MAMMOTH.

Drawn with a flint on a piece of Mammoth's ivory ; from Cave of La Madeleine, Dordogne, France.



EARLIEST PORTRAIT OF A MAN, WITH SERPENT AND HORSES' HEADS.
From Grotto of Les Eyzies. Reindeer Period.



REINDEER FEEDING.

From Grotto of Thayngen, near Schaffhausen, Switzerland.

which he holds to be the fragments of an animal named by him *Pithecanthropus Erectus*, or "upright ape-man." The several portions were found adjacent, but at different times, so that their identity as parts of the same individual has been questioned. But although anthropologists are not in agreement as to the remains being positively human, the majority hold that opinion, and it is not without significance to note that the bones were found in that part of the globe where it is highly probable that man and ape became differentiated. A comparison of the cranium with that of Neanderthal shows that it is of decidedly lower type, and that it may be classified as between the Neanderthal man and the gorilla.

In trying to fix anything like definite dates for man's existence upon earth, we must reverse the process by which we have proved the enormous antiquity of his earliest remains, and ascend step by step from the known to the unknown. The first step is that supplied by history.

Until very recently, the palm of antiquity, limiting that term to the historic period, rested with Egypt. Its chronology started with Menes, its reputed earliest king, whose date Professor Flinders Petrie fixes at 4777 B.C. "with a possible error of a century." The old scepticism as to the actual personality of the ancient Pharaohs is dispelled by modern research, Professor Petrie having found traces of kings before Menes, while there appears good reason for accepting Dr. Borchardt's claims to have discovered the actual tomb and personal relics of that king at Nagada, a little north of Thebes.

But it would seem that Egypt must yield priority to Babylonia. For in recent excavations at Nuffar or Nippur, in Northern Babylonia, Dr. Hilprecht has unearthed from the deepest human deposits in the ruins of the temple of Bel a number of tablets which he contends justify him in dating the founding of that temple, and the first settlement of the city, "somewhere between 7,000 and 6,000 B.C. and possibly earlier." And as the tablets are inscribed with cuneiform characters, which are the slow outcome of picture-writing, as are all other alphabetic and syllabic signs, it may yet be proved that Babylonia possessed a script at least 1,300 years

before the earliest known Egyptian hieroglyphs. It is true that their love of the decorative and their veneration for what is old may explain the persistence of the use of primitive modes of writing among the Egyptians, but this cannot weigh against the argument that the more central position of Mesopotamia gave her advantages which quickened culture within her borders.

Nor do these two great empires monopolise the story of antiquity. Explorations in Greece and the surrounding archipelago have brought to light a third venerable centre, perchance an indigenous centre of civilisation, whose relics show that "we have probably to deal with a total period of civilisation in the *Ægean* not much shorter than that in the Nile Valley." So that centuries before the Phœnicians launched their craft upon the Midland Sea, or sailed beyond the Pillars of Hercules, and at a period when the *Iliad* and *Odyssey* were not in existence, there was active intercourse between East and West, intercourse, as evidenced by the discovery of a commercial script, even between Arabia and Iberia. Thus does the epigraphic and other material which the spade of the antiquarian has upturned and the skill of the philologist deciphered, push ever farther back the horizon of history. But beyond that receding marge lie the vast domains of man's past which it is the province of the prehistoric archæologist, the palæontologist, and the geologist to explore.

Here, then, we take leave of the one and follow the guidance of the other.

The earliest historical civilisations were all acquainted with metals, chiefly in the form of bronze, which is an alloy of copper and tin, very hard, easily cast, and well adapted for every description of tool and weapon. Indeed, it has only been superseded by iron within recent historical times. But the Bronze Age was preceded by a long Neolithic period, when stone, finely wrought and often ground or polished, was used for the purposes to which metal was afterwards applied. The men of this Neolithic period, who reached Europe from the east or south, probably from both regions, were comparatively civilised; they had all the common domestic animals, the dog, horse, ox, sheep, goat, and pig; also some of the cultivated cereals and fruits;

they knew the arts of cooking, spinning, weaving, and pottery, they were grouped into clans and tribes, and lived in villages. Some think the Iberian or Basque people may be a remnant of this Neolithic race, who were driven westward by the later wave of Celtic migration just as the Celts were driven by the still later waves of Teutonic and Slavonic immigrants. Be this as it may, it is certain that a Neolithic people were spread very widely over the globe, as their remains of very similar character are found almost everywhere in Europe, Asia, and America, and always in association with the existing or most recent fauna and configuration of the earth's surface.

The difficulty in assigning any precise date for these remains arises very much from the fact that the Neolithic passed into the Bronze or historical civilisation, at different times in different countries. The Australians, the Polynesians, and the Esquimaux were or are still in the Stone period, while steam-engines are spinning cotton at Manchester, and the most famous cities of Egypt and the East have been for centuries buried under shapeless mounds of their own ruins. It is probable that all Europe remained in the Neolithic stage for many centuries after the historical date of the commencement of the Egyptian empire.

Still there are some remains which may enable us to form an approximate conjecture of the time during which this Neolithic period may have lasted.

The two principal clues are furnished :

1. By the Danish mosses and kitchen-middens.
2. By the Swiss lake-dwellings.

In Denmark there are a number of peat mosses varying in depth from ten to thirty feet, which have been formed by the filling-up of small lakes or ponds in hollows of the Glacial drift. Around the borders of these mosses, and at various depths in them, lie trunks of trees which have grown on their margin. At the present surface are found beech-trees, which are now, and have been throughout the whole historical period of 2,000 years, the prevalent form of forest vegetation in Denmark. Lower down is found a zone of oaks, a tree which is now rare and almost superseded by the beech. And still lower, towards the bottom of the mosses, the fallen trees are almost entirely Scotch firs, which have been long

unknown in Denmark and when introduced will not thrive there. It is evident therefore, that there have been three changes of climate, causing three entire changes in the forest vegetation in Denmark, since these mosses began to be formed. The latest has lasted certainly for 2,000 years, and we cannot tell how much longer, so that some period of more than 6,000 years must be assumed for the three changes.

Now, it is invariably found that remains of the Iron Age are confined to the present or beech era, while bronze is found only in that of oak, and the Age of Stone coincides with that of the Scotch fir.

The kitchen-middens afford another memorial of the prehistoric age in Denmark. There are mounds found all along the sheltered sea-coasts of the mainland and islands, consisting chiefly of shells of the oyster, cockle, limpet, and other shell-fish, which have been eaten by the ancient dwellers on these coasts. Mixed-up with these are the bones of various land animals, birds, and fish, and flint flakes, axes, worked bones and horns, and other implements, including rude hand-made pottery. The relics are very much the same as those found in the fir zone of the peat mosses, and although old as compared with the Iron or historical age, they do not denote any extreme antiquity. The shells are all of existing species, though the larger size of some of those found on the shores of the Baltic shows that the salt water of the North Sea had then a freer access to it than at present. The bones of animals, birds, and fish are also all of existing species, and no remains of extinct animals, such as the mammoth, or even of reindeer, have been found. By far the most common are the red deer, roe-deer, and wild boar. The dog was known, and appears to have been the only domestic animal among the earliest Neolithic peoples.

Most of the stone implements are rude, but a few carefully-worked weapons have been found, and a few specimens of polished axes, which, with the presence of pottery and the nature of the fauna, show conclusively that these Danish remains are all of the Neolithic age and subsequent to the close of the Glacial period. In fact, similar shell mounds are found in almost all quarters of the globe where savage tribes have lived on the sea-coast, subsisting mainly on shell-fish.

and they are probably still being formed on the shores of the Greenland and Arctic Seas, and in Australia, and remote islands of the Pacific.

Human remains are scarce in these Danish deposits, but numerous skulls and skeletons have been found in tumuli which, from their situation and from stone implements being buried with the dead, may be reasonably inferred to be those of the people of the peat mounds and shell mounds. They denote a short race with small and very round heads, in many respects resembling the present Lapps, but with a more projecting ridge over the eye.

On the whole, all we can conclude from these Danish remains is that at some period, not less than 6,000 or 7,000 years ago, when civilisation had already been long established in the valley of the Nile, rude races resembling the Lapps or Esquimaux lived on the shores of the Baltic, who, although so much more recent, and acquainted with the domestic dog, pottery, and the art of polishing stone, had not advanced much beyond the condition of the later cave-men of the South of France; and that this race was succeeded by one which brought in the much higher civilisation of the Bronze Age.

The lake-dwellings of Switzerland give still more detailed and interesting information as to Neolithic times.

During a very dry summer in 1854, the Lake of Zurich fell below its usual level and disclosed the remains of ancient piles driven into the mud, from which a number of deer-horns and other implements were dredged up. This led to further researches, and the result has been that a large number of villages built on these piles has been discovered in almost all the Swiss lakes, as well as in those of Italy and other countries. On the whole, more than 200 have been discovered in Switzerland, and fresh ones are being constantly brought to light. They range over a long period, a few belonging to the Iron Age and even to Roman times; while the greater number are almost equally divided between the Age of Bronze and that of Stone. Some of them are of large size, and must have been long inhabited and supported a numerous population, from the immense number of implements found, which at one station alone, that of Concise on the Lake of Neufchâtel, amounted to 25,000. These

implements consist mainly of axes, knives, arrow-heads, saws, chisels, hammers, awls, and needles, with a quantity of broken pottery, spindle-whorls, sinkers for nets, and other objects.

In the oldest stations, where no trace of metal is found, and the decay of the piles to a lower level shows the greatest antiquity, the implements are all of the Neolithic type, and the animal remains associated with them are all of the recent fauna. There are no mammoths, rhinoceroses, or reindeer; the wild animals are the red deer and roe, the urus, bison, elk, bear, wolf, wild cat, fox, badger, wild boar, ibex, and other existing species; and of domestic animals, the dog, pig, horse, goat, sheep, and at least two varieties of oxen. Birds, reptiles, and fish were all of common existing species. Carbonised ears of wheat and barley have been found, as also pears and apples, and the seeds, stones, and shells of raspberry, blackberry, wild plum, hazel-nut, and beech-nut. Twine, and bits of matting made of flax, as well as the occurrence of spindle-whorls, show that the pile dwellers were acquainted with the art of weaving.

On the whole, these pile-villages show that a large population lived in Switzerland for a long time before the dawn of history, and that they had already attained a considerable amount of civilisation at their first appearance, which went on steadily increasing down to the time of the Roman conquest. Various attempts have been made to fix an approximate date for the earliest of these pile-villages, but they have not been very successful. They have been based mainly on the amount of silting up which has taken place in some of the smaller lakes since the piles were driven in, as compared with that which has occurred since the Roman period. The best calculations appear to show that 6,000 or 7,000 years ago Switzerland was already inhabited by men who used polished stone implements, but how long they had been there we have no distinct evidence to show. Perhaps 10,000 years may be taken as the outside limit of time that can be allowed for the Neolithic period in Switzerland, Denmark, or any known part of Europe.

In Egypt, however, there is evidence of a much greater antiquity. Fragments of pottery, which was entirely unknown in the Palæolithic age, have been brought

up by borings in the Nile Valley from depths which, at the average rate of accumulation there during the last 3,000 years of three inches and a half in a century, would denote an age of from 13,000 to 18,000 years. Looking at the dense population and high civilisation of Egypt at the commencement of history, 7,000 years ago, it is highly probable that this time at least must have elapsed since the country was first occupied by a settled agricultural population as far advanced in the arts of life as the lake-dwellers of Switzerland.

Any calculation, however, of Neolithic time takes us back a very short step in the history of the human race. The Palæolithic period must evidently have been of vastly longer duration.

Here it is convenient to note that the theory of an absolute break, through geological changes and subordinate causes, between the Palæolithic and Neolithic Ages which long held the field, has disappeared (except in Great Britain) before the evidence against tenantless intervals in prehistoric times. The tools and weapons found in certain caves, as at Solutré, in the Maçon district, and at Mentone, show an overlapping of earlier and later specimens, which witness to fusion in more or less degree between prehistoric peoples. Doubtless in the more northerly parts of the Continent there were local migrations and retreats, but there was no wholesale withdrawal or extermination of the ruder races, leaving vacant areas for their conquerors. Europe has been continuously inhabited by man since he first set his foot in it, and the proofs of this, ever increasing, come in the shape of the rude specimens of art which link Northern with Southern Europe, and, what is of the deepest interest, both regions with the Eastern Mediterranean. For these and other materials, more advanced in character, are revolutionising the old theories of European civilisation, which held it to be a wholly imported product, and are showing how indigenous that culture was, originating, mayhap, as shown already, in the islands of the Ægean, and diffusing itself, not without Oriental influences upon it, in westerly directions.

In carrying our researches further back, the possibility of assigning anything like a definite date for the existence of man depends on the question whether

it is possible to fix any approximate dates for the commencement and duration of the Glacial period.

In the first place, how do we know that there has been any such period?

In England we are more familiar with water than with ice; we therefore recognise at once the signs of the action of water. If we come across a dry channel, winding in alternating curves between eroded banks, and showing deposits of gravel and silt, we say without hesitation, "Here a river formerly ran." But if we had lived in Switzerland, we should recognise with equal certainty the signs of glacial action. Suppose any one visiting Chamouni walks up the valley to the foot of the Mer de Glace, where the Arve issues from the glacier, let us say in autumn, when the front of the glacier has shrunk back some distance, what does he see? Rounded and polished rocks, which seem as if they had been planed by a gigantic plane working downwards over them, and on these a mass of miscellaneous rubbish shot down as if from a dust-cart, consisting of stones of all sizes, some of them boulders as big as a house, scattered irregularly on a mass of clay and sand. When he looks more closely he will see that these stones are not rounded as they would be by running water, but blunted at their angles by a slow grinding action; and in many cases, both the stones and the rocks on which they rest are scratched and striated in a direction which is that of the glacier's motion. At the bottom of this rubbish-heap he will find the clay into which the rock has been ground by the full weight of the glacier, very stiff and compact; while if he looks down the valley, he will see, on a hot day, a swollen and turbid river issuing from the melting ice and flooding the meadows, on which it will leave a deposit of fine mud. These are effects actually produced by ice; and wherever he sees them he can infer the former presence of a glacier, as certainly as when he sees a bed of rounded pebbles he infers the former presence of running water. The planed rocks are commonly known as *roches moutonnées*, from a fancied resemblance of their smooth, rounded hummocks to the backs of a flock of sheep lying down; the rubbish heaps are called *moraines*; and the stiff bottom clay with boulders embedded in it is called the *grund-*

moraine, till, or boulder clay; while the blunted and scratched stones are said to be glaciated.

These tests, therefore, *roches moutonnées*, moraines, boulders, and glaciated stones, are infallible proofs that wherever we find them there has been ice-action, either in the form of glaciers, or of icebergs, which are only detached portions of glaciers floated-off when the glacier ends in the sea. Now, if our inquirer extends his view, he will find that these signs, the meaning of which he has learned at the head of the valley of Chamouni, are to be found equally in every valley and over the whole plain of Switzerland, up to a height of more than 3,000 feet on the slope of the opposite Jura range, while on the Italian side the Glacial drift extends far into the plains of Piedmont.

Extending our view still more widely, we find that every high mountain range in the Northern hemisphere has had its system of glaciers; and one great mountain mass, that of Scandinavia, has been the nucleus of an enormous ice-cap, radiating to a distance of not less than 1,000 miles, and thick enough to block up with solid ice the North Sea, the German Ocean, the Baltic, and even the Atlantic up to the 100 fathom line. This ice-cap, coalescing with local glaciers from the higher lands of England, Scotland, and Ireland, swept over their surface, regardless of minor inequalities of hill and valley, as far south as to the present Thames Valley, grinding-down rocks, scattering drift and boulders, and, in fact, doing the first rough sub-soil ploughing which prepared most of our present arable fields for cultivation. The same ice-sheet spread masses of similar drift over Northern Germany, Sweden, Denmark, and the northern half of European Russia, and left behind it numerous boulders which must have travelled all the way from Norway or Lapland.

If we cross the Atlantic we find the same thing repeated on a still larger scale in North America. A still more gigantic ice-cap, radiating from the Laurentian ranges, which extend towards the Pole from Canada, has glaciated all the minor mountain ranges to the south up to heights sometimes exceeding 3,000 feet, and coalescing with vast glaciers thrown off by the Rocky Mountains from their eastern flanks, has

swept over the whole Continent, leaving its record in the form of drift and boulders, down to the 40th parallel of latitude. It is difficult to realise the existence of such gigantic glaciers, but the proofs they have left are incontrovertible, and we have only to look to Greenland to see similar effects actually in operation. The whole of that vast country, where at former periods of the earth's history, fruit-trees grew and a genial climate prevailed, is now buried deep under one solid ice-cap, from which only a few of the highest peaks protrude, and which discharges its surplus accumulation of winter snow by huge glaciers filling all the fiords and pushing out into the sea with an ice-wall sometimes forty or fifty miles in length, from which icebergs are continually breaking off and floating away. A still more gigantic ice-wall surrounds the Southern Pole, and in a comparatively low latitude presented an insuperable barrier to the further progress of the ships of Sir J. Ross's expedition.

A still closer examination of the Glacial period shows that it was not one single period of intense cold, but a prolonged period, during which there were several alternations, the glaciers having retreated and advanced several times with comparatively mild inter-glacial periods, but finally with a tendency on each successive advance to contract its area, until the ice shrank into the recesses of high mountains, where alone we now find it. Another noteworthy point is that during this long Glacial period there were several great oscillations in the level of sea and land.

Such was the Glacial period, and to assign its date is to fix the date when we know with certainty that man already existed, and had for some long though unknown time previously been an inhabitant of earth. Is this possible? To answer this question we must begin by considering what are the causes, or combination of causes, which may have given rise to such a Glacial period. When we look at the causes which actually produce existing glaciers, we find that extreme cold alone is not sufficient. In the coldest known region of the earth, in Eastern Siberia, there are no glaciers, for the land is low and level and the air dry. On the other hand, in New Zealand, in

the latitude of England and with a mean annual temperature very similar to that of the West of Scotland, enormous glaciers descend to within 700 feet of the sea-level. The reason is obvious; the Alps of the South Island rise to the height of 11,000 feet above the sea, and the prevalent westerly winds strike on them laden with moisture from their passage over a wide expanse of ocean. In like manner, in the case of the Swiss Alps, the Himalayas, and other great mountain ranges, high land and moist winds everywhere make glaciers. Given the moist wind, any great depression of temperature, whether arising from elevation of land or other causes, will make it deposit its moisture in the form of snow, and the accumulation of snow on a large surface of elevated land must inevitably relieve itself by pushing down rivers of ice to the point where it melts, just as the rain-fall relieves itself by pouring down rivers to the point where the surplus water finds its level in the sea.

When the two conditions of high land and moist winds are combined, low temperature increases their effect, and the snow-fall consolidates into a great ice-cap, from which only the tops of the highest mountains project, and which pushes out gigantic glaciers far over surrounding countries and into adjacent seas. Such is now the case in Greenland, and was formerly the case in Scandinavia, where a huge sheet of ice radiated from it over Northern Germany as far as Dresden, filled up the North Sea, and, coalescing with smaller ice-caps from the highlands of Scotland, England, and Wales, buried the British Islands up to the Thames under massive ice. At the same period glaciers from the Alps filled the whole plain of Switzerland, and in North America the ice-cap extended from Labrador to Philadelphia.

The first remark to be made is that, as these phenomena depend primarily on moist winds, and only secondarily on cold, and as moist winds imply great evaporation and therefore great solar heat over extensive surfaces of water, all explanations are worthless which suppose a general prevalence of cold, either from less solar radiation, passage through a colder region of space, or otherwise. We must seek for a cause which is con-

sistent with the general laws of Nature, and with the leading facts of the actual generation of glaciers at the present day.

Astronomers believe that they have discovered such a cause in the theory first started by Mr. Croll, that the glaciation of the Northern hemisphere was due to a secular change in the shape of the earth's orbit, combined with the shorter changes produced by the precession of the equinoxes. The latter cause is due to the fact that the earth is not an exact sphere, but slightly protuberant at the equator, and that the attraction of the sun on this protuberant matter prevents the axis round which the earth rotates from remaining exactly parallel with itself, and makes it move slowly round its mean position just as we see in the case of a schoolboy's top, which reels round an imaginary upright axis while spinning rapidly. This revolution in the case of the earth completes its circle in about 21,000 years, so that if summer, when the pole is turned towards the sun, occurred in the Northern hemisphere when the earth was in perihelion, or nearest the sun, and consequently winter when it was in aphelion, or furthest away from the sun, after 10,500 years the position would be exactly reversed, and winter would occur in perihelion and summer in aphelion; the Southern hemisphere then enjoying the same conditions as those of the Northern one 10,500 years earlier. And in another 10,500 years things would come back to their original position.

Now if the earth's orbit were an exact circle this would make no difference, all the four seasons would be of the same duration and would receive the same solar heat in both hemispheres, and if the orbit were nearly circular, so that the difference between the perihelion and aphelion distances was small, the effect would be small also. But if the orbit flattened out or became more eccentric, the effect would be increased. The time of traversing the aphelion portion of the annual orbit would become longer and that of traversing the perihelion portion shorter, as the orbit departed from the form of a circle and became more elliptic. Whenever, therefore, the North Pole was turned away from the sun in aphelion, the winters would be longer than the summers in the Northern hemisphere, and conversely, the summers would be longer than the winters when, after an

interval of 10,500 years, precession brought about the opposite condition of things, in which winter occurred in perihelion.

At present the earth's orbit is nearly circular, and the Northern hemisphere is nearest the sun in winter and furthest from it in summer, but the difference is only about 3,000,000 miles, or a small fraction of the total mean distance of 93,000,000 miles, which makes the winter half of the year shorter than the summer half by nearly eight days.

But mathematical calculations show that under the complicated attractions of the sun, moon, and larger planets, the eccentricity of the earth's orbit slowly changes at long and irregular intervals, but always within fixed limits, increasing up to a certain point and then diminishing till it approaches the circular form, when it again increases. The *maximum* limit of eccentricity makes the difference between the greatest and least distances of the earth from the sun range between 12,000,000 and 14,000,000 miles, which is four or five times as great as at present; and with this eccentricity, and winter in aphelion in the Northern hemisphere, the winter half of the year in Northern latitudes would be twenty-six days longer than the summer half, instead of eight days shorter as at present. In this state of things the quantity of heat received daily from the sun in winter would be such as to lower the temperature of the whole Northern hemisphere by 35° Fahrenheit, and reduce the average January temperature of England from 39 to 4°, while the mean summer temperature would be about 60° higher than at present. But this summer heat, derived from solar radiation, would not counteract the cold of winter, for all moisture during winter being accumulated in ice and snow, most of the solar heat of summer would be expended in supplying latent heat to melt a portion of this frozen accumulation, and dense fogs would intercept a large amount of the solar radiation.

After 10,500 years this state of things would be entirely reversed, and with twenty-six days more of summer, and the earth 12,000,000 miles nearer the sun in winter, the Northern hemisphere would enjoy something like perpetual spring. There can be no doubt that these are real causes, and the only difficulty is to account for their not having been more invariable

in their operation and given us a constant succession of Glacial periods since the commencement of geological time, whenever the eccentricity became great, which occurs at irregular periods, but practically about three times in every 3,000,000 years. The answer is that the effects would only occur when the other conditions were present, viz., high land, moist winds, and an absence of oceanic currents of warm water like the Gulf Stream. The latter is one of the main causes which affect temperature. The difference of temperature between the equatorial and polar regions causes a constant overflow of heated air from south to north, which is replaced by an indraught of colder air from north to south, which, owing to the greater velocity of the earth's rotation towards the equator, takes the form of trade-winds blowing constantly from a more or less easterly direction. These winds, sweeping over the Atlantic Ocean, raise its level at its western barrier, and the accumulation deflected by America flows off in a current which extends to the western shores of Europe and carries mild winters into the extreme North. In the Orkney and Shetland Islands, which are nearly in the same latitude as Cape Farewell in Greenland, there is so little ice that skating is a rare accomplishment, and curling, the roaring game which is so popular some degrees further south, is quite unknown. If the Gulf Stream were diverted, and the highlands of Scotland upheaved to the height of the Alps of New Zealand, the whole country would again be buried under glaciers pushing out into the Atlantic and German Ocean.

These considerations may show why every period of great eccentricity was not necessarily a Glacial period, though under certain conditions it must inevitably have been so, and geologists are generally agreed that the last period of the sort must have been one of the main causes of the great refrigeration which set in over the whole Northern hemisphere towards the close of the Pliocene period, and continued until recent times. But in this case we can fix the date with great accuracy, for calculation shows that the last period of great eccentricity began 240,000 years ago, and lasted 160,000 years. For the last 50,000 years the departure of the earth's orbit from the circular form has been exceptionally small. We may suppose the Glacial

period, therefore, to have commenced 240,000 years ago, come to its height 160,000 years ago, and finally passed away 80,000 years before the present time.

These dates receive much confirmation from conclusions drawn from a totally different class of facts. A bed of existing marine shells of Arctic type, apparently belonging to one of the latest phases of the Glacial period, has been found on the top of a hill in North Wales which is now 1,100 feet above the sea-level, and the same marine drift seems to extend to a height of upwards of 2,000 feet. There must, therefore, have been a depression of the land sufficient to carry it many fathoms below the sea, and a subsequent elevation sufficient to carry the sea bottom up to a height of certainly 1,100 and probably over 2,000 feet. In all probability, these movements were very slow and gradual, like those now going on in Greenland and Scandinavia, for there are no signs of earthquakes or volcanic eruptions in the district; and it is probable that pauses occurred in the movements, and a long pause when subsidence had ceased before elevation began. Without taking these pauses into account, and assuming the elevation only just completed, and that Sir C. Lyell's average of two and a half feet a century is a fair rate for these slow movements, it would have required 50,000 years of continued elevation to bring these shells, and 80,000 years to bring the marine drifts, up to their present height above the sea; and a similar period previously must be allowed for their submergence. We may fairly conclude, therefore, that upwards of 100,000 years have elapsed since these shells lived and died at the bottom of the sea towards the close of the Glacial period, which corresponds very well with the date assigned by astronomical calculations.

Again, another attempt to fix a date for the close of the Glacial period has been made by Monsieur Forel, a Swiss geologist, from actual measurements of the quantity of suspended matter poured into the Lake of Geneva by the Rhone, and the area of the lake which has been silted up since it was filled by ice. It is evident that this silting up at the head of the lake could only begin when the great Rhone glacier, which once extended to the Jura Mountains,

had shrunk back into its valley far enough to pour its river into the lake. M. Forel's calculations give 100,000 years as the probable time required for the river to silt up so much of the lake as is now converted into dry land. The data are somewhat vague, as on the one hand the rate of deposition may have been greater when a large mass of ice and snow was being melted, while on the other hand it may have been less, while the glacier still occupied the valley almost to the head of the lake, and the Rhone had only a course of a few miles. All that can be said, therefore, is that it gives an approximate date for the close of the Glacial period which, like that derived from rates of depression and elevation, corresponds wonderfully well with the date required by Croll's theory.

Now, whether the date be a little more or a little less, it is clear that man existed on earth throughout a great part, if not the whole, of the Glacial period. He had existed a long while in conjunction with a fauna of more Southern and African aspect, before the reindeer migrated in vast herds into Southern France. His remains are found in caves and river drifts associated with those of the hippopotamus, an animal which could by no possibility have lived in rivers which for half the year were bound hard in ice. Such remains must therefore of necessity date either from a period before the great cold had set in, or from some inter-glacial period prior to the great cold which drove the reindeer, musk ox, glutton, and Arctic hare as far south as the slopes of the Pyrenees.

In England we can trace distinctly at least four successions of boulder clays, that is of the ground moraines of land ice, separated by deposits of drifts, sands, and brick-earths, formed while the glaciers were retreating and melting; and a number of the Palæolithic implements have been found in what was undoubtedly part of the period of the second or great chalky boulder clay, which overspreads the southern and eastern counties of England up to the Thames Valley. The discovery of Palæolithic remains in the deposit of St. Prest, near Chartres, makes it probable that some at least of the ruder instruments date back to the very beginning of the Glacial period, and a good body

of evidence points to the conclusion that man was living during the many alternations of climate of that period, and whenever the glaciers retreated, followed them up closely.

In seeking to trace back human origin to more remote periods, we must begin by describing shortly the geological periods during which the existence of man may have been possible. It is useless to go back beyond the Chalk, which was deposited in a deep sea and forms a great break between the modern and the Secondary period, in which latter reptiles predominated, and mammalia are only known by a few remains of small insectivorous and marsupial animals.

The inauguration of the present state of things commences with the Tertiary period. This has been divided into three stages: the Eocene, in which the first dawn appears of animal life similar in type to that now existing; the Miocene, in which there is a still greater approximation to existing forms of life; and the Pliocene, in which existing types and species become preponderant. Then comes the Pleistocene or Quaternary, including the great Glacial period, during which the whole marine and nearly the whole terrestrial fauna are of existing or recently extinct species, though very different in their geographical distribution from that of the present day. And finally we arrive at the recent period, when the present climate and the present configuration of lands, seas, and rivers prevail with very slight modifications, and no changes have taken place either in the specific character or geographical distribution of life, except such as can be clearly traced to existing causes such as the agency of man.

This is the geological frame-work into which we have to fit the history of man's appearance upon earth. We have traced him through the recent and Quaternary; can we trace him further into the Tertiary? Speaking generally, we may say that the Eocene period was that in which Europe began to assume something like its present configuration, and in which mammalian life, of the higher or placental type, began to supplant the lower forms of marsupial life which had preceded. But these higher types were for the most part of a more primitive

or generalised character than the more specialised types of later periods, and the highest order, that of the *primates*, which includes man, ape, and lemur, was, as far as is yet known, represented only by two or three extinct lemurian forms.

The plan on which Nature has worked in the evolution of life seems always to have been this: she begins by laying down a sort of ground plan, or generalised sketch of a particular form of life, say, first of vertebrata, then of fish, then of reptiles, and finally of mammalian life. This sketch resembles the simple theme of a few notes on which a musician proceeds to work out a series of variations, each surpassing the other in complication and specialised development in some particular direction. Now, in the Eocene period we are in the stage of the theme and first simple variations of the mammalian melody. It hardly seems likely, therefore, that a creature so highly specialised as man, even in his most rudimentary form, should have existed, and in the absence of any direct evidence to the contrary, it is safe to assume that his first appearance must have been of later date.

But when we come to the Miocene and Pliocene periods, the case is different. It is true that in the Miocene the specialisation of certain families, as for instance that of the horse, had not been carried out to the full extent, and that all the species of Miocene land-mammals and several of the genera are now extinct. But there were already true apes and baboons, and even two species of anthropoid ape, one of which, the *Dryopithecus*, whose fossil remains were found in the South of France, was as large as a man.

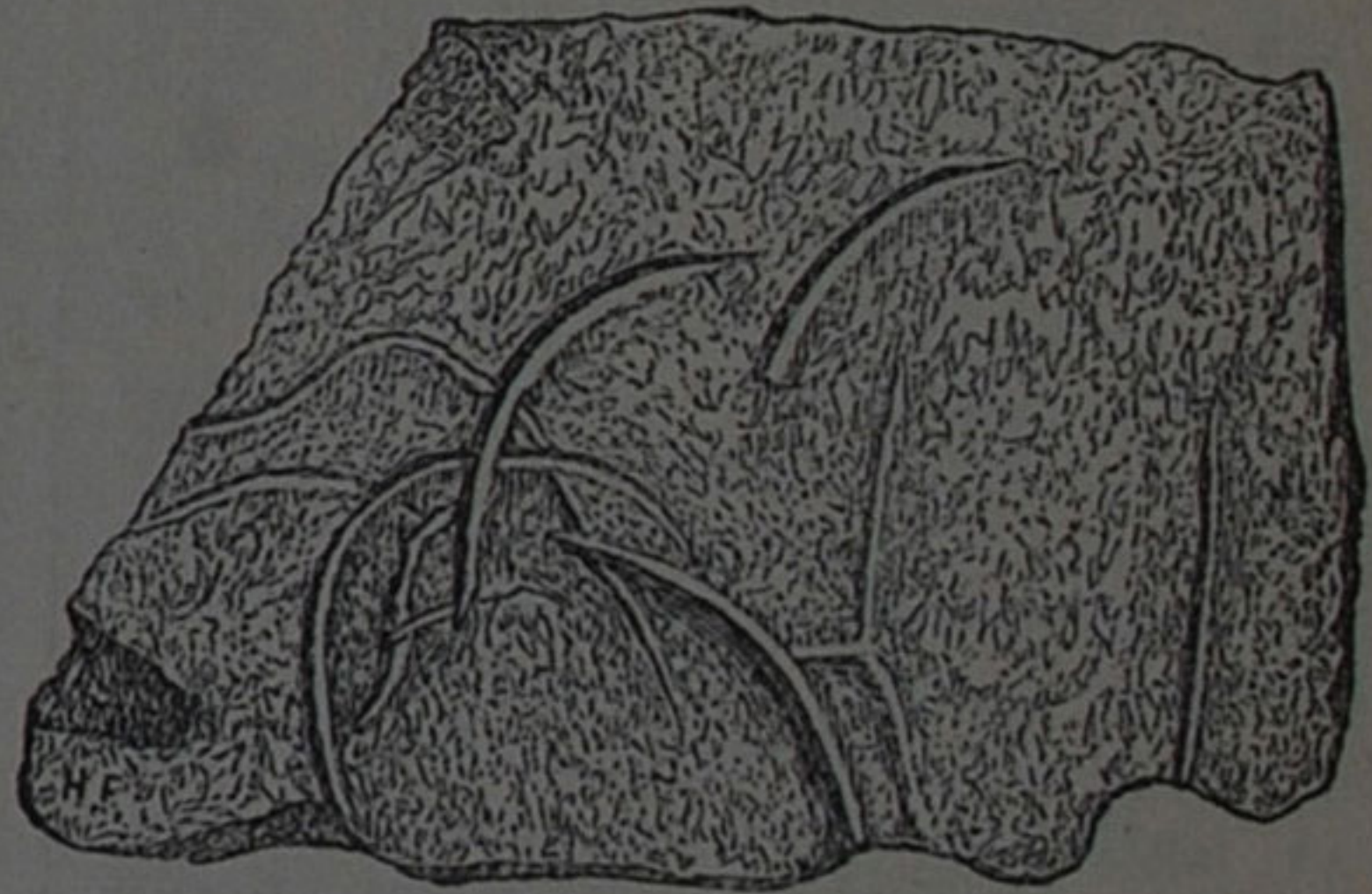
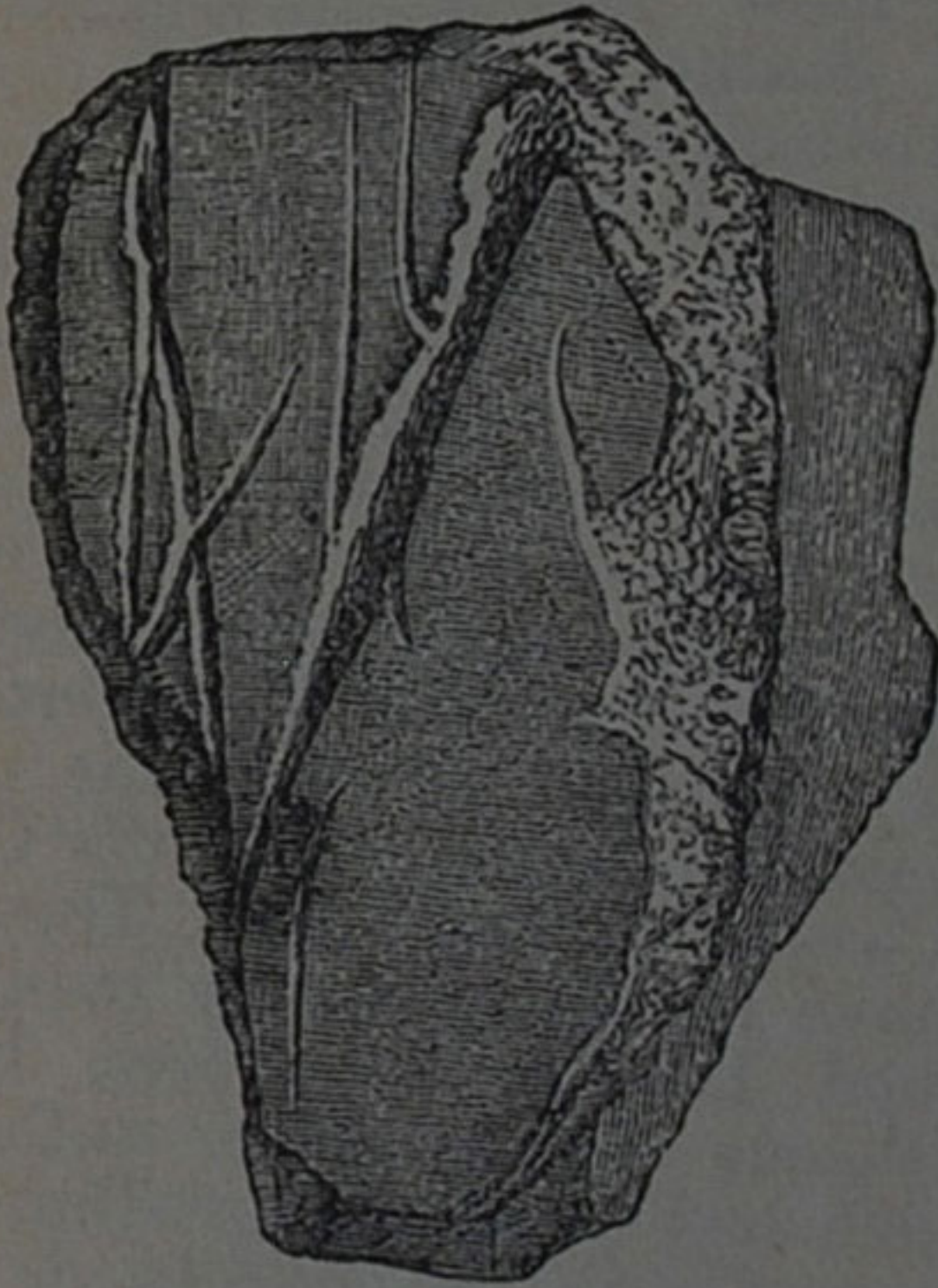
Now, wherever anthropoid apes lived it is clear that, whether as a question of anatomical structure or of climate and surroundings, man, or some creature which was the ancestor of man, might have lived also. Anatomically speaking, apes and monkeys are as much special variations of the mammalian type as man, whom they resemble bone for bone and muscle for muscle, and the physical animal man is simply an instance of the quadrumanous type specialised for erect posture and a larger brain. The larger brain, implying greater intelligence, must also have given him advantages in contending with outward circumstances, as for instance, by fire and clothing against cold, which might

enable him to survive when other species succumbed and became extinct.

If he could survive, as we know he did, the adverse conditions and extreme vicissitudes of the Glacial period, there is no reason why he might not have lived in the semi-tropical climate of the Miocene period, when a genial climate extended even to Greenland and Spitzbergen, and when ample forests supplied an abundance of game and edible fruits. The same reasons apply, with still greater force, to the Pliocene period, when existing types and species had become more common and when a mild climate still prevailed. The existence of Tertiary man must antecedently be pronounced highly probable; but probabilities are not proofs, and the

near Chartres, which were always considered to be Pliocene. Since the discovery, however, some geologists have contended that these strata are not Pliocene, but of the earliest Quaternary, or perhaps a transition period between Pliocene and Quaternary. This evidence cannot, therefore, be accepted as conclusive for anything more than proof that man's existence extends at any rate over the whole Quaternary period, comprising the vast glacial and inter-glacial ages which have effected such changes in the earth's surface.

Less disputable evidence is supplied by the Pliocene of Monte Aperto, near Siena, Italy, where bones of the *Balænotus*, a sort of Pliocene whale, which bear marks of incisions which to all appearance must



INCISED BONES OF BALÆNOTUS. Pliocene. From Monte Aperto. Figured by Quatrefages, "Hommes Fossiles et Hommes Sauvages," p. 93.

fact of such existence must be determined by the evidence. All that can be said is that while there ought to be great caution in admitting as established a fact of such importance, there ought to be no determined predisposition to disbelieve it, like that which for so many years retarded the acceptance of the evidence for Palæolithic man. On the contrary, the fact that man existed in such numbers and under such conditions as have been described in the Quaternary period, establishes a strong presumption that his first appearance must date from a much earlier period.

Let us see how the evidence stands. Undoubted stone implements, and bones bearing traces of cuttings by flint knives, have been found in strata at St. Prest,

have been made by flint knives employed in hacking off the flesh. Doubts were thrown at first on this, as it was thought that possibly fish, or some gnawing animal like the beaver, might have cut the grooves with their teeth. But later specimens have been found on which the cuts have a regular curvature which could not have been made by any teeth, and present precisely the same appearance as the cuts which are so commonly found on the bones of reindeer and other animals in hundreds of Palæolithic caves.

M. Quatrefages, who is a very eminent and at the same time very cautious authority, says, in his last work on the subject published in 1884, "Hommes Fossiles et Hommes Sauvages," that "the most in-

credulous must be convinced. Had they been found in Quaternary beds no one would have hesitated to regard them as intentionally caused. The hand of man armed with a cutting instrument could alone have left marks of this sort on a plain surface. It is evident that some horde of savages of these remote times had found the carcass of this great cetacean stranded on the shore, and cut the flesh off with stone knives just as the savages of Australia do at the present day."

If these bones of the *Balænotus* really bear marks of human tools, the spectacle which might have been witnessed on the shore of the Pliocene sea perhaps 500,000 years ago, must have closely resembled that given by Sir John Lubbock from a description by Captain Grey of a recent whale feast in Australia. "When a whale is washed on shore it is a real godsend to them. Fires are immediately lit, to give notice of the joyful event. Then they rub themselves all over with blubber, and anoint their favourite wives in the same way; after which they cut down through the blubber to the beef, which they sometimes eat raw and sometimes broil on pointed sticks. As other natives arrive they 'fairly eat their way into the whale, and you see them climbing in and about the stinking carcass, choosing tit-bits.' For days 'they remain by the carcass, rubbed from head to foot with stinking blubber, gorged to repletion with putrid meat—out of temper from indigestion, and therefore engaged in constant frays—suffering from a cutaneous disorder by high feeding—and altogether a disgusting spectacle. There is no sight in the world,' Captain Grey adds, 'more revolting than to see a young and gracefully-formed native girl stepping out of the carcass of a putrid whale.'"

The evidence for Miocene man is much of the same character: very strong and conclusive as far as it goes, but resting on too few instances to be universally accepted. In 1868 the Abbé Bourgeois laid before the Anthropological Congress at Paris certain flints which he had found *in situ* in undoubted Miocene strata at Thenay, in the Beauce, near Blois. They were received with general incredulity, and the traces of human design were denied. The Abbé, however, persisted, and having made fresh discoveries the subject was referred to the next meeting of the Congress at Brussels,

who appointed a commission of fifteen of the most eminent European authorities in such matters to report upon it. Nine reported that some of the flints showed undoubted traces of human workmanship, five were of an opposite opinion, and one was neutral. Since then fresh objects have been found, and M. Quatrefages, who had formerly been doubtful, says in his recent work:

"These new objects, and especially a scraper which is one of the most distinctly characterised of that class of implements, have removed my last doubts." And certainly, if the figures given at page 92 of his "*Hommes Fossiles et Hommes Sauvages*" correctly represent the original implements, and they really came from Miocene strata, doubt is no longer possible. The evidence of design in chipping into a determinate shape is quite as clear as in the similar class of implements from Kent's Cavern or the Cave of La Madeleine. They must either have been chipped by man, or as Mr. Boyd Dawkins supposes, by the *Dryopithecus* or some other anthropoid ape which had a dose of intelligence so much superior to the gorilla or chimpanzee as to be able to fabricate tools. But in this case the problem would be solved and the missing link discovered, for such an ape might well have been the ancestor of Palæolithic man.

The next instance is from Otta, in the valley of the Tagus, where flint implements were alleged to have been discovered by an eminent Portuguese geologist, Señor Ribeiro, in Miocene strata. The subject was fully discussed on the spot, at a meeting of the Anthropological Congress at Lisbon in 1880. The general opinion seemed to be that some of the implements showed undoubted traces of human design, but some good authorities remained sceptical; and although there was no doubt that they were found in Miocene strata, it was thought possible that flints of Quaternary age might have fallen into fissures, or been mixed up with



FLINT SCRAPER.
From Thenay. Miocene
Figured by Quatrefages,
"Hommes Fossiles et
Hommes Sauvages," p. 92.

MIOCENE IMPLEMENTS FROM THENAY COMPARED WITH UNDOUBTED
PALÆOLITHIC IMPLEMENTS FROM QUATERNARY CAVES AND DRIFTS.

MIOCENE.



QUATERNARY. Chaleux,
Belgium. Reindeer Period.
Congrès Préhistorique,
Bruxelles, 1872.



SCRAPER, OR RUDE
KNIFE. Thenay. Mio-
cene. Quatrefages,
p. 92.



BORER, OR AWL.
Thenay. Miocene.
Congrès Préhistorique,
Bruxelles, 1872.



SCRAPER. Thenay. Miocene.
Quatrefages, p. 92.



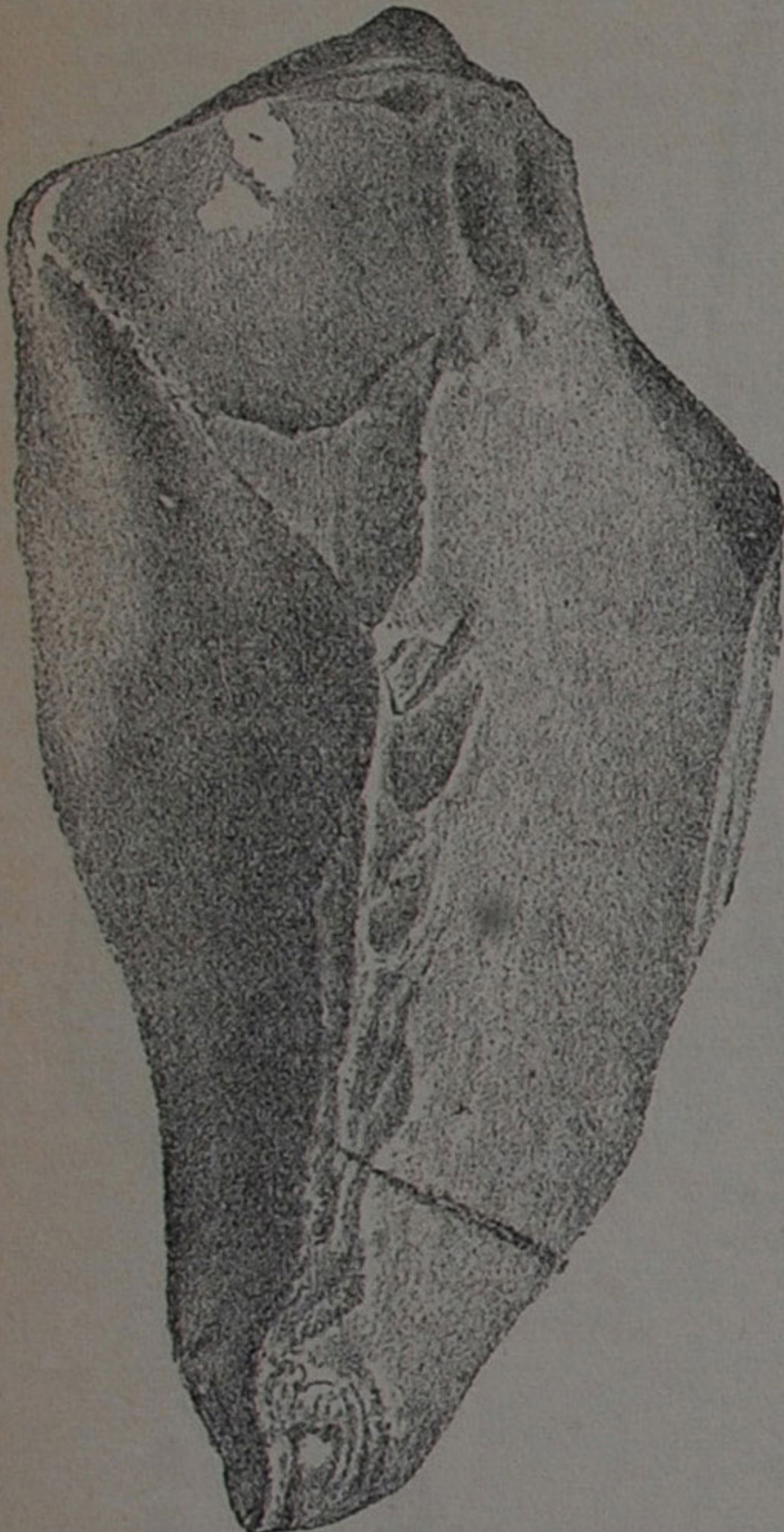
QUATERNARY.
From Le Moustier



QUATERNARY. Mammoth Period.
River Drift, Mesvin, Belgium.
Congrès Préhistorique, Bruxelles, 1872.

Miocene sands by floods at some very remote period, and thus become encrusted in a Miocene matrix.

The verdict as to Miocene man in Europe remains "Not proven." Leaving



TERTIARY HÂCHE.

From Miocene Strata of Tagus Valley.
(Half the actual size.)

Quatrefages, "Hommes Fossiles et Hommes Sauvages."

the Old World for the New, the same will apply to the alleged discovery of a human skull in Calaveras County, California, buried under six distinct layers of hardened volcanic ashes, and, presumably, of Pliocene date, if not earlier. Whitney, the Director of the Geological Survey of the United States, and other American geologists, believe this skull to be Pliocene, but doubts have been thrown on its authenticity, and European geologists do not generally accept it.

A human bone is described by Lyell, which was found near Vicksburg in a side valley of the Mississippi, associated

with bones of the extinct Mastodon and Megalonyx. But, although undoubtedly of great antiquity, there is no proof that it does not belong to the Quaternary period, especially as the mastodon seems to have lived until comparatively recent times in America, its remains being often found in recent bogs and peat mosses.

The same remark will apply to the skull which was found, in digging a well at New Orleans, under six distinct layers of cypress forests such as are now growing on the surface, showing as many periods of successive subsidences, subsequent elevations, and stationary periods long enough to allow of a forest growth of many generations of large trees. Here again the antiquity must be very great, but we have no reason to carry it back into Tertiary periods, or beyond the recent periods when the Mississippi began to flow in its present course and form its present delta.

Human remains have also been discovered in caves in Brazil and Mexico associated with bones of extinct animals, but we have no clear information as to the time when these animals became extinct, or as to the exact order of superposition in which the human skulls and implements were found, and the occurrence of a polished stone celt in the same cave throws still more doubt on their extreme antiquity.

Although the instances cited might be multiplied, it must be remembered that remains of Tertiary man are not likely to be abundant. If man was then living, it was probably in fewer numbers and in more limited areas. The pressure of population had not yet driven wandering hordes to follow sea-coasts and cross rivers and mountains in pursuit of food. Probably at this early period man lived more on fruits, and therefore required fewer implements, and his intelligence was less, so that he had less power of fashioning them. For the purposes for which his Palæolithic descendants chipped stones into shape, he may have used natural stones which would often answer the purpose, but which, when thrown away, would leave nothing by which they could be recognised.

If the forests now inhabited by the gorilla and chimpanzee were submerged and again elevated, no trace would be found of the existence of animals which had built rude nests, used broken branches

of trees as clubs, and cracked cocoa-nuts with hammer stones.

But above all, the surface of these older strata has been so much denuded, that the situations in which alone we might expect to find remains of man have almost entirely disappeared. Ninety-nine hundredths of our Quaternary implements come from river drifts or caves. Where are the Pliocene or Miocene rivers or caves? They have disappeared amidst the revolutions of the earth's surface and the constant denudation which wastes continents away. The negative evidence would be strong if we could point to caves filled with bone-breccias of a Pliocene or Miocene fauna, in which no trace was found of human remains. But it is weak as against even a single well-ascertained instance, if it merely amounts to such remains not being frequently found where we could hardly expect to find them. And it is weak against the strong presumption that when Quaternary man is found in such numbers and under such conditions, spread over wide areas in inhospitable climates, he must have had his first origin in earlier times. The cradle of that origin remains undiscovered, perhaps undiscoverable. For in seeking for evidence about Tertiary man in Europe, we are off the scent. He must be searched for in the region or zone where Dr. Dubois found the fragments already described, and the search may, nevertheless, be in vain. For perchance the area of the parting of the ways between the ape-like man and the man-like ape, as lateral descendants of a pithecoïd ancestor, is in some Indo-African land which has long been covered by the sea, and from which, in the warm climates of inter-glacial periods, when a temperate flora grew in northern latitudes, the earliest human beings spread themselves over the then habitable globe, migrating by way of Africa into Europe, and by way of both Europe and Asia into America, while the ancient land-extensions led him dry-footed, to Australia.

With these high probabilities, is it possible to assign any approximate date to man's appearance?

Reckoning by the thickness of the different stratified deposits which make up the earth's crust, and assuming the average rate of their deposition, or what is the same thing, the average rate of waste of land surface, to have been the

same throughout, the whole Tertiary period carries us back barely one-twentieth part of the way towards the first beginnings of fossil-bearing strata. That is, if 100,000,000 years have elapsed since the earth became sufficiently solidified to support vegetable and animal life, the Tertiary period may have lasted for 5,000,000 years; or for 10,000,000 years, if the life-sustaining order of things has lasted, as Lyell supposes, for at least 200,000,000 years. Even if we take the shorter period, the time is ample for the enormous changes which have taken place since the commencement of the Eocene period. The average rate of denudation over the globe has been taken at about one foot in 3,000 years, from actual calculations of the average amount of solid matter carried down by the Mississippi and other great rivers. Now at this rate it would take only 2,000,000 years to wear the whole of Europe down to the sea-level, and, in the absence of any compensating movements of elevation, the whole of North America would be washed away and deposited in strata at the bottom of the Atlantic and Pacific Oceans in less than 3,000,000 years.

If, therefore, the origin of man could be traced down to the middle Miocene, or even to the date of the great anthropoid *Dryopithecus* of Southern France (an ape approximating nearest to the chimpanzee), we should have to assume a period for his existence of probably between one and two millions of years, a mere fraction of the time since the earth became the abode of life and existing causes operated to bring about geological formations.

As regards the habits and manners of Quaternary man we know very little that is positive, and can only gather some vague indications from the relics in caves and river drifts. These, however, are sufficient to establish with certainty that the law of his existence has been one of continued progress. The older the remains, the ruder are the implements and the fewer the traces of anything approaching to civilisation. As already shown, Neolithic man is comparatively civilised. He has domestic animals and cultivated plants; he has clothing and ornaments, well-fashioned tools and pottery, and permanent dwellings. He lives in societies, builds

villages, buries his dead, and shows his faith in a future life by placing with them food and weapons. As we ascend the stream of time these indications of an incipient civilisation disappear. The first vestige of the domestic animals is found in the dog which gnawed the bones of the Danish kitchen-middens, and of the earliest Swiss lake-dwellings. When fairly in Palæolithic times, even the dog disappears, and man has to trust to his own unaided efforts in hunting wild animals for food.

Weapons and implements become more and more rude until, in the oldest deposits, we find nothing but roughly-chipped hatchets, arrow-heads, flakes, and scrapers. Implements of bone, such as barbed harpoons, borers, and needles, which are abundant in the middle Palæolithic or reindeer period, become ruder and then disappear. Pottery, which is extremely abundant in the Neolithic period, either disappears altogether or becomes so scarce that it is a moot question whether a few of the rudest fragments found in caves are really Palæolithic. If so, they clearly date from the later Palæolithic, and pottery was unknown in the earlier Palæolithic times.

Judging from the portraits engraved on bone during the reindeer period, Palæolithic man pursued the chase in a state of nature, though from the presence of bone needles it is probable that the skins of animals may have been occasionally sewed together by split sinews to provide clothing. There can be no doubt that his habitual dwelling was in caves or rock-shelters. Here was his home, here he took his meals and allowed the remains of his food to accumulate. His staple diet consisted of the contemporary wild animals, the mammoth, the rhinoceros, the cave bear, the horse, the aurochs, and the reindeer. Even the great cave lion was occasionally killed and eaten, and the fox and other smaller animals were not despised; while among tribes skilled in the use of the bow and arrow, birds were a common article of food, and fish were harpooned by those who lived near rivers. Wild fruit and roots were also doubtless consumed, and from the formation of their teeth and intestines it is probable that if we could trace the diet of the earliest races of men we should find them

to have been frugivorous, like their congeners the anthropoid apes.

The abundance of wild animals and the long period for which hunting savages inhabited the same spots may be inferred from the fact that at one station alone, that of Solutré in Burgundy, it is computed that the remains of no less than 40,000 horses have been found. All the long bones of the larger animals have been split to extract the marrow, which was, as with the modern Eskimos and other savages, a great delicacy, and seems also to have been used for softening skins for the purpose of clothing.

Among the split bones a sufficient number of human bones have been found to make it certain that Palæolithic man was, occasionally at least, a cannibal; and in several caves, notably that of Chaleux, in Belgium, these bones, including those of women and children, have been found charred by fire, and in such numbers as to indicate that they had been the scene of cannibal feasts. It is a remarkable fact that cannibalism seems to have become more frequent as man advanced in civilisation, and that while its traces are frequent in Neolithic times, they become very scarce or altogether disappear in the age of the mammoth and the reindeer.

As regards religious ideas they can only be inferred from the relics buried with the dead, and these are scarce and uncertain for the earlier periods. The caves in which Palæolithic man lived on the flesh of the Quaternary animals, have been so often used as burying-places in long-subsequent ages, that it is extremely difficult to ascertain whether the skeletons found in them are those of the original inhabitants. Thus the famous cave of Aurignac, in which Lartet thought he had discovered the tomb of men at whose funeral feast mammoths and rhinoceroses were consumed, is now generally considered to be a Neolithic burying-place superimposed on an abandoned Palæolithic habitation.

There are not more than five or six well authenticated instances in which entire Palæolithic skeletons have been found under circumstances in which there is a fair presumption that they may have been interred after death, and these afford no clear proof of articles intended for use in a future life having been deposited with them. All we can

say, therefore, is that from the commencement of the Neolithic period downwards, there is abundant proof that man had ideas of a future state of existence very similar to those of most of the savage tribes of the present day; such proof is wanting for the immensely longer Palæolithic period, and we are left to conjecture. The only arts which can with certainty be assigned to our earliest known ancestors are those of fire and of fashioning rude implements from stone by chipping. Everything beyond this is the product of gradual evolution.

CHAPTER VI.

MAN'S PLACE IN NATURE

Origin of Man from an Egg—Like other Mammals—Development of the Embryo—Backbone—Eye and other Organs of Sense—Fish, Reptile, and Mammalian Stages—Comparison with Apes and Monkeys—Germs of Human Faculties in Animals—The Dog—Insects—Helplessness of Human Infant—Instinct—Heredity and Evolution—The Missing Link—Races of Men—Leading Types and Varieties—Common Origin Distant—Language—How Formed—Grammar—Chinese, Aryan, Semitic, etc.—Conclusions from Language—Evolution and Antiquity—Religions of Savage Races—Ghosts and Spirits—Anthropomorphic Deities—Traces in Neolithic and Palæolithic Times—Development by Evolution—Primitive Arts—Tools and Weapons—Fire—Flint Implements—Progress from Palæolithic to Neolithic Times—Domestic Animals—Clothing—Ornaments—Conclusion, Man a Product of Evolution.

ALTHOUGH the establishment of the great antiquity of the human race has attracted more immediate attention, being a fact at once intelligible to the general public, the researches of anatomists and physiologists, aided by the microscope, have brought to light results quite as remarkable as regards the individual man and his place in Nature. Until recently it was taken for granted that man was a special miraculous creation, altogether superior to and distinct from the rest of the animal world. This assumption, gratifying alike to our vanity, and our laziness in the laborious search for truth, has been to a

great extent disproved and replaced by the Law of Evolution.

The most striking proof of this is found when we trace scientifically the growth of each individual man from his first origin to his final development. Man, like all other animals, is born of an egg. The primitive egg, or ovum, which was the first germ of our existence, is a small cell about the one-hundred-and-twenty-fifth of an inch in diameter, consisting of a mass of semi-fluid protoplasm enclosed in a membrane, and containing a small speck or nucleus of more condensed protoplasm. This nucleated cell is itself the first form into which a mass of simple jelly-like protoplasm is differentiated in the course of its evolution from its original uniform composition. The



HUMAN EGG.
Magnified 100 times.

nucleated cell is the starting-point of all higher life, and by splitting up and multiplying repetitions of itself in geometrical progression, provides the cell-material out of which all the complicated structures of living things are built up. In sexual generation, which prevails in all the higher forms of life, this process requires, in order to start it, the co-operation of two such cells or germs of life, one male, the other female.

The first remarkable fact is that the human egg is, at its commencement, undistinguishable from that of any other mammal, and remains so for a long period of its growth, going through its earlier stages of development in precisely the same way. At first the egg behaves exactly as any other single-celled organism, as for instance that of the amœba, which is considered the simplest form of organised life. It contracts in the middle and divides into two cells, each with its nucleus and each an exact counterpart of the original cell. These two subdivide into four, the four into eight, and so on, until at last a cluster of cells is formed which is called a *morula* from its resemblance to the fruit of the mulberry-tree. Development goes on, and the globular lump of cells changes

into a globular bladder whose outside skin is built up of flattened cells. Then condensation takes place, from the more rapid growth of cells at particular points, and the foundation is laid of the actual body of the germ or embryo, the other cells of the germ-bladder serving only for its nutrition. Up to this point the germs not only of all mammals, including man, but of all vertebrate animals, birds, reptiles, and fishes, are scarcely distinguishable.

In the next stage the outer surface of the embryo develops three distinct layers, the outer one of which, or epidermis, is modified into the skin, sense-organs, and nervous system; the inner one, or epithelium, into the mucous membrane or lining of all the intestinal organs; while the intermediate layer is the raw material of muscles, bones, and blood-

pression in the outer skin extends until the edges close and form a hollow space in which the eye is formed. At first it is a mere black pigment mark on the interior surface of the enclosed space, which develops into the retina, with a wonderful apparatus of optic nerves for conveying impressions photographed on it to the brain. The enclosed space itself is filled with a fluid, or vitreous humour, from which a lens is condensed for collecting the rays of light and concentrating them on the retina, and by degrees all the beautiful and complicated organs are evolved for perfecting the work of the eye and protecting it from injury. But this fact must be kept clearly in view: the process is identically the same as that by which the eyes of other animals are formed, and its various stages represent those by which the



MAMMALIAN EGG.

First Stage.

Second Stage.

Third Stage.

vessels. The embryo is now contracted in the middle and assumes the form of a violin-shaped disc, and a slight longitudinal furrow appears, dividing it into two equal right and left parts, which is gradually converted into a tube containing the spinal marrow, to protect which a chain of bones or vertebræ is developed, forming the back-bone.

And now comes what is the most marvellous part of the process, viz., the development of the brain, eye, ear, and other organs of sense, from these simple elements. The brain begins as a swelling of the foremost end of the cylindrical marrow-tube. This divides itself into five bladders, lying one behind the other, from which the whole complicated structure of the brain and skull is subsequently developed.

The eye, ear, and other sense-organs, begin in the same way. A slight de-

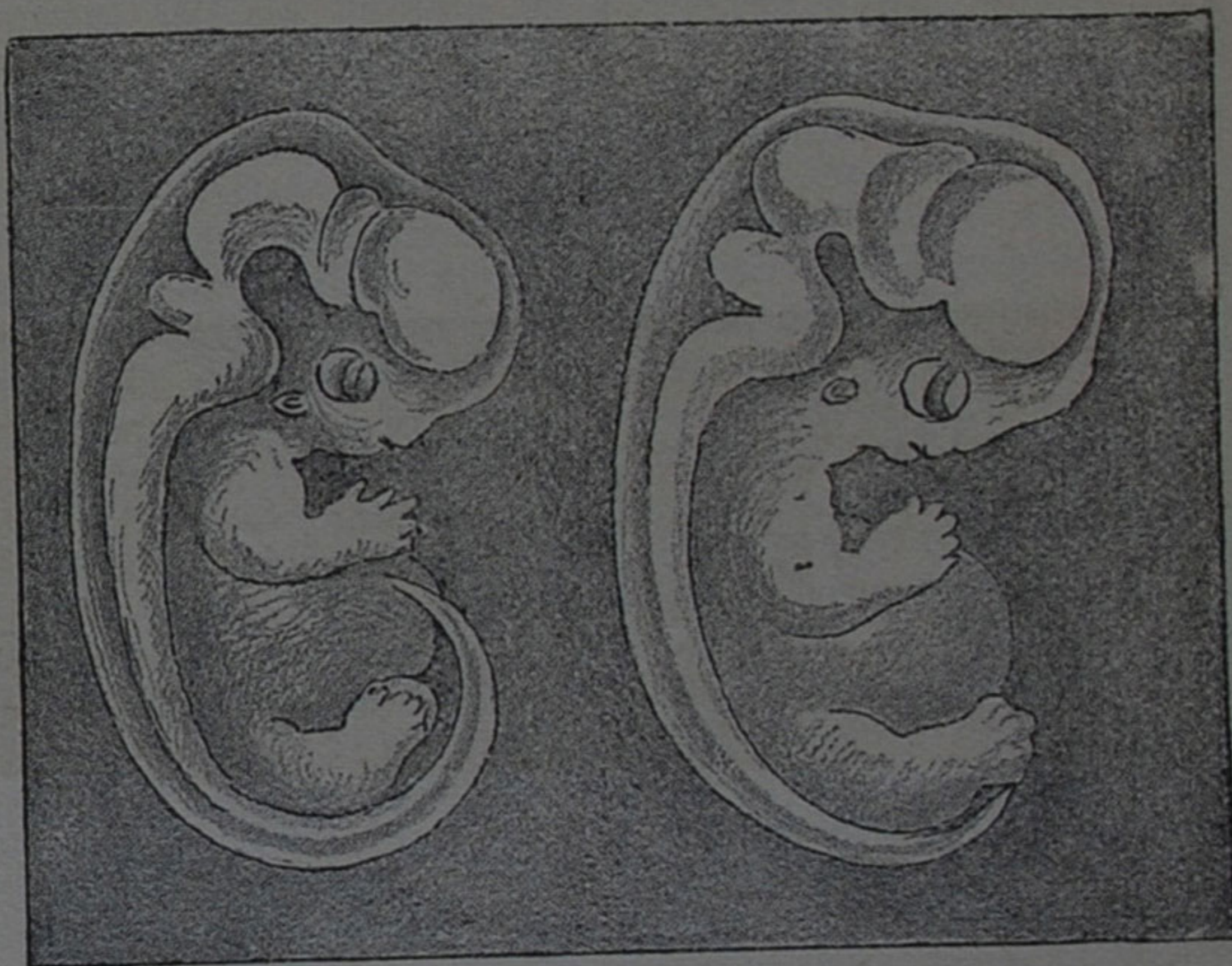
organs of vision have gradually risen to the development of a complete eye, in advancing from the lowest to the higher forms of life. Thus in the lowest, or Protista, the eye remains a simple pigment spot, which probably perceives light by being more sensitive to variations of temperature than the surrounding white cells. The next higher family develop a lens, and so on in ascending order, different families developing different contrivances for attaining the same object, but all starting from the same origin, development of the cells of the epidermis, and leading up to the same result, organs of vision adapted for the ordinary conditions of life of the creature which uses them. I say the *ordinary* conditions, for there are curious instances of the eye persisting, dwindling from disuse, and finally disappearing, in animals which live underground like the

mole, or in subterranean waters like some fish in the Mammoth Cave of Kentucky and underground lakes of Carinthia, where the stimulus of light is no longer felt for many generations.

The history of the ear and other organs of sense is the same as that of the eye. They are all developments of the cell system of the outer skin, and all pass through stages of development identical with those at which it has been arrested in the progression from lower to higher forms of life. The same principles apply to the development of the inner organs, such as the heart, lungs, liver, etc., a striking illustration of which is found in

of development remains the same as that of other mammalia. The rudimentary limbs are exactly similar, the five fingers and toes develop in the same way, and the resemblance after the first four weeks' growth between the embryo of a man and a dog is such that it is scarcely possible to distinguish them. Even at the age of eight weeks the embryo man is an animal with a tail, hardly to be distinguished from an embryo puppy.

As evolution proceeds, the embryo emerges from the general mammalian type into the special order of *Primates* to which man belongs. This order, beginning with the lemur, rises through



DOG (six weeks).

MAN (eight weeks).

From Haeckel's "Schöpfungsgeschichte."

the fact that the gill arches, or bones which support the gills by which fishes breathe, exist originally in man and all other vertebrate animals above the ranks of fish, but, in the development of the embryo, they are superseded by the air-breathing apparatus of lungs, and converted to other purposes in the formation of the jaws and organ of hearing. In fact, we may say that every human being passes through the stage of fish and reptile before arriving at that of mammal, and finally of man.

If we take him up at the more advanced stage, where the embryo has already passed the reptilian form, we find that for a considerable time the line

the monkey, the baboon, and tailed ape, up to the anthropoid apes, the chimpanzee, gorilla, orang, and gibbon, which approach nearest to the human type. The succession is gradual from the lower to the higher forms up to the anthropoid apes, but a considerable gap occurs between these and man. It is true that in his physical structure man resembles these apes closely, every bone and muscle of the one having its counterpart in those of the other. But even at its birth the human infant is already specialised by considerable differences. The brain is larger, its convolutions more complex, the spine has a double curvature, adapting it for an erect posture, and the legs, with a

corresponding object, are longer and stronger, while the arms are shorter and less adapted for climbing. The thumb also is longer, making the hand a better instrument for all purposes, except that of clasping the branches of trees, for which the long, slender fingers of the ape are more available. The great toe also is less flexible, and the foot more adapted for giving the body a firm support and less for being used as a hand.

As growth proceeds after birth these differences become more and more accentuated. The infant chimpanzee is not so very unlike the infant negro, but after a certain age the sutures of the skull close in the former, making the skull a solid box, which prevents further expansion of the brain, and the growth of the bone is directed towards the lower part of the face, giving the animal a projecting muzzle, massive jaws, and a generally bestial appearance, while at the same time its intelligence is arrested and its ferocious instincts become more prominent. Still these higher apes remain creatures of very considerable intelligence and warm affections, as may be seen in the behaviour of those which have been caught young and brought up under the influence of kind treatment. There is a chimpanzee now¹ in the Zoological Gardens at Regent's Park, which can do all but speak, which understands almost every word the keeper says to it, and when told to sing will purse out its lips and make an attempt to utter connected notes. In the native state they form societies, obey a chief, and often show great sagacity in their manner of foraging for food and escaping from danger.

Even in lower grades of life than the anthropoid apes we can see plainly many of the germs of human faculties in an undeveloped state. Those who are fond of dogs, and have lived much with them and understood their ways, must have been struck by the many human-like qualities they possess, and especially by the very great resemblance between young dogs and young children. They both like and dislike very much the same people and the same mode of treatment. They like those who take notice of them, caress them, talk to them, and, above all, those whom they can approach with per-

fect confidence of receiving uniform kind treatment. They dislike those who have no sympathy with them, or whose treatment of them is either cold or capricious. Their great delight is to play with one another, and often to tease and make a pretence of quarrelling and fighting. Both have an instinct for mischief, and are constantly trying it on how far they can go without getting into serious difficulties.

Later in life, and in more serious matters, the dog has certainly the germs of higher intelligence, and does a number of things which require a certain exercise of reasoning power. He has a good memory, and imagination enough to be excited at the prospect of a walk where there is a chance of finding a rat or a rabbit, and to dream of chasing imaginary rabbits when he is lying curled-up on the hearthrug. Every dog has an individual character of his own as clearly defined as that of an individual man, nor can the rudiments of reasoning be denied to the hound who, in a kennel of twenty others, knows perfectly well that he is Rover, and not Rattler or Ranger, and waits till his name is called to come forward for a biscuit. When he has got it, his sense of property makes him appropriate it as his own, and respect the biscuits appropriated to other dogs, at any rate to the extent of knowing perfectly well that he is doing wrong if he takes them by force or steals them.

In moral qualities the dog approaches even more closely to man. His fidelity, affection, and devotion even to death, are proverbial. He feels shame and remorse when he has departed from the canine sense of right and wrong or from the canine standard of honour, and is happy when he feels that he has done his duty. What is this but the working of an elementary conscience? Even in the higher sphere of religious feeling, the dog feels unbounded love and reverence for the master who is the highest being conceivable to him, or in other words, his God; and he shudders as that master does in the presence of anything weird and supernatural. Every good ghost story begins by describing how the dogs howled and cringed at their master's feet when the first shadow of supernatural presence was cast on the haunted castle.

Capacity for progressive improvement

¹ 1888.

can hardly be denied to a race which has developed such qualities from ancestors who, like the wild and half-wild dogs of Asia and America, had not even learned to bark, and were as unlike the civilised and affectionate collie as Palæolithic man to his modern successor. In fact, the progress of the dog seems only to be limited by the want of organs of speech, and of an instrument like the hand by which to place himself in closer relation with the outer world.

The same remarks apply to the elephant, whose great sagacity seems clearly attributable to the possession of such an instrument in the trunk, inferior no doubt to the hand, but still very superior to the paw of the dog or to the hoof-enclosed fore-foot of the horse. In all animals the greater or less perfection of the instruments by which they act upon and are acted upon by the outer world, seems to be the principal factor in determining the quality of the brain as an organ of intelligence.

In the insect world we find still more wonderful exemplifications of the resemblance between animal and human intelligence. Ants live in organised societies, build cities, store-up food for winter, keep aphides as milk-cows, carry on slave-hunting raids, and push the division of labour to such an extent that some tribes are all workers, others all warriors and slave-owners. These actions are not all merely mechanical and instinctive, for ants can to a considerable extent adapt themselves to circumstances, and alter their habits and mode of life when it becomes necessary in the "struggle for existence." The same is true of bees, beetles, and other insects, but it is useless to dwell on these, for the organisation of the insect world is so different from that of the mammalian, to which man belongs, that no safe analogy can be drawn from one to the other. It is from the higher mammalian types that we can fairly draw the inference that, if like effects are produced by like causes, the more perfect intelligence and morality of man must be the same in kind though higher in degree than the less perfect manifestations of the same qualities in animals of similar though less perfect physical organisation.

There is one respect in which the human infant differs greatly from the

young of other animals, viz., in the long period for which it remains in a condition of utter helplessness. In many of the lower forms of life the young creature emerges into the world with many of its necessary faculties complete, and has to learn comparatively little from education. The chicken runs about and picks up food on the day it escapes from the egg, and the young flycatcher, while fragments of the shell still adhere to it, will peck at flies. As we rise in the scale of creation, these instinctive aptitudes become fewer, and more time is required before the young animal can shift for itself; till at length, in the human infant, we arrive at a stage where for some time it can do little to preserve its existence except to breathe and suck.

The reason of this is doubtless to be found in the higher development which it is destined to attain. The faculties of every animal depend on two causes—first, heredity, or those which have been evolved from the type, and become fixed by succession through a long series of ancestors; secondly, adaptation, or those which are acquired by education, including in the term everything that is requisite to place the animal in harmony with its surrounding environment. The first are what are called instincts, which exist from the birth, and are preserved unconsciously and without an effort. The last involve an effort, and reference from the outer stations of the senses along the telegraph wires called nerves, to the central office of the brain, where the message is recorded and the reply considered and transmitted along another set of nerves to the muscles, where it translates itself into action. In either case the fundamental fact seems to resolve itself into a tendency of molecular motion to follow beaten rather than unknown paths. What the brain has once thought or perceived, it will think or perceive more readily a second time, and in like manner, a message which has once been transmitted and read off along a nerve, from muscle to brain or from brain to muscle, will be transmitted and read off more readily by practice, until at length it ceases to require conscious effort and becomes instinctive. We may see an illustration of this in the facility with which a piano player, who began by learning the notes with difficulty.

acquires such aptitude that the execution of rapid passages becomes mechanical, and can be carried on without a mistake, even when the performer is thinking of something else or talking to a bystander.

The outer world with which every animal has to deal from its birth upwards may be compared to a dense forest or jungle through which it has to find its way. A certain number of paths have been cut by its ancestors, and it finds them ready made by heredity; others it constructs for itself by repeated efforts until they become as broad and easy as those which it inherited; and finally, if the forest is thick and its area extensive, it can only be explored by leaving the beaten paths of inherited or acquired instinct, and groping the way painfully by conscious effort and attention.

We can now see why the lower the animal, or in other words the less extensive the forest, the whole vital energy may be concentrated on the few beaten paths opened by heredity, and a few necessary actions may be performed from the first, instinctively and with great perfection, while in higher organisms the vital energy is employed in developing a great mass of future possibilities rather than a small number of inferior present realities. The baby cannot run about the room and feed itself like the chicken, because the baby has to grow into a man or woman, while the chicken has only to grow into a fowl which can do very little more in its adult than in its infant state.

In fact, when we come to analyse the sum of faculties of the adult man, we find that they are derived to a surprisingly small extent from heredity as compared with education. In saying this, however, it must be understood that the term "heredity" is limited to that direct heredity which transmits characters by instinctive necessity, and not to the far larger sphere of indirect heredity by which faculties, arts, modes of thought, and rules of conduct, are accumulated in civilised societies, and become the principal instrument of education in its larger sense. If it were possible to suppose a human infant, born of civilised parents, left entirely to itself, what would it grow into? It would have the physical characters and advantages of its human ancestry which heredity transmits; bipedal movement, large, convoluted brain with potential capacities;

aptness of hand and opposable thumb; but its solitariness would be fatal to its progress. It would not learn to speak, in the sense of using any articulate language; its arts might not extend beyond recognising a few articles of food, and perhaps using stones to crack nuts, and constructing some rude shelter from branches of trees. It would know nothing of fire, and on the whole it would not be so far advanced as its oldest Palæolithic ancestor.

As regards a moral sense, and all that we are accustomed to think the highest attributes of humanity, it is clear that its mind would be a blank. Even at a much more advanced stage, such ideas evidently come from education, and are not the results either of inherited instinct or of supernatural gift. An English child kidnapped at an early age by Apache Indians or head-hunting Dyaks, would, to a certainty, consider murder one of the fine arts, and the slaughter of an inoffensive stranger, especially if accomplished with a treachery that made the exploit one of little risk, an achievement of the highest manhood. If brought up among Mahometans he would consider polygamy, if among the Todas polyandry, as the natural and proper relation of the sexes. All that can be said is, that if recaptured and brought back to civilised society, he would perhaps be assisted by heredity in adopting its ideas more readily than would be the case if he had been born a savage.

It is clear, therefore, that the history of the individual man tells the same story of evolution from low beginnings as is told by that of the human race as traced from Palæolithic, through Neolithic, into modern times. His law is progress, worked out by conscious effort called forth by the environment of outward circumstances, and accelerated from time to time by the successful efforts of a few superior men, whose greater sum of energy or happier organisation for development, enables them to pioneer new paths through the vast unexplored forests of science, art, and morality.

The difficulty of accounting for the development of intellect and morality by evolution is not so great as that presented by the difference in physical structure between man and the highest animal. Given a being with man's brain and man's hand and erect stature, it is easy to see

how intelligence must have been gradually evolved, and rules of conduct best adapted for his own good and that of the society in which he lived must have been formed and fixed by successive generations, according to the Darwinian laws of the "struggle for life" and the "survival of the fittest."

But it is not so easy to see how this difference of physical structure arose, and how a being who had such a brain and hand, and such undeveloped capabilities for an almost unlimited progress, came into existence. The difficulty is this: the difference in structure between the lowest existing race of man and the highest existing ape is too great to admit of the possibility of one being the direct descendant of the other. The negro in some respects makes a slight approximation towards the Simian type. His skull is narrower, his brain less capacious, his muzzle more projecting, his arm longer than those of the average European man. Still he is essentially a man, and separated by a wide gulf from the chimpanzee or gorilla. Even the idiot or *crétin*, whose brain is no larger and intelligence no greater than that of the chimpanzee, is an arrested man and not an ape.

If, therefore, the Darwinian theory holds good in the case of man and ape, we must go back to some common ancestor from whom both may have originated by pursuing different lines of development. But to establish this as a *fact* and not a *theory* we require to find that ancestral form, or, at any rate, some intermediate forms tending towards it. We require to find fossil remains proving for the genus man what the *Hipparion* and *Anchitherium* have proved for the genus horse, that is, gradual progressive specialisation from a simple ancestral type to more complex existing forms. In other words, we require to discover the "missing link." Now it must be admitted that hitherto, not only have no such missing links been discovered, but the oldest known human skulls and skeletons show no very decided approximation towards any such pre-human type. On the contrary, one of the oldest types, that of the men of the sepulchral cave of Cro-Magnon, is that of a fine race, tall in stature, large in brain, and on the whole superior to many of the existing races of mankind. The reply of course is that

the time is insufficient, and if man and the ape had a common ancestor that as a highly developed anthropoid ape certainly, and man probably, already existed in the Miocene period, such ancestor must be sought still further back, at a distance compared with which the whole Quaternary period sinks into insignificance. It is said also that the discovery of man's antiquity is of quite recent date, and that fifty years ago the same negative evidence was quoted as conclusive against his existence in times and places which now afford his remains by tens of thousands. All this is true, and it may well make us hesitate before we admit that man, whose structure is so analogous to that of the animal creation, whose embryonic growth is so strictly accordant with that of other mammals, and whose higher faculties of intelligence and morality are so clearly not miraculous instincts but the products of evolution and education, is alone an exception to the general law of the universe, and is the creature of a special creation.

This is the more difficult to believe, as the ape family, which man so closely resembles in physical structure, contains numerous branches which graduate into one another, but the extremes of which differ more widely than man does from the highest of the ape series. If a special creation is required for man, must there not have been special creations for the chimpanzee, the gorilla, the orang, and for at least 100 different species of apes and monkeys which are all built on the same lines?

What are the facts really known to us as to man, his nature, and his origin?

Man is one of a species of which there are in round numbers, according to the computations of Wagner and Supan, some 1,480 millions of individuals living at the present time on the earth. Taking thirty years as the average duration of each generation there are thus over 3,600 millions who are born and die per century, and this has gone on more or less during the period embraced by history, which extends for a great part of the Old World over thirty centuries, in the case of Babylonia perhaps over ninety, and in Egypt, certainly over seventy centuries. At the commencement of these historical periods population was dense, probably in Egypt and Western Asia denser than at

present, and civilisation far advanced. The Pyramids, which are among the oldest and the largest buildings in the world, prove this conclusively, both from the mechanical skill and astronomical science shown in their construction, and from the great accumulation of capital and highly artificial arrangements of society which could alone have rendered such works possible. The great mass of the population in these times lived in what is known as the Old World, and was accumulated mainly in the great valley systems of the Nile, and of the various rivers and irrigated plains of the southern half of the continent of Asia. Northern Asia and Europe were thinly inhabited by ruder tribes. Of America and the interior of Africa we know little until a much later date, but the population was in all probability sparse and savage; in Australia, it was still scantier and more savage; while in New Zealand and most of the Pacific Islands it has been introduced by migration only within comparatively recent times.

The next leading fact we have to observe is that the human race is not everywhere the same, but is divided into several well-marked varieties. The most obvious distinction is that of colour. In the Old World there are three distinct and clearly characterised groups—the white, the yellow, and the black. These are found mainly in three separate zoological provinces: the white in the temperate and north-temperate zones of Europe and Western Asia, the yellow in those of Eastern Asia, and the black in the tropical zone, principally of Central Africa. Where they are pure and unmixed, these race-types differ from one another not in colour only but in many other important and permanent characters. The average size of the brain, the complexity of its convolutions, the shape of the skull, the bones of the face and jaws, the comparative length of the limbs, the structure of the hair and skin, the characteristic odour, the susceptibilities to various diseases, are all essentially different, so that no observant naturalist, or even observant child or dog, could ever mistake a Chinaman for a Negro, or a Negro for an Englishman.

Such a naturalist, seeing for the first time typical specimens of the three races, would pronounce them without hesitation to be distinct species, and would

predict with much confidence that they would either not cross, or, if they did, would produce a hybrid progeny of inferior fertility.

But here he would be wrong, for, in fact, the most opposite races breed freely together, and produce a fertile progeny.

Moreover, when we extend our view beyond the clearly distinguished types of the white, yellow, and black, as seen in Caucasian, Mongoloid, and Negro races, we find these types breaking off into sub-types and shading off towards each other, while a large proportion of the human race consists of brown, red, olive, and copper-coloured people, who may either be original varieties, or descended from crosses between the primitive races. Small isolated groups differing from the main races also crop up, of whom it is hard to say from whom they are descended or how they got there: as for instance the Hottentots, in South Africa; the pigmy black Negritos of the Andamans and other South Asiatic islands; the Papuans and Australians; the so-called hairy Ainos of Japan, and some of the aboriginal races of India.

To a certain extent climate seems to have had an influence in creating or developing the main typical differences. Thus the main line of black races lies along the hot tropical belt of the earth from Old to New Guinea. But the rule is not universal, there is no similar type in tropical America, where a singular uniformity of type and colour prevails throughout the whole continent. Even in Africa we find the Negro type, while retaining its black colour, shading off towards higher types and losing its more animal-like characteristics. Again, colour, the origin of which remains a perplexing problem to the physiologist, becomes generally lighter as we pass from tropical to south-temperate and from south to north-temperate regions, probably because the skin needs less protection from the sun's rays which the pigmentation affords. The exceptions supplied by the Esquimaux may be due to their having six months' unbroken sunlight, and by the now extinct Tasmanians to their migration from tropical regions.

Even within great and well-defined races themselves there are clearly marked varieties. Thus the white race consists of the two distinct types of the fair-whites and dark-whites, the former prevailing in

Northern Europe and the latter in Southern Europe, Western Asia, and North Africa; the contrast between a fair Swede with flaxen hair and blue eyes, and a swarthy Spaniard with black hair and eyes, being almost as marked as between the latter and some of the higher black or brown races. Throughout a great part of Europe, including specially England, it is evident that the existing population is derived mainly from repeated crosses of these two races with one another and probably with earlier races.

In the existing state of things also it is evident that if the different races of mankind ever really did pass into one another under influences like those of climate, the time of their doing so is long past. A colony of English families transported to tropical Africa would to a certainty die out long before they had taken even the first step towards acquiring the black velvety skin, the woolly hair, the projecting muzzle, and the long narrow skull of the typical Negro, while a Negro colony transported to Scotland or Scandinavia would as certainly disappear from diseases of the chest and lungs, long before they began to vary towards the European type. The yellow race seems to be on the whole the best fitted to withstand climate and other external influences, and it certainly shows no signs anywhere of passing over either into the Caucasian or the Negro type.

On the whole, therefore, if the fact of fertile inter-crossing is to be taken as proving the unity of the human race and their probable descent from a common ancestor, and we are to assume that all the great varieties which we find existing are the result of modifications gradually introduced by climate and surrounding circumstances, it is evident that the point of divergence must be put at an immense distance.

This is the more certain, as when we look back for a period of more than 4,000 years, we find from the Egyptian monuments that some of the best-marked existing types have undergone no sensible change. The portraits of negroes and of Semitic dark-whites painted on the walls of temples and tombs of the 12th dynasty, about 2,000 B.C., might be taken as characteristic portraits of the negro and Jew of the present day, and the modern Egyptian fellah reproduces with little or no change the features of the ancient Egyptians of the days of Rameses and Ameno-

phis. It is evident, therefore, that where no great change has taken place from crossing of races, they will maintain their special characters unaltered for more than 100 generations. Indeed we might say for 200 generations, for the statues and wooden statuettes from the tombs of Sak-kara, the ancient Memphis, which certainly date back for more than 5,000 years, show us the Egyptian type in its highest perfection, and with a more intellectual and I might say modern expression than is found 1,000 or 2,000 years later, when the type of the higher classes had evidently deteriorated somewhat from a slight infusion of African elements.

The same conclusion of the great distance at which any common point of divergence of the various races of mankind must be placed, is confirmed by a totally different line of inquiry, that into the origin of language.

Philologists have clearly proved that languages did not spring into existence ready made, like Minerva from the brain of Jupiter, but have followed the general law of Nature, and have had their periods of birth, growth, and evolution from simple into complex organism. Now there is a vast variety of languages, some say more than a thousand. A large proportion of these are, of course, only what may be called dialects of the same original language, as in the case of the whole Indo-European family, including Sanscrit, Zend, Greek, Latin, Teutonic, Celtic, and Slavonic, with all their offshoots and derived branches, as well as many others. Any one who wants to be convinced of this has only to refer to Max Müller's works and trace the history of one verb, viz., that used to denote individual existence.

Asmi in Sanscrit has become *eimi* in Greek, *sum* in Latin (whence *sono*, *suivis*, and all the modern derivatives of Latin races), and "am" in English; while the Latin *est*, the Greek *esti*, and the German *ist*, are clearly akin to the original *asti*. It may help in understanding how language has been formed if we point out that "I am" originally meant "I breathe," and "he is" is the more general and abstract form of "he stands."

But there are a number of languages between which no such relationship can be traced, which are constructed on radically different principles, and have no resemblance with one another in their roots, or primitive sounds used to express

objects and simple ideas, except in the few cases where it can be traced to importation from abroad, or to imitation of naturally suggested sounds, such as those which have led so many nations to express the idea of "mother" by a sound resembling the bleating of a lamb. Obviously, similarity of sound in such words as are used for the ideas of father, mother, cow, crow, thunder, crack, splash, and so on, suggests no common origin, and as most, or at any rate a great many roots, were probably derived originally in this manner, though long since diverted to express other ideas by associations which it is impossible to trace, the wonder rather is that we should find so many languages with so few roots in common. The best authorities tell us that a list of fifty to one hundred languages could be made of which no one has been satisfactorily shown to be related to any other.

The main distinction between languages, however, is to be found in their inner mechanism, or grammar, rather than in the mere difference of root-sounds. The result of years of mechanical training in barbarous Latin and Greek grammars in our English public schools has been to leave the average Englishman completely ignorant of the real meaning of the word "grammar," and almost incapable of comprehending that it can mean anything else than a string of arbitrary rules to be learned by heart for the vexation of small boys.

And yet grammar is really most interesting, as showing the modes by which the dawning human intellect has proceeded, at remote periods and among different races, in working out the great problem of articulate speech, by which man rises into the higher regions of thought and is mainly distinguished from the brute creation. Consider first what the problem is, and then some of the principal modes which have been invented to solve it.

Suppose some primitive race to have accumulated a certain stock of root-words, or simple sounds to signify definite objects and simple ideas, they must soon find that these alone are not sufficient to convey briefly and clearly to other minds the ideas which they wish to express. For instance, suppose a tribe had got root-words to express the ideas of "man," "bear," and "kill." What one of the

tribe wants to convey from his own mind to that of his neighbour may be, "The man has killed the bear," or "The bear has killed the man," or "The" (or "A") man has killed a bear," or "bears," or "will" or "may have" killed, and so on through a vast number of variations on the original three-note theme. Up to a certain point, a man might succeed in making himself understood by using his three root-sounds in a certain order, aided by the pantomime of accent and gesture; and the Chinese, though one of the oldest civilised peoples of the world, have scarcely got beyond this stage. But the process would be difficult and uncertain, and at length it would occur to some genius that such modifications as those of definite and indefinite, past and present, singular and plural, etc., were of general application, not to the particular three or four roots which he wished to connect, but to all roots. The next step would be to invent a set of sounds which, attached in some way to the root-sounds, should convey to the hearer the sense in which it was intended that he should take them.

This is the fundamental idea of grammar, but it has been worked out by different races in the most different manner. The Chinese and other allied races in the South-east of Asia, such as the Burmese and Siamese, have solved it in the simplest manner. Their languages are what is called monosyllabic—that is, each word consists of a single syllable, and is a root expressing the fundamental idea, without distinction of noun from verb, active from passive, or other modifications. They have to trust, therefore, to express their meaning, mainly to syntax, or the order in which words succeed one another, which, up to a certain point, is the simplest method, and is largely adopted in modern English. Thus, "Man kill bear," "Bear kill man," convey the meaning just as clearly as the classical languages do by cases, when they distinguish whether the man is the killer or the killed by saying *homo* or *hominem*. But the monosyllabic system limits the nations who use it to an inconveniently small number of words, and fails in expressing their more complex relations, so that we find the same word in Chinese or Siamese often expressing the most different ideas, and the meaning can only be conveyed by supplementing the root-words and syntax by accent and other

conventional signs which are akin to the primitive devices of gesture language. Thus, in Siamese, the syllable *ha*, according to the note in which it is intoned, may mean a pestilence, the number five, or the verb "to seek."

This very primitive and almost infantine form of language is confined to one family, that of the Chinese and Indo-Chinese, who, it may be observed, are by no means simple or primitive in other respects, but stand and have stood for centuries at a comparatively high level of civilisation. All other races, including the most savage, have adopted some form or other of grammar, *i.e.*, of modifying original root-sounds by additional generic sounds of definite determination; but the devices on which they have hit for this purpose are most various. Thus, the grammar of the Aryan family of languages has been formed by reasoning out such general categories of thought as articles, pronouns, and prepositions, coining sounds for them and prefixing these sounds to the root-sounds as separate determinating signs. More complex shades of meaning are conveyed principally by inflections, *i.e.*, by adding certain generic new sounds to the original root-word, and incorporating them with it so as to form modifications which are a sort of secondary words. Thus the ideas of present, past, and future love, loving, and being loved, lovely, and so on, are formed by transforming the root *amo* into such modifications as *amor*, *amavi*, *amabo*, *amans*, *amabilis*, etc. We can see this process in the course of formation in the change which converted the old English form "Cæsar his" into the modern genitive "Cæsar's."

Other families again obtain the same results by very different processes. The Semitic languages, for instance, including Hebrew, Arabic, Assyrian, and Phœnician, are what is called "triliteral," *i.e.*, they consist of roots mostly of three consonants, and express different shades of grammatical meaning by altering the internal vowels. Thus, from the root *m-l-k* are derived *melek*, a king; *malak*, he reigned, and so on.

The so-called Turanian family, comprising Huns, Turks, Finns, Lapps, and other Mongolian races of Northern Asia, all speak agglutinative languages, *i.e.*, languages in which the root is put first and is followed by suffixes strung on to

it, but not incorporated with it and remaining distinct. Thus in Turkish, the root *sev*, to love, is expanded into *sevishdirilmedeler*, meaning "incapable of being brought to love one another."

These are only given as specimens of some of the most marked of the vast varieties of language which have been examined and classified by philologists. They suggest a great many interesting reflections, but I confine myself to those which bear more immediately on the subject of man's origin and development. It is evident that they imply great antiquity for the existence, not of man only, but of separate races of men speaking separate languages.

Babylonian inscriptions, estimated by Dr. Hilprecht to be 9,000 years old, show that the characteristic features of the Semitic languages were as clearly established then as they are now; and the hieroglyphics of Egyptian monuments, 7,000 years old, show the Coptic language essentially the same as modern Coptic, and although presenting some points of analogy with Semitic, too different to be classed with it. If these are descended from a common ancestor, clearly their origin must be extremely remote. And even with unlimited time it is difficult to conceive how such radical differences in the structure of languages could have arisen unless the different races had branched off before any clear form of articulate speech had become fixed. Could a race accustomed for generations to the free-flowing inflectional Aryan, have deserted it for the cramped forms of the Semitic, or, *vice versa*, could the Semite have adopted the modes of thought and expression of Sanscrit? And the same difficulty would apply in at least twenty or thirty cases of other families of language.

It must be recollected that language is not merely the conventional instrument of thought, but to a great extent its creator, and the mould in which it is cast. The mould may be broken, and races abandon old and adopt new languages by force of external circumstances, such as conquest or contact with and absorption by superior races, but there is no instance of its being so transformed from within as to pass into a totally different type. Nor can we very well see how root-words once attached to fundamental ideas, such for instance as the simpler numerals, should come to be

forgotten and new and totally different words invented.

Of course, the explanation was easy in the olden days, when everything was referred to miracle. Languages were different because God, to baffle the attempt of united mankind to build a tower high enough to reach to heaven, had made them so. But the theory of special miraculous creation for each language cannot stand a moment's investigation.

As in the case of the animal world, special creations, if admitted at all, must be multiplied to an extent which becomes absurd. Is every petty tribe of savages who speak a language unintelligible to others to be supposed to have had it conferred upon it as a miraculous gift? Was the language of the extinct Brazilian tribe, of which Humboldt tells us that a very old parrot spoke the last surviving words, one of the languages used to scatter the builders of the Tower of Babel? Or, still more conclusively, where we know and can prove that one part of a language is the product of natural laws, can we assume that another part of the same language is the result of miracle? Did it require Divine inspiration to make the old Egyptians call a cat *miaou*, or to teach so many nations to express the idea of mother by imitating the bleating of a lamb? If not, why should half the words in a dictionary be miraculous and half natural?

And if Cæsar is correctly reported to have been more proud of discovering a new case than of conquering Gaul, ought we not to "render unto Cæsar the things that are Cæsar's," and assign grammar as well as words to human invention? In short, no reasonable man who studies the subject can doubt that language is just as much a machine of human invention for communicating thought, as the spinning jenny is for spinning cotton.

The general conclusion, then, to be drawn from the study of language points in the same direction as that of all other branches of science, viz., that their true history is that of evolution from simple origins by the operation of natural laws over long periods of time into forms of greater complexity and higher development. What language really does for us is to take up the thread where the oldest history fails us, and show that even at this date it is impossible to doubt that

the human race must have been already in existence for a very long period, and in existence as at the present day in several sharply distinguished varieties, so that the common origin, if there be one, must be placed still further back. As history verified by the Babylonian monuments extends over a period of, say, nearly 9,000 years, this is equivalent to saying that such a period can only be a very small part of the total time which has elapsed since man became an inhabitant of the earth.

The origin and development of religions have been much discussed, but too often with a desire to make theories square with wishes. The subject also does not admit of such precise determination as in treating of arts and languages, which have left traces of themselves in the form of primitive implements and primitive roots.

The history of religions really begins with written records, or, at the earliest, with the older myths which are embodied in these records. But these are all comparatively modern, and imply a considerable progress in civilisation before they could have existed. If we wish to form some idea of what may have been the primitive elements from which religion was evolved during the long Neolithic and still longer Palæolithic periods which preceded history, we must look at what are actually the religious ideas of contemporary savage and semi-barbarous races.

As we rise above the level of the lowest savagery we find ideas of religion beginning to grow from two main tap-roots. One is the idea of ghosts or spirits, which arises naturally from dreams and visions and develops itself into ancestor and hero-worship, and belief in a world of spirits, good and evil, influencing men's lives and fortunes, and in many forms of sickness taking possession of their bodies. This spirit-worship also necessarily leads to some dim perception of a future life.

The other tap-root is the inevitable disposition to account for the phenomena of nature, when men first began to reflect on them, by the agency of invisible beings like themselves; in other words, of anthropomorphic gods. Perhaps this is a higher and later stage of religious belief than the former, for it implies a certain disposition to inquire into the causes of things and a certain amount of reasoning

power to infer like causes from like results.

But the two often blend together, as in the religions of the Aryan-speaking peoples, in which we see deified heroes and ancestors crowding the courts of Olympus, with a multitude of anthropomorphic gods, who are often merely obvious personifications of natural phenomena or astronomical myths. Thus, Varuna, Ouranos, or Uranus, are said to be personifications of the vault of heaven; Phœbus, the shining one, of the sun; Aurora, of the dawn; while Hercules is half deified hero and half solar myth. Sometimes, however, of the two stems of religion one only has flourished, and the other has either never existed, or been overshadowed by the first and relegated to a lower sphere. Thus the great Chinese civilisation, comprising such a large portion of the human race, has apparently developed its popular religion from the idea of spirits and spirit-worship. The worship of ancestors is its main feature, and its sacred books are, in effect, treatises on ethics and political economy, with rules for rites and ceremonies to enforce decent and decorous behaviour, rather than what we should call works of religion.

With other races again, and specially the Hebrew, the idea of a tribal anthropomorphic God has gradually swallowed up that of other gods, developed into that of one Almighty Being, and dwarfed that of ghosts and spirits. Their primitive God was anthropomorphic, and modelled on the idea of an Oriental sultan—sometimes good and beneficent, but sometimes cruel and capricious, and above all jealous of any disrespect and enraged by any disobedience. Morality seems at first to have had little or nothing to do with these conceptions, and there is not the remotest trace in the early history of any religion, of its having been born ready-made from the necessary intuition of one Almighty God of love, mercy, and justice, which is so confidently assumed by many metaphysicians and theologians. On the contrary, conscience had to be first evolved, and the process may be followed step by step by which, as manners became milder and ideas purer, the grosser attributes of Deity gradually yielded to the idea of a just and merciful God.

These considerations, however, lead us

far from the question of the first dawn of religion among primitive man. Judging from the earliest facts of history, and the analogy of modern savage races, we might look for the first traces of religious ideas from the contents of tombs and from idols. When a tribe had attained to some definite idea of a future life it would almost certainly bury weapons and implements with its dead, as is the case with modern savages. When it had reached the stage of worshipping anthropomorphic deities, it would probably frame images of them, some of which would be found in their tombs and dwellings.

The latter test soon fails us. In the early Egyptian tombs, and in the remains of the prehistoric cities excavated by Dr. Schliemann, images of owl and ox-headed goddesses, and other symbolical figures or idols, are found in abundance. But when we ascend into Neolithic times, such idols are no longer found, or, if found, it is so rarely that archæologists still dispute as to their existence. Certain crescents found in the Swiss lake-dwellings were at one time thought to indicate a worship of the moon, but the better opinion seems to be that they were used as rests for the head during sleep, as we find similar objects now used in many parts of the world. Among the many thousand objects recovered from these Swiss lake-dwellings and other Neolithic abodes, there are only a very few which may possibly have been rude idols or amulets, and the only ones which may be said with some certainty to have been idols, are one or two discovered by Mons. de Braye in some artificial caves of the Neolithic period, excavated in the chalk of Champagne, which appear to be intended for female figures of life size with heads somewhat resembling that of the owl-headed Minerva.

When we pass to Palæolithic times the evidence of idols becomes more faint, and rests solely on the slender conjecture that some of the figures carved by the Reindeermen of La Madeleine and other caves, may probably have been intended for amulets. As they were skilful carvers, and fond of drawing whatever impressed itself on their imagination, the presumption is strong that they had not advanced to the stage when the worship of gods symbolised by idols had come into existence, as otherwise more undoubted idols must have

been found in the caves which were so long their habitations, and which have yielded such a number of remains of works of art.

The evidence for a belief in a future existence and in spirits is more conclusive. Throughout the whole Neolithic period we find objects which were evidently intended for use in a future life buried with the dead. We find also in many Neolithic tombs a singular fact which points to the existence of a very long belief in evil spirits. Many of the skulls, especially of young people, have been trepanned, that is, a piece of the skull has been cut out, making a hole, apparently, to let out the evil spirit which was supposed to be causing epilepsy or convulsions; and where the patient had recovered and the wound healed, when he died long afterwards, a piece of the skull, including this trepanned portion, was sometimes cut out and used apparently as an amulet. The objects deposited in graves show that the idea of a future life, as with most savages of the present day, was that of a continuation of the same life as he had led here, though perhaps in happier hunting-grounds. In some cases a great chief seems to have had wives and slaves slaughtered and buried with him, though the proofs of this are more clear and abundant in later times than during the Neolithic period. Cannibalism, however, seems to have occasionally prevailed both in Palæolithic, Neolithic, and prehistoric times, as it did so extensively among modern savage races before they came under civilising influences. This is clearly proved by the number of human bones, chiefly of women and young persons, which have been found charred by fire and split open for extraction of the marrow.

The evidence of belief in a future life becomes more rare and uncertain in Palæolithic times. Perhaps it may be because we have so few authentic discoveries of Palæolithic burying-places, and so many instances of caves, once inhabited by Palæolithic races, being used long afterwards as Neolithic sepulchres. After the famous cave of Aurignac it is difficult to trust any evidence as to the discovery of a real Palæolithic sepulchre which has not been subsequently disturbed.

In the few cases also where Palæolithic skeletons have been found, as in that of the men of Neanderthal and Mentone, they have often been those of single indi-

viduals, and it may be doubted whether they were buried there, or merely died in the caves in which they lived, in which case any implements found with them do not necessarily imply that they were placed there for use in a future life. On the whole it seems doubtful whether any certain proofs of burials denoting knowledge of a future life can be found in Palæolithic times, and if there are, they are certainly few and far between, and confined to the later stages of that period.

All we can say is, that religion certainly did not descend ready-made among these aboriginal savages, but that, like language, it was slowly developed from beginnings as rude as those we now find among the lowest races of savages.

It may be well, however, to say here, once for all, what is applicable to many other passages in this book, that the question of the origin of any religion is entirely different from that of its truth or falsehood. To explain a thing is not to disprove it; on the contrary, a thing only really becomes true to us when we understand it. A stately oak, with wide-spreading branches, that give shade and shelter to the cattle of the fields, is not the less a fact because we know that it did not drop ready-made from heaven, but grew from an acorn. The intrinsic truth of a religion must be tested by the conformity which, in a given stage of its evolution, it bears to the facts of the universe as disclosed by science, and to the feelings and moral perceptions which have been equally developed by evolution in the contemporary world.

All I contend for is, that all religions have grown and been developed from humble origins, and that their history, impartially considered, does not contradict, but on the contrary greatly confirms the law of natural evolution.

Of the two faculties by which man is commonly distinguished from the brute creation, viz., that of being the speaking and the tool-making animal, the former attribute has been shown to be the product of evolution from origins long since lost in the far-off distance of remote ages.

The same remark is even more certainly true as regards the other attribute of tool-making, or, in its widest sense, adapting natural laws and natural objects to the arts of life by intelligent application. The primitive roots, so to speak, of this

industrial language, which in the case of spoken language for the most part elude our search, are here furnished by the Palæolithic remains found so abundantly in river drifts and caves. There can be no doubt whatever that the modern wood-cutter's axe and carpenter's adze are the lineal descendants of the rudely-chipped *hâches*, or celts, which are dug out of the gravels of St. Acheul, or from below the stalagmite of Kent's Cavern. The regular progression can be traced from the mass of flint rudely chipped to a point, with a butt-end left rough to grasp in the hand, up to more symmetrical and carefully-chipped forms; to implements intended to be hafted or fastened to a handle; to implements ground and polished to a sharp edge and pierced for the handle; and finally to the finished specimens of the later Neolithic period, which exactly represent the adze and battle-axe, and are almost identical with those used quite recently by the Polynesians and other semi-civilised races who had no access to metals. From these the transition to metals is easily traced, the first bronze implements and weapons being facsimiles of those of polished stone which they superseded, and the gradual development of bronze, and from bronze to the cheaper and more generally useful metal, iron, being a matter of quite modern history.

In like manner, the development of the knife, sword, and all cutting instruments, from the primitive flint-flake, can be traced step by step, and is beyond doubt; and equally so the development of all missiles, from the primitive-chipped flint, used as a javelin or arrow-head, up to the modern rifle. When we catch the first glimpse of the beginnings of human art or industry, the furniture or stock-in-trade of Palæolithic man appears to have been as follows:

He was acquainted with fire. This seems to be clearly established by the charred bones, charcoal, and other traces of fire which are found in the oldest Palæolithic caves, and even in the far distant Miocene period, if we can believe in the flints discovered by the Abbé Bourgeois in the strata of Thenay, some of which appear to have been split by the action of fire. This is a remarkable fact, for a knowledge of the means of kindling fire is by no means a very simple or obvious attainment. Apes

and monkeys will sit before a fire and enjoy its warmth, but no monkey has yet developed intelligence enough even to put fresh sticks on to keep up the fire, much less to rekindle it when extinct. Primæval man must often have had experience of fire from natural causes, as from forests and prairies scorched by a tropical sun being set on fire by lightning, or from volcanic eruptions; but how he learned from these to kindle fire for himself is not so obvious. Savage races, as a rule, do so by converting mechanical energy into heat, by the friction of a stick twirled round in a hole, or rubbed backwards and forwards in a groove in another piece of wood; and there are old observances among civilised nations which show that this was the mode practised by their ancestors, as when the sacred fire in the Temple of Vesta was relighted in this manner by the old Romans if it had chanced to be extinguished. It is probable, therefore, that this was the original mode of obtaining fire, but if so, it must have required a good deal of intelligence and observation, for the discovery is by no means an obvious one, nor is it easy to see any natural process that might suggest it.

Neither ancient history nor the accounts of existing savage races throw much light on the question. The narratives of the discovery of fire contained in the oldest records are obviously mythical, like the fable of Prometheus, which is itself a version of the older Vedic myth of the god Agni (cognate with Latin *ignis* or fire) having been taken from a casket and given to the first man, Manou, by Pramantha, which in the old Vedic language means taking forcibly by means of friction. Of the same character are the mythical legends of savage races of fire having been first brought by some wonderful bird or animal; and there is nowhere anything like an authentic tradition of the fact of its first introduction. There have been reports of savages who were unacquainted with fire, but they have never been well authenticated, and the nearest approach to such a state of things was probably furnished by the aborigines of Van Diemen's Land, of whom it is said that in all their wanderings they were particularly careful to bear in their hands the materials for kindling a fire, in the

shape of a firebrand, which it was the duty of the women to carry, and to keep carefully refreshed from time to time as it became dull.

On the whole, traditions all point to fire having been first obtained from friction, and it is possible that the first idea may have been derived from the boughs of trees, or silicious stalks of bamboos, having been set on fire when rubbed together by the action of the wind, or by the rubbing of the hands together.

It is easier to see the origin of the remaining equipment of primitive man, viz., chipped stones, for flints splintered by frost or fire often take naturally the forms of sharp-edged flakes and rude hatchets or hammers, and very little invention was required to improve these specimens, or endeavour to imitate them by artificial chippings. It is rather surprising that this art did not improve more rapidly, for it is evident that the old Palæolithic period must have lasted a long time before any decided progress began to show itself. And during this long period a singular uniformity appears to have prevailed throughout the Palæolithic world. The rude form of the celt or *hâche*, with a blunt butt and chipped roughly to a point, is found in the oldest river gravels and caves wherever they have been investigated, and the forms of the Somme and the Thames specimens are repeated in the quartzite implements of the Madras laterite.

In the very oldest caves and river deposits the tool equipment of man seems to have been very much limited to these rude celts, used probably for smashing skulls in war and the chase, and splitting bones to get at the marrow; sharp-edged flakes for cutting; rude javelin-heads; and stones chipped to a rounded edge, very like those used by the Esquimaux for scraping bones and skins. As we ascend in time we find arrow-heads of stone and bone, at first unbarbed and gradually becoming barbed, showing that the bow had been discovered; harpoons of bone and fish-hooks; bone pins and needles; and a much greater variety and more carefully-chipped forms of flint tools and weapons; until we finally reach the upper reindeer stage of caves like that of La Madeleine, where artistic drawings and carvings are found, and the equipment generally is superior to that of many existing savage tribes, and

not much inferior to that of the Esquimaux and other Arctic races.

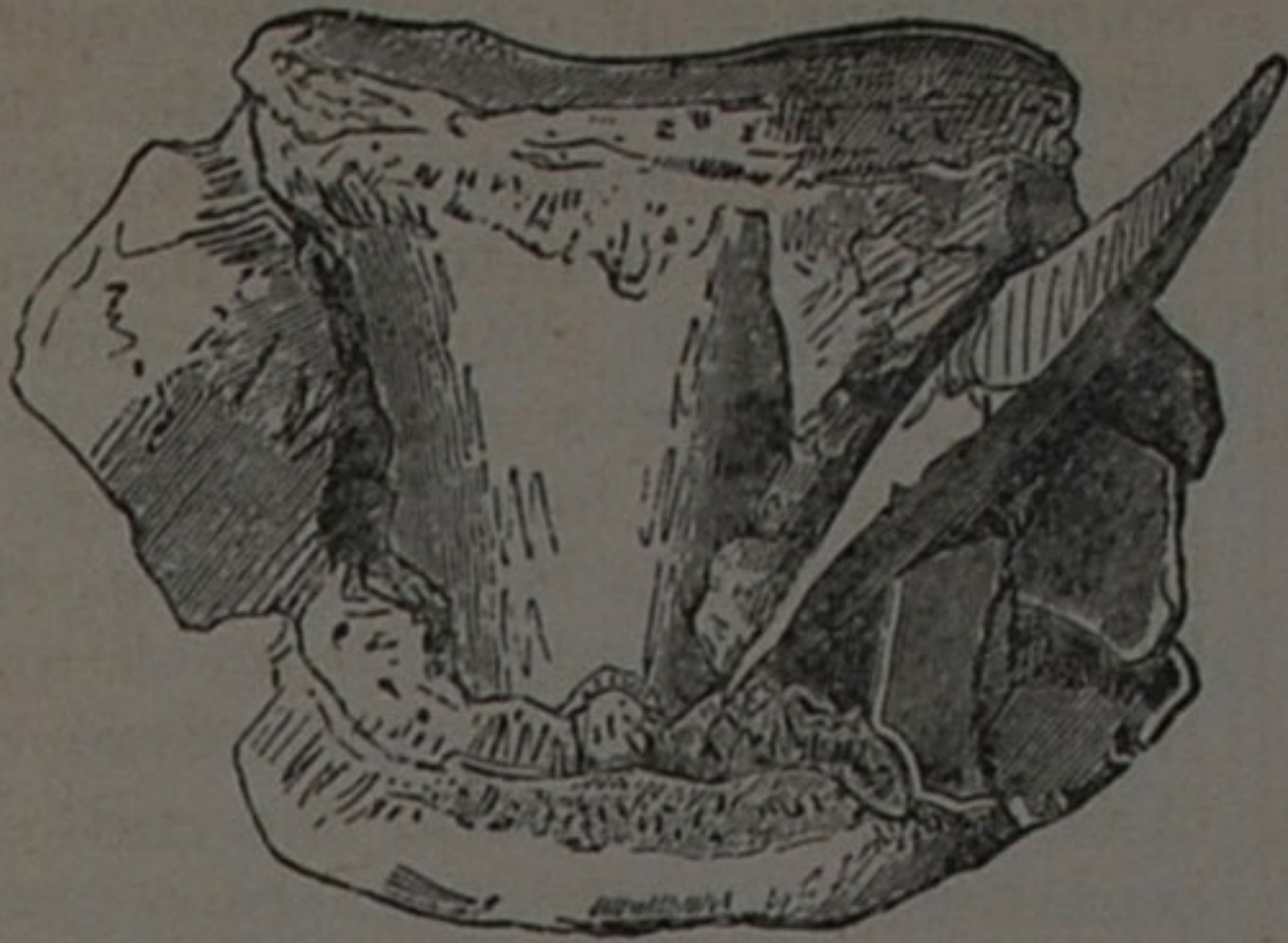
We then pass into Neolithic times, when many of the chief elements of civilisation are already in full force. Man has emerged in many localities from the hunter into the pastoral stage, the principal domestic animals are known, and in some of the later lake-dwellings he has advanced a stage further, and has become an agriculturist living in villages. From this to the Bronze and early historical periods, there is no great break, and the ruder tribes of barbarians described by Cæsar and Tacitus may well have been the lineal descendants of the Neolithic men whose polished axes and finely-shaped arrow-heads lie scattered over the surface of Europe and are found in innumerable burial-mounds and dolmens.

But in Palæolithic times, though we can see constant progress, mankind is still in a state of unmitigated barbarism. Agriculture was clearly unknown, for the hand-mills, pestles, and mortars, which are among the most enduring and abundant relics where grain was used for food, are never met with. Pottery was unknown in all the earlier periods, and it is questionable whether even the rudest forms of baked clay, moulded by hand, are found where there is no intermixture of a subsequent Neolithic habitation. The dog was clearly not a companion of man prior to the era of the Danish kitchen-middens, for the spongy parts of bones which are always gnawed by dogs when dogs are present, are invariably preserved in the *débris* of Palæolithic caves, and the few bones of dogs, wolves, and foxes found with human remains in these caves almost always show that the animals had formed part of the food of the inhabitants.

Other domestic animals were, in all probability, equally unknown, although it has been thought possible that some of the tribes of the reindeer period may have had herds of the half-tame deer, like the modern Laplanders. This conjecture, however, appears to rest solely on the large number of bones and horns found at certain stations, which may have arisen from their having been occupied for a very long period, and as the dog was unknown, it seems probable that no other animals had been domesticated.

As regards clothing, the first certain

DEVELOPMENT OF THE ARROW.



FLINT ARROW IN VERTEBRA OF REINDEER.
Palæolithic. La Madeleine.



PALÆOLITHIC.
Mammoth Period. Le Moustier.



PALÆOLITHIC.
Reindeer Period.
First vestige of barb.



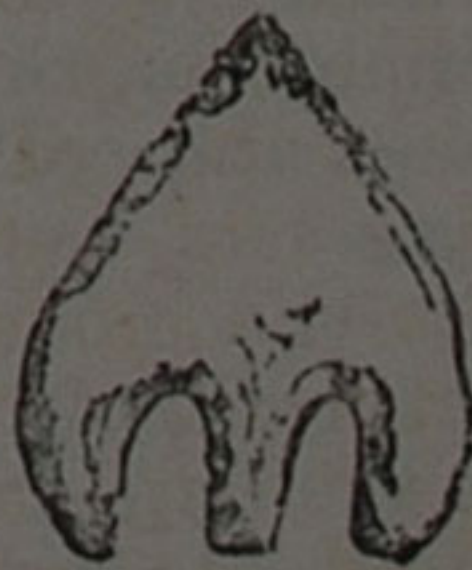
PALÆOLITHIC.
Reindeer Period.



PALÆOLITHIC
Reindeer Period.



NEOLITHIC.
Denmark.



NEOLITHIC.
Ireland.



NEOLITHIC.
Denmark.



RECENT.
Esquimaux.

(From Lubbock's "Prehistoric Times.")

proofs of its use are afforded by the bone pins and needles, which were evidently employed for fastening the skins of animals together, while the scrapers were used for scraping these skins and fashioning the bone implements. It is probable, therefore, that the use of skins as a protection against the cold of the Glacial period, was known at a very early period.

Ornaments, also, are of very early date. Perforated shells, sometimes fossil, and pierced teeth of the bear and other animals are frequently found under circumstances which show that they must have been strung together as necklaces. The skeleton found in a cave at Mentone had a number of perforated shells of *Nassa*, and a few stags' teeth also perforated, dispersed about the skull, evidencing that they had formed some sort of head ornament. Lumps of red hematite, also, probably used for paint, have been found in some of the caves of the reindeer period.

Captain Cook's description of the savages of *Tierra del Fuego* would have applied to the men of that period, "although content to be naked, they were very ambitious to be fine;" and probably like these poor Fuegians, they adorned themselves with streaks of red, black, and white, and wore bracelets and anklets of shell and bone.

If we wish to form some ideas of the manners and customs of our Palæolithic ancestors, we must look for them among existing savage races whose mode of life, and equipment of tools and weapons, most nearly resemble those of the earliest cave-dwellers. The Australians, the Bushmen of South Africa, the Mincopies of the Andaman Islands, and the Fuegians are probably the lowest specimens of the human race known in modern times; but even these are in some respects further advanced in the arts than Palæolithic man. The Bushmen are skilled in the use of the bow, and have discovered the art of poisoning their arrows. The

Australians, Mincopies, and Fuegians have canoes, harpoons, and fish-hooks. The latter approach more nearly to the conditions of life of the savages who accumulated the kitchen-middens on the coasts of Denmark at a much later period, and the Bushmen probably represent those of the cave-men who lived principally on the produce of the chase of large animals, such as the mammoth, rhinoceros, cave bear, horse, and deer. The pigmy Bushman will attack the elephant, the rhinoceros, and even the lion, and often succeed in killing them by pitfalls or poisoned arrows.

The inferences, therefore, to be drawn, alike from the physical development of the individual man, and from the origin and growth of all the faculties which specially distinguish him from the brute creation—language, religion, arts, and science—point to the conclusion that he is a product of laws of evolution, and not of special or miraculous creation.

Still, granting this, we must admit on the other hand, that until more of the "missing links" are discovered, and the origin of man thus placed on a basis of scientific certainty, there is an opening left for the belief that here, if nowhere else, there was some supernatural interference with the laws of Nature, and that the finger of the clock-maker did here alter the hands of the clock from the position which they would have occupied under the original law of its construction. But if this were so, it must equally in candour be admitted that the miracle did not consist in placing man and woman upon earth, at any recent period, or with faculties in any way developed, but could only have consisted in causing a germ or germs to come into existence, different from any that could have been formed by natural evolution, and containing within them the possibilities of conscious and civilised man, to be developed from the rudest origins by slow and painful progress over countless ages.

PART II.—MODERN THOUGHT

CHAPTER VII

MODERN THOUGHT

Lines from Tennyson—The Gospel of Modern Thought—Change exemplified by Carlyle, Renan, and George Eliot—Science becoming Universal—Attitude of Orthodox Writers—Origin of Evil—First Cause unknowable—New Philosophies and Religions—Herbert Spencer and Agnosticism—Comte and Positivism—Pessimism—Mormonism—Spiritualism—Dreams and Visions—Somnambulism—Mesmerism.

LIV.

Oh yet we trust that somehow good
Will be the final goal of ill,
To pangs of nature, sins of will,
Defects of doubt, and taints of blood ;
That nothing walks with aimless feet ;
That not one life shall be destroy'd,
Or cast as rubbish to the void,
When God hath made the pile complete ;
That not a worm is cloven in vain ;
That not a moth with vain desire
Is shrivel'd in a fruitless fire,
Or but subserves another's gain.
Behold, we know not anything.
I can but trust that good shall fall
At last—far off—at last, to all,
And every winter change to spring.
So runs my dream : but what am I ?
An infant crying in the night :
An infant crying for the light :
And with no language but a cry.

LV.

The wish, that of the living whole
No life may fail beyond the grave,
Derives it not from what we have
The likest God within the soul ?
Are God and Nature then at strife,
That Nature lends such evil dreams ?
So careful of the type she seems,
So careless of the single life ;

That I, considering everywhere
Her secret meaning in her deeds,
And finding that of fifty seeds
She often brings but one to bear,

I falter where I firmly trod,
And falling with my weight of cares,
Upon the great world's altar-stairs
That slope thro' darkness up to God,

I stretch lame hands of faith, and grope,
And gather dust and chaff, and call
To what I feel is Lord of all,
And faintly trust the larger hope.

LVI.

“ So careful of the type ? ” but no.
From scarp'd cliff and quarried stone
She cries, “ A thousand types are gone :
I care for nothing, all shall go.

“ Thou makest thine appeal to me :
I bring to life, I bring to death :
The spirit does but mean the breath :
I know no more. ” And he, shall he,

Man, her last work, who seem'd so fair,
Such splendid purpose in his eyes,
Who roll'd the psalm to wintry skies,
Who built him fanes of fruitless prayer,

Who trusted God was love indeed,
And love Creation's final law—
Tho' Nature, red in tooth and claw
With ravine, shriek'd against his creed—

Who loved, who suffer'd countless ills,
Who battled for the True, the Just,
Be blown about the desert dust,
Or seal'd within the iron hills ?

No more ? A monster then, a dream,
A discord. Dragons of the prime,
That tare each other in their slime,
Were mellow music match'd with him.

O life as futile, then, as frail !
O for thy voice to soothe and bless !
What hope of answer, or redress ?
Behind the veil, behind the veil.

TENNYSON, *In Memoriam*.
(By kind permission of LORD TENNYSON.)

THESE noble and solemn lines of a great poet sum up in a few words what may be called "the Gospel of Modern Thought." They describe what is the real attitude of most of the thinking and earnest minds of the present generation. On the one hand, the discoveries of science have so far established the universality of law, as to make it impossible for sincere men to retain the faith of their ancestors in dogmas and miracles. On the other, larger views of man and of history have shown that religious sentiment is an essential element of human nature, and that many of our best feelings, such as love, hope, conscience, and reverence, will always seek to find reflections of themselves in the unseen world. Hence faith in dogma has diminished and charity increased. Fewer believe old creeds, and those who do, believe more faintly; while fewer denounce them, or are insensible to the good they have done in the past and to the truth and beauty of the essential ideas that underlie them.

On the Continent, and especially in Catholic countries, where religion interferes more with politics and social life, there is still a large amount of active hostility to it, as shown by the massacre of priests by the French Communists; but, in this country, the old Voltairean infidelity has died out, and no one of ordinary culture thinks of denouncing Christianity as an invention of priestcraft. On the contrary, many of our leading minds are at the same time sceptical and religious, and exemplify the truth of another profound saying of Tennyson:

There lives more faith in honest doubt,
Believe me, than in half the creeds.

The change which has come over modern thought cannot be better exemplified than by taking the instance of three great writers whose works have produced a powerful influence—Carlyle, Renan, and George Eliot. They were all three born and brought up in the very heart of different phases of the old beliefs—Carlyle, in a family which might be taken as a type of the best qualities of Scottish Presbyterianism, bred in a Lowland farmhouse, under the eye of a father and mother whom he loved and revered, who might have been the originals of Burns' "Cotter's Saturday Night," or the descendants of the martyrs of Claverhouse. His own temperament strongly inclined to

a stern Puritanical piety; his favourite heroes were Cromwell and John Knox; his whole nature was antipathetic to science. As his biographer, Froude, reports of him, "He liked ill men like Humboldt, Laplace, and the author of the 'Vestiges.' He refused Darwin's transmutation of species as unproved; he fought against it, though I could see he dreaded that it might turn out true." And yet the deliberate conclusion at which he arrived was that "He did not think it possible that educated honest men could even profess much longer to believe in historical Christianity."

The case of Renan was equally remarkable. He was born in the cottage of Breton peasants of the purest type of simple, pious, Catholic faith. Their one idea of rising above the life of a peasant was to become a priest, and their great ambition for their boy was that he might be so far honoured as one day to become a country curé. Young Renan, accordingly, from the first day he showed cleverness, and got to the top of his class in the village school, was destined for the priesthood. He was taken in hand by priests, and found in them his kindest friends; they sent him to college, and in due time to the Central Seminary where young men were trained for orders. All his traditions, all his affections, all his interests, led in that direction, and yet he gave up everything rather than subscribe to what he no longer believed to be true. His conversion was brought about in this way. Having been appointed assistant to a professor of Hebrew he became a profound scholar in Oriental languages; this led to his studying the Scriptures carefully in the original, and the conclusion forced itself upon him that the miraculous part of the narrative had no historical foundation. Like Carlyle, the turn of his mind was not scientific, and while denying miracles he remained keenly appreciative of all that was beautiful and poetical in the life and teaching of Jesus, which he has brought more vividly before the world in his writings than had ever been done by orthodox commentators.

George Eliot, again, was brought up in yet another phase of orthodox Christianity—that of middle-class nonconformist Evangelicalism. She embraced this creed fervently, and, as we see in her "Dinah," retained a keen appreciation

of all its best elements. But as her intellect expanded and her knowledge widened, she too found it impossible to rest in the old belief, and, with a painful wrench from a revered father and loving friends, she also passed over from the ranks of orthodoxy. She also, after a life of profound and earnest thought, came to the conclusion recorded of her by an intimate friend and admirer, Mr. Myers :

"I remember how at Cambridge, I walked with her once in the Fellows' Garden of Trinity, on an evening of rainy May; and she, stirred somewhat beyond her wont, and taking as her text the three words which have been used so often as the inspiring trumpet-calls of men—the words *God, Immortality, Duty*—pronounced, with terrible earnestness, how inconceivable was the *first*, how unbelievable the *second*, and yet how peremptory and absolute the *third*. Never, perhaps, had sterner accents affirmed the sovereignty of impersonal and unrecompensing law. I listened, and night fell; her grave, majestic countenance turned toward me like a Sibyl's in the gloom; it was as though she withdrew from my grasp, one by one, the two scrolls of promise, and left me the third scroll only, awful with inevitable fates."

Such instances as these cannot be the result of mere accident. As long as scepticism was confined to a limited number of scientific men it might be possible to think that it was merely the exaggeration of a particular train of thought pursued too exclusively. But when science has become the prevailing mode of thought, and has been brought home to the minds of all educated persons, it is no longer possible to represent it as an exceptional aberration. And where the bell-wethers of thought lead the way, the flock will follow. What the greatest thinkers think to-day, the company of thinkers will think to-morrow, and the great army of non-thinkers will treat as self-evident the day after. This is very nearly the case at the present day; the great thinkers have gone before, the mass of thinkers have followed, and the still greater mass of non-thinkers are wavering and about to follow. It is no longer, with those who think at all, a question of absolute faith against absolute disbelief, but of the more or less shade of "faintness" with which they cling to the "larger hope."

This is nowhere more apparent than in the writings of those who attempt to stem the tide which sets so strongly against orthodoxy. They resolve themselves mainly into one long wail of "oh the pity of it, the pity of it!" if the simple faith of olden times should disappear from the world. They show eloquently and conclusively that science and philosophy cannot satisfy the aspirations or afford the consolations of religion. They expose the hollowness of the substitutes which have been proposed, such as the worship of the unknowable, or the cult of humanity. They win an easy triumph over the exaggerations of those who resolve all the historical records of Christianity into myths or fabulous fulfilment of prophecies, and they wage fierce battles over minor points, as, for example, whether the first quotations from the Gospels are met with in the first or second half of the second century. But they nowhere attempt to grapple with the real difficulties, or to show that the facts and arguments which converted men like Carlyle and Renan are mistaken facts and unsound arguments. Attempts to harmonise the Gospels and to prove the inspiration of writings which contain manifest errors and contradictions, have gone the way of Buckland's proof of a universal deluge, and of Hugh Miller's attempt to reconcile Noah's ark and the Genesis account of creation with the facts of geology and astronomy. Not an inch of ground that has been conquered by science has ever been reconquered in fair fight by theology.

This great scientific movement is of comparatively recent date. Darwin's "Origin of Species" was published only in 1859, and his views as to evolution, development, natural selection, and the prevalence of universal law, have already annexed nearly the whole world of modern thought and become the foundation of all philosophical speculation and scientific inquiry.

Not only has faith been shaken in the supernatural as a direct and immediate agent in the phenomena of the worlds of matter and of life, but the demonstration of the "struggle for life" and "survival of the fittest" has raised anew, and with vastly augmented force, those questions as to the moral constitution of the universe and the origin of evil, which have

so long exercised the highest minds. Is it true that "love" is "Creation's final law," when we find this enormous and apparently prodigal waste of life going on; these cruel internecine battles between individuals and species in the struggle for existence; this cynical indifference of Nature to suffering? There are, approximately, 3,600 millions of deaths of human beings in every century, of whom at least 20 per cent., or 720 millions, die before they have attained to clear self-consciousness. What becomes of them? Why were they born? Are they Nature's failures, and "cast as rubbish to the void"?

To such questions there is no adequate answer. We are obliged to admit that as the material universe is not, as we once fancied, measured by our standards and regulated at every turn by an intelligence resembling ours; so neither is the moral universe to be explained by simply magnifying our own moral ideas, and explaining everything by the action of a Being who does what we should have done in his place. If we insist on this anthropomorphic conception we are driven to this dilemma. Carlyle bases his belief in a God, "the infinite Good One," on this argument: "All that is good, generous, wise, right—whatever I deliberately and for ever love in others and myself, who or what could by any possibility have given it to me but One who first had it to give? This is not logic; this is axiom."

But how of the evil? No sincere man looking into the depths of his own soul, or at the facts of the world around, can doubt that along with much that is good, generous, wise, and right, there is much that is bad, base, foolish, and wrong. If logic compels us to receive as an axiom a good author for the former, does not the same logic equally compel us to accept the axiom that the author of the latter must have been one who "first had it in himself to give"? That is, we must accept the theory of a God who is half good, half evil; or adopt the Zoroastrian conception of a universe contested by an Ormuzd and Ahriman—a good and evil principle, whose power is, for the present at any rate, equally balanced.

From this dilemma there is no escape, unless we give up altogether the idea of an anthropomorphic God, and adopt frankly the scientific idea of an "Infinite

and Eternal Energy," inscrutable and past finding out; and of a universe whose processes we can trace, but of whose ultimate essence we know nothing, only suspecting, or faintly discerning, a fundamental law which may make the polarity of good and evil a necessary condition of existence. This is a more sublime as well as more rational belief than the old orthodox conception; but there is no doubt that it requires more strength of mind to embrace it, and that it appears cold and cheerless to those who have been accustomed to see special providences in every ordinary occurrence, and to fancy themselves the special objects of supernatural supervision in all the details of daily life. Hopes and fancies, however, are powerless against facts; and the world is as surely passing from the phase of orthodox into that of scientific belief as youth is passing into manhood; and as the planet which we inhabit is passing from the more fiery state into that of temperate heat, progressive cooling, and final extinction as the abode of life. In the meantime, what can we do but possess our souls in patience, follow truth wherever it leads us, and trust, as Tennyson advises, that in the long run everything will be for the best, and "every winter turn to spring"?

The decay of old religious beliefs, and the introduction of new conceptions based on scientific discovery, have given rise to many attempts to found new philosophies, and in some cases new sects and religions, of some of the principal of which a short account may be given.

One of the greatest thinkers of modern times, Herbert Spencer, has expanded the theories of modern science, especially those of the conservation of energy and of Darwinian evolution, into a generalised philosophy, embracing not only the phenomena of the material and living universe, but also history, religion, politics, and all the complex relations of social life. He starts from the principle that throughout the universe, in general and in detail, there is an unceasing redistribution of matter and motion. This shows itself as evolution where there is a predominant aggregation of matter and diminution of motion, and as dissolution where matter is disintegrated and motion increased. Thus, in the formation of coal, the motion of the sun's rays is fixed in the condensed matter of the

Intuitions are no fancies.

chemical products of vegetation, and is dissipated when, after countless ages, the coal is burned and its substance dissolved into its elements. These changes constitute a transformation of the uniform or homogeneous into the differentiated or heterogeneous, as seen in the condensation of nebulous or cosmic matter into suns and planets; in the varied elements of the inorganic world; "in each organism, vegetable or animal; in the aggregate of organisms, thought and geologic time; in the mind; in society; in all products of social activity." These changes are all in the direction of passage from an indefinite whole to definite parts, and they are inevitable, unless the original substance were so absolutely uniform as to be absolutely stable.

Once started, this process of differentiation tends necessarily to go on, the surrounding conditions being ever at work, whether by aggregation or dissolution, by joining like to like, or separating unlike from unlike, to sharpen and make more definite existing differences.

This is in effect a generalised conception of Darwin's laws of the "struggle for life" and "survival of the fittest." Finally, however, the result of all these changes is that an ultimate equilibrium will be reached, which is rest in the inorganic and death in the organic world; as when the sun with all its planets shall have parted with all its heat, and all its energy shall have run down to one uniform level. From this state it can only be roused by some fresh shock from without, dissipating it again into a mass of diffused matter and unbalanced motions.

Hence we come to the final statements of the Spencerian philosophy, as given in the words of its author:—

"This rhythm of evolution and dissolution, completing itself during short periods in small aggregates, and in the vast aggregates distributed through space completing itself in periods which are immeasurable by human thought, is, so far as we can see, universal and eternal, each alternating phase of the process predominating, now in this region of space and now in that, as local conditions determine. All these phenomena, from their great features even to their minutest details, are necessary results of the persistence of force under its forms of matter and motion. Given these as distributed through space, and their quantities being

unchangeable either by increase or decrease, there inevitably result the continuous redistributions distinguishable as evolution and dissolution, as well as those special traits above enumerated. That which persists, unchanging in quantity, but ever changing in form, under these sensible appearances which the universe presents to us, transcends human knowledge and conception, is an unknown and unknowable power, which we are obliged to recognise as without limit in space and without beginning or end in time."

This is, in its highest form, the philosophy of Agnosticism. A very different thing, be it observed, from Atheism, for it distinctly recognises an underlying power which, although "unknown and unknowable," may be anything harmonising with the feelings and aspirations in which all religious sentiment has its origin, so long as it fulfils the condition of not, by too precise definition, coming into collision with something which is not "unknown" but "known" and irreconcilable with it.

For instance, there is nothing in Agnosticism to negative the possibility of a future state of existence. Behind the veil there may be anything, and no one can say that individual consciousness may not remain or be restored after death, and that our condition may not be in some way better or worse, according to the use we have made of the opportunities of life. But if any one attempts to define this future state and say we shall have spiritual bodies, live in the skies, sing psalms, and wave palm-branches, we say at once, "This is partly unknowable and partly known to be impossible."

That which has given the philosophy of Spencer a wide influence is the manner in which he applies it to the subjects which more immediately concern the mass of thinking minds, such as history, politics, and the problems of social life. What Darwin shows in animal life and the origin of species, Spencer traces in the rise and fall of empires, the growth and decline of religions, the increasing complexity of social relations, the conflicting forces of evolution and dissolution at work around us in our every-day life, in the relations of science and theology, capital and labour, state socialism and *laissez-faire*. For instance, the decline of

the Roman Empire and its overthrow by the barbarians is analogous to the decay of a planet from loss of internal heat and its dissipation into matter capable of fresh evolution, by the shock of a comet. The ever-increasing gulf between wealth and poverty, science and superstition, resembles the process by which the one-toed horse became gradually differentiated more and more from the common five-toed type of its remote ancestor.

These speculations of Spencer, pursued with vast acuteness and research through all branches of social science, though they have not founded a new religion or established a new sect, have undoubtedly exercised a great influence on modern thought, especially among the rising generation.

Another "ism" which, although it has exercised a much narrower influence than the philosophy of Spencer, has founded a sect and put forward more definite claims to give the world a new religion is that which is known as "Positivism," or "Comtism," from the name of its founder, Auguste Comte. It is not easy to understand, but its essence seems to be this:—

Admitting that science has killed theology, and that the old forms of supernatural religion, inevitable in the childhood of the world, have become incredible, Comte cast about for some idea which should be at the same time "positive," or based on ascertained fact, and fervid enough to satisfy the cravings of religious sentiment. He thought he found it in "Humanity;" that is, in love and veneration for the abstract idea of the human race, taken collectively, and considered in its past, present, and future relations. As patriotism, a very ardent feeling, is the love of a limited section of the human race; and as it has been gradually enlarged from the limits of a tribe to those of a city, and from those of a city to those of a country or nationality, he conceived that it might be still farther enlarged so as to embrace all mankind. So far it may be admitted that there is a germ of truth in Comte's idea, and that elevated minds may enlarge their view beyond the narrow bounds of a particular country at a particular period, and may derive fresh incentives to action, and fresh subjects for ennobling thought, from a contemplation of the past progress, present condition, and future possibilities of the collective human race. But there is a

homely proverb that "charity begins at home," and as we widen the sphere of patriotism or philanthropy we are very apt to diminish their intensity and find them evaporate in a mist of high-sounding phrases. The "friend of man" is very apt to be the friend of no one man in particular, and to make universal philanthropy an excuse for neglecting individual charity.

Apart, however, from this objection, and granting that with increased intercourse and increased culture "Humanity" might become a more practical idea, we should be still a long way from making it the basis of a new religion. It is here that Comte has laid himself open to such criticism as that of Huxley, who defined Positivism as "Catholicism without Christianity." With the narrow systematising logic so characteristic of the French intellect Comte has worked out a complete scheme of ritual, hierarchy, and all the apparatus of an old religion. A supreme pontiff at its head, associated with a supreme priestess to represent the female element; for saints, the distinguished men of philosophy, theology, art and science; for days of worship, fête days of these saints, and meetings to commemorate their merits, and to observe certain "sacraments."

All this savours too much of the "Goddess of Liberty," and of the theophanthropy of the French Revolution, when the disciples of Rousseau cut off heads in the name of universal benevolence, to find much acceptance in a sceptical age and among a practical people. Robuster intellects, like George Eliot, even where they incline to accept Humanity as an ennobling idea, and to recognise Comte as an original thinker, reject all the constructive and ceremonial part of his new religion as unworthy of notice; while to the mass of thoughtful persons the whole thing appears unreal and paradoxical.

One more "ism"—Pessimism, the gospel of feebleness and failure—has had a considerable effect on the Continent, though little in this country. It is based on the fact that, in accordance with the universal law of polarity, progress is not an unmixed good, but develops a corresponding negative of failure. In simple forms of society the distinctions between wealth and poverty, capital and labour, culture and ignorance, are not so sharply defined, and the lot of those who fail in

very true.

the battle of life is not so hard as when men are congregated in crowded cities, exposed to temptations, and tantalised by the sight of wealth and luxury before their eyes and yet beyond their reach. A mass of misery and discontent is thus created, which in lower natures translates itself into anarchism and fanatical hatred of all above them, while in higher ones it takes the form of theories for the regeneration of the world by levelling everything that exists, and building anew on fresh foundations. Still higher minds see the futility of these theories, and take refuge in a philosophy which pronounces the world a mistake, life an evil, and universal suicide the only possible solution of what is radically bad. This is, in substance, the philosophy of Schopenhauer and the school of Continental Pessimists. It has something in common with Buddhism, which regards all personal existence as a painful dream or illusion, and places supreme happiness in escape from it by annihilation of individuality.

To understand how such a doctrine can have found acceptance, we must remember that the tendency of modern civilisation is to throw more and more work on the brain and nervous system and less on other organs. This of itself tends to produce more ill-health both of mind and body, especially of those digestive organs upon which the sensation of health and well-being so mainly depends. A dyspeptic man is of necessity an unhappy and desponding man. Moreover, in ruder states of society such weaklings were got rid of by the summary process of being killed off, while with the more humane and refined arrangements of modern times they live on and "weary deaf heaven with their fruitless cries."

It is among such men, with cultivated intellects, sensitive nerves, and bad digestion, that we find the prophets and disciples of the gospel of Pessimism. They feel, and feel truly, that as far as they are concerned life is an evil, the pains of which far outweigh its pleasures, and, having lost faith in a future life where the balance will be redressed, they see no remedy for the miseries of the world but that of ceasing to be, or annihilation.

This affords another illustration of the extent to which religions and philosophies are, like the spectre of the Brocken, reflections of our own selves on dissolving mists, clothed with our own clothes and

repeating our own gestures. To a healthy man or to a strong man the pessimist view of the universe is simply impossible. If he has experienced a fair average of happiness and success in life, he instinctively rejects a creed which tells him that there are no lights as well as shadows. If he has a mind of average strength, he feels that suffering is a thing to be avoided prudently, borne stoically, or grappled with courageously, and not to be run away from by moral or physical suicide.

Accordingly Pessimism is not a creed which is ever likely to exert much influence on the strong, practical Anglo-Saxon race, and we can discern some faint traces of it only in the tendency of certain very limited cliques of so-called *Æstheticism* to admire morbid and self-conscious ideals, both in poetry and painting.

It is a very curious and remarkable fact, that while so many highly intellectual attempts have been made in vain in modern times to found new sects and religions, the only one which has had any real success is that which is based on the most gross and vulgar imposture—Mormonism. Mormonism is a fact which, without the vestige of a reasonable argument to show for itself, originating in the vulgar ravings and forgeries of a vulgar Yankee, and violating the first instincts of the family and of society by polygamy, still flourishes in spite of persecutions and prohibitions. The reason seems to be that, instead of being a theory in the air or over the heads of the masses, it is, with all its faults, a practical system in contact with the actual realities of life. Its success is mainly owing to its being an organised system of emigration, and a faith which places its Paradise here on earth and not in the skies. A poor ignorant labourer in Wales or Norway, who becomes a convert to Mormonism, is taken in hand at once, forwarded to his destination, and when he arrives there looked after and put in a way of earning an honest livelihood and probably becoming a landed proprietor. The ideal set before him is not a very high one, that of becoming a sober, industrious, respectable, narrow-minded citizen of the State of Utah, and a creditable member of the community of Latter Day Saints. But to a poor labourer from the slums of Liverpool, to lead such a life, in the pure mountain air

in the valley of the Salt Lake, and see his flocks and herds increasing and his family growing up, without care for the future, is indeed the realisation of an earthly Paradise. The moral to draw from this is, that the success of a religion, under the conditions of modern society, does not depend so much on its theory as on the way in which it takes hold of the practical problems of life and shows an aptitude for grappling with them.

Another wide-spread modern delusion, that of Spiritualism, is akin to Mormonism, as showing how little reason has to do with the beliefs which are most readily propagated among large classes of the community. Nothing but the most morbid appetite for the supernatural, combined with the most absolute ignorance of the laws of evidence, could induce sane people to believe that, if a corner of that mysterious and awful veil were lifted which separates the living from the dead, we shall discover what?—spirits whose vocation it is to turn tables and talk twaddle.

In vain, medium after medium is detected, and the machinery by which ghosts are manufactured exposed in police-courts; in vain, the manifestations of the so-called spirits are repeated by professional conjurors like Maskelyne and Cooke, who disclaim any assistance from the unseen world. People are still found to believe the unbelievable because it gratifies their taste for the marvellous, and enables them to fancy themselves the favoured recipients of supernatural communications.

The explanation that Spiritualism has received a certain amount of acceptance from men of a very different order, like Crookes and Wallace, may be found in the phenomena associated with it, such as mesmerism and clairvoyance, which have a certain basis of fact, and open up interesting fields for scientific investigation. The working of the nervous apparatus in certain abnormal conditions, and the physical effects of imagination, are subjects imperfectly understood, but well deserving accurate inquiry.

Take, for instance, dreams, which afford the first certain starting-point towards a theory of visions and apparitions. It is as certain that we dream as that we sleep, and that in our sleeping state we often live a sort of second life, which is different from our ordinary

waking life. Dreams are made up of impressions which have been recorded by the brain in its waking state, and which are revived in new combinations and imaginary scenes, when consciousness is suspended. These impressions are thus often worked up into a succession of dreams so vivid as to be scarcely distinguishable from reality. It happened to me, about the middle period of my life, to be sent, almost at a day's notice, to India, where for more than two years I had a period of intensely hard work and great responsibility, as Finance Minister. This naturally left a number of strong impressions on my brain, which for years afterwards kept reviving in a series of connected dreams, in which I fancied myself back in India. I had thus a dream life as well as a real life of Indian experiences, and the former was so vivid that, if I were writing reminiscences, I should sometimes find it difficult to distinguish between the two.

This enables me to realise how dreams may readily pass into visions. If I had dozed off in an arm-chair after dinner, and fallen into one of my Indian dreams, I might have seen Lord Canning, who had been dead for years, walk into the room as distinctly as if he had been present in person. In a less critical age, and with a less sceptical turn of mind, I might readily have been convinced that I had seen his ghost.

There can be no doubt that, in this way, dreams must often, in pre-scientific ages, have originated a *bona fide* belief in spirits. Herbert Spencer traces to this cause the origin of all religious belief. Perhaps this may be carrying it too far, but doubtless it was one of the main causes, especially of that portion of religion which took the form of offerings to the dead, and ancestor-worship.

But a still further step may be taken from the ordinary dream to the waking dream or vision. It is a well-established fact that under peculiar and rare circumstances the brain may dream, that is, revive impressions where there is no corresponding reality, without losing its consciousness. There was a celebrated case of a Berlin bookseller in the last century, who, having fallen into bad health, lived for more than a year in the company of ghosts—that is, he constantly saw men and women, with every appearance of being alive, enter the