

# The Piltdown Skull

(*Eoanthropus dawsoni*)

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During the last few months people have been constantly asking me how I came to find the primitive human skull called *Eoanthropus* (Man of the Dawn), perhaps the most primitive hitherto discovered, and therefore so-called. Surely, it was a mere chance discovery? Yes, a chance, but not altogether chance, as I will endeavour to tell in as simple language as possible.

If we have to trace back a train of thought which conduced to this discovery, we have to throw our minds a long way back to the commencement of the geological stage of the world's history called the Tertiary epoch. The World was very different then, the ground whereon we stand (the Wealden) was submerged and huge deposits of strata were piled above our land including the whole depth of the chalk downs. It has been well said that in those days "not one of the present great features of the globe was in existence. Our great mountain ranges, Pyrenees, Alps, Himalayas, Andes, have all been upheaved since the chalk was deposited, and the Cretaceous sea flowed over the sites of Sinai and Ararat."

The subterranean forces which wrought these huge changes accomplished the greater part of the mighty "scene shifting," to use a theatrical expression, preceding the advent of Man upon the earth. Among lesser upheavals occurred a large dome-shaped swelling, 120 miles long by about 40 to 50 miles wide, extending from the Bas Boulonnais on the East to Hampshire on the West, and therefore including our own county. This brought up what had been the bottom of the chalk sea, to a height, in geological elevation, 3,000 feet above the level of the present sea.

But "geological elevations" assume that the geological deposits remain intact during the whole time of the uplift. This was probably not the case, for the rise of the strata appears to have been a gradual one, occupying many thousands of years to complete, and during that time as the dome rose above the surface of the sea, it was subjected to the planing action of the waves, besides the wearing effects of sub-aerial denudation, with the result that the chalk and other strata lying above the Wealden were completely washed away from the central area, leaving the chalk at the sides, which are now mainly represented by the North and South Downs respectively.

We cannot, in this outline, enter into the possibilities of the recurrent rising and depression of the strata, but we ultimately arrive at a period when there appears to have been a sea-worn plain, extending right over the whole surface of the Weald, including the tops of the chalk downs. This is proved by the existence of certain gravel beds which persistently occur at the same elevations, and a general correspondence of the higher altitudes. This plain was finally raised to about the existing altitude of the North and South Downs, and was no doubt thickly covered with various superficial deposits chiefly

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derived from the Upper Chalk strata, the Greensand, and the higher beds of the Wealden in the central area.

Then commenced that prolonged period of the later denudation of the district, conducted by the natural agencies which have carved out the chalk downs and the hills and valleys of the Weald as we now see them. We must try and conceive all these denudations being carried forward over an immense period of time under greatly varying conditions, commencing with a tropical climate and afterwards undergoing repeated variations from temperate to arctic coldness. One can only imagine that if, as we believe, some of the gravels of the old plain of denudation are identical with gravels of those we now find in the central Wealden area, then the bulk of these gravels must have traveled down to their present level like the proverbial toad under a harrow.

We have only to look at pieces of flint from these gravels, with their deeply stained patinas and weathered surfaces, to realise the vicissitudes they have undergone in their passage from the beds of the Upper Chalk to their present level hundreds of feet beneath. Sometimes they were drifted along in some river or stream, ancestors of those in our present Wealden country at other times they were left high and dry on some terrace or plateau, exposed to heat or frost until some cause, whether upheaval, subsidence, or glaciation, again set them in motion; but their ultimate trend was always downwards. It should be noticed, however, that some portions of these gravels appear to be much more rolled than others.

There is a curious fact about these ancient flints found in the early Wealden gravels, and that is that nearly all of them are what are called tabular flints, and are not nodular. By far, the largest number of flints in the chalk are of the nodular variety, the tabular occurring somewhat rarely in the bands. The nodular flints are made up of concentric layers of impure silex, and if we watch the ploughlands on the chalk Downs we shall soon find that they are constantly disintegrating, owing to contraction and expansion and general weathering. Tabular flints are, on the other hand, more tough and have a primitive fracture, and it will be found that although they are not so numerous on the chalk Downs as the nodular flints, yet as we proceed from the Downs on to older strata upon which flints are scattered over the surface, it is the nodular flints which become fewer in number, owing to their disintegration, and eventually little flint is left but the tabular variety.

If we examine the text books and scientific papers by eminent geologists and the Ordnance "drift maps" dealing with the subject, it will be found that no flint gravels are recorded as overlying the central area of the Weald, that is, over the Hastings Beds. Indeed, eminent geologists expressly declared that they did not exist, and were at some pains to explain this supposed phenomenon. The limit of the flint-bearing gravels was placed some four or five miles to the north of the South Downs in the valley of the Ouse, just south of Isfield. What had become of all the remains of the flints derived from "the

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chalk arch" which geologists believed formerly covered the whole of the Wealden area? The answer was that denudation had effaced them all out of existence or swept them to the south.

Many years ago, I think just at the end of the last century, business led me to Piltdown, which is situated on the Hastings Beds and some four or five miles north of the line where the last of the flint-bearing gravels were recorded to occur. It was a Court Barton of the Manor of Barkham at which I was presiding, and when business was over and the customary dinner to the tenants of the Manor was awaited, I went for a stroll on the road outside the Manor House. My attention was soon attracted by some iron-stained flints not usual in the district and reminding me of some Tertiary gravel I had seen in Kent. Being curious as to the use of the gravel in so remote a spot, I enquired at dinner of the chief tenant of the Manor where he obtained it.

Having in remembrance the usually accepted views of geologists above-mentioned, I was very much surprised when I was informed that the flint gravel was dug on the farm and that some men were then actually digging it to put on the farm roads, that this had been going on so far as living memory extended, and that a former Lord of the Manor had the gravel dug and carried some miles north into the country for the coach-drive at "Searles." I was glad to get the dinner over and visit the gravel pit, where, sure enough, two farm hands were at work digging in a shallow pit three or four feet deep, close to the house. The gravel is an old river-bed gravel chiefly composed of hard rolled Wealden iron-sandstone with occasional sub-angular flints. The men informed me that they had never noticed any fossils or bones in the gravel. As I surmised that any fossils found in the gravel would probably be interesting and might lead to fixing the date of the deposit, I specially charged the men to keep a look out.

Subsequently, I made occasional visits but found that the pit was only intermittently worked for a few weeks in the year according to the requirements of the farm roads. On one of my visits, one of the labourers handed to me a small piece of a bone which I recognised as being a portion of a human cranium (part of a left parietal) but beyond the fact that it was of immense thickness there was little else of which to take notice. I at once made a long search but could find nothing more and soon afterwards made a whole day's search in company with Mr. A. Woodhead, M.Sc., but the bed appeared to be unfossiliferous. There were many pieces of dark brown ironstone closely resembling the piece of skull, and the season being wet, any fossil would have been difficult to see. I still paid occasional visits to the pit, but it was not until several years later that when having a look over the rain-washed spoil heaps, I lighted on a larger piece of the same skull which included a portion of the left supra-orbital border.

Shortly afterwards I found a piece of a hippopotamus tooth. In the meantime there had been a revival of the study of early man, and I had lately had the opportunity of examining a good cast of the famous Heidelberg jaw. The massive appearance of the two

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pieces of cranium from Piltdown made it seem likely that they had belonged to an individual allied to the original possessor of the Heidelberg jaw. And so it came to pass that one morning I walked into the Natural History Museum to call on my old friend the Keeper of the Geological Department, Dr. A. Smith Woodward, F.R.S., and produced my find, with the remark "How's that for Heidelberg?" However, as we now know, there is a very wide difference between *Eoanthropus* and *Homo heidelbergensis*.

The discovery seemed so promising that we resolved to leave no stone unturned in the spoil-heaps available to us, in spite of the dread conviction that the remainder of the skull had been crushed by the wagons on the farm roads or coach drive. We soon found that the work would have to be very slowly conducted for every spade-full had to be carefully sifted and examined, and there were many days of most unpromising work. It was not until we had been busy off and on for some weeks that after a hard and unproductive day's work I struck part of the lowest stratum of the gravel with my pick, and out flew a portion of the lower jaw from the iron-bound gravel.

But, for the most part, our work consisted in sifting the debris left by the former workmen with occasional excavation into undisturbed patches of gravel which had been overlooked by them. In one such patch Dr. Woodward found a piece of the cranium bordered with a portion of the lambdoid suture within a yard of where the piece of jaw was found. Altogether we found nine separate fragments of the skull, not including the mandible, and there can be little doubt that when the workmen first dug up the skull it was complete in most of its details, and that it was shattered and mixed with the gravel before any part of it was noticed by them. The remainder is now irrecoverable, having been used for road mending along with the dug gravel.

Having completely satisfied ourselves on this important point, our next step was to attempt a restoration of the cranium and mandible from the fragments. These operations were conducted by Mr. F. O. Barlow, the able preparator of the Natural History branch of the British Museum at South Kensington, under the superintendence of Dr. Smith Woodward. The pieces were eventually joined into three separate groups, the first consisting of nearly the whole of the left side of the cranium, the second of a considerable portion of the parietal region of the right side of the cranium, articulating by a small portion of the lambdoid suture with a large portion of the occipital region.

The latter fragment clearly shows the median line of the skull which is so important a detail to be ascertained in the work of reconstruction, where, as in this case, the parietal bones do not obscure traces of the median line. By restoring one side of the skull from the other side, it was possible to build up the whole skull with the exception of a triangular space in the central frontal region, including three-fourths of the brow ridge, and the whole of the root of the nose. A small portion of the supra-orbital ridge, or corner of the ridge, and the eye socket remained on the left side and from this it is inferred that there was no prominent bony ridge above the eyes as one was formerly led to associate with

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early man from its repeated occurrence in skulls of the Neanderthal type and which gave a strange ape-like aspect to the crania. Therefore, taking this cranium alone, there did not appear to be superficially any great difference between this skull and that of an ordinary human skull, except a few details noticeable to experts, such as a simian or ape-like appearance at the back of the head, where it was attached to the neck, and in the extent of the grooves of the temporal muscles which rise closely to the top of the cranium as in the apes.

It was on examining the interior of the cranium that the primitive characters of the individual became apparent. The enormous thickness of the walls of the skull without any trace of disease or other malformation was most striking, varying from 8 to 20 millimetres. The average thickness of a modern European skull is from 5 to 6 millimetres, and the earliest known among other skulls 6 to 8 millimetres. This huge thickness of cranial wall gives an appearance of average size to the outer view of the skull, while the internal brain capacity is one-third less than that of a modern European. The internal surface of the bones of the head retain in a most striking manner the whole pattern of the middle meningeal veins and arteries of the brain which formerly filled the cavity, and many of the furrows upon the surface of the cerebral hemispheres can still be detected.

It was found possible by pouring plaster into this cavity formerly occupied by the living brain to obtain a most life-like cast of the whole organ. The cast was submitted to the world's greatest authority on the brain, Prof. Grafton Elliot Smith, M.D., F.R.S., who pronounced it to be the most simian human brain so far recorded. It was also noticed that although almost any one of the simian characters might be detected singly in human crania of existing types, especially if search were made among the more lowly of these, yet the simultaneous presence of so many ape-like characters in one and the same specimen was a point of great significance.

To the third group was assigned the fragment consisting of nearly the complete half of the lower jaw or mandible, and containing the first and second molar teeth together with the socket for the third. Had there been no further evidence, this portion of the jaw, although closely associated with the other human fragments in the gravel-bed (there being also no traces of another individual to which it might be assigned) would have been the cause of serious misgivings among the majority of human anatomists, on account of the very chimpanzee-like characteristics which place it a long distance apart from any other recorded human remains, whether fossil or recent.

There are certain minor details with respect to the jaw which oscillate between what are human and what are ape-like characteristics. The comparative weakness of the whole bone with its muscular attachments leans towards the human type; then there are the two molar teeth which are worn flat, as in primitive races of man who carelessly grind up minute quantities of grit with their food, and this is a characteristic which has only been

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met with in man. It is believed that the long canine teeth of the apes would prevent the particular grinding motion by which the molars acquire this process of wear.

Otherwise the teeth themselves have everything in common between the apes and the lowest known types of man. The existence of five cusps to the molars, and the large size and comparative narrowness of the teeth, have their comparisons in both forms; while even the entire absence of chin is a feature known to occur in certain of the most primitive fossil types of man. The chief difference which separates this jaw from all other human types is the formation of its inner surface, where there is a complete absence of a very characteristic human prominent ridge called the "mylohyoid ridge," to which in man the muscles which control speech are attached; and there is a curious flange-like conformation connected with the symphysis which has never been known to occur in man, but which does occur in apes.

The diagnosis of a probable incapacity for speech in this individual from the absence of the mylohyoid ridge and other attachments for muscles has received strong and unlooked-for support by an examination of certain characters of the brain governing the powers of speech which were found to be in a primitive and undeveloped stage. Professor Elliot Smith writes:

"This peculiar conformation assumes quite a special interest when it is remembered that this obviously expanding area occupies the position where in the modern brain is developed the territory which recent clinical research leads us to associate with the power of 'spontaneous elaboration of speech and the ability to recall names' (Adolf Meyer). The apparent paradox of the association of a simian jaw with a human brain is not surprising to anyone familiar with recent research upon the evolution of man."

He also remarks that it is a brain "such as might reasonably have been expected to be associated in one and the same individual with the mandible which so definitely indicates the zoological rank of its original possessor."

This portion of the brain is situated on the left side above the ear, and consideration regarding it are not affected by any [80] differences of opinion respecting the precise position of the median line. Although judging from the age of the deposit in which it was found, the skull is older than any skull hitherto discovered, being early Pleistocene if not late Pliocene, yet the modern type of its external appearance has occasioned surprise.

The articular surface of the skull which forms the joint with the lower jaw known as the glenoid cavity appears singularly human in form, far more so than in the Neanderthal skulls, and one would have expected to find this detail more ape-like than ever in *Eoanthropus*. Unfortunately the joint or condyle on the jaw itself had rotted away owing to its spongy structure but it appears to have been short as in the simian forms, though in other respects it must have been of the human type.

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When preparing this model of the restored skull, it was necessary to mould hypothetically the whole of the face and upper jaw, on the basis of the extant portion of the lower jaw and teeth, the small portion of the left orbit, and the articular surfaces preserved on the skull for the attachment of the bones of the face. That the face was prognathous, like an ape's, cannot be doubted from the great length of the jaw, which exceeds that of the most primitive human jaw by a length as 60 millimetres is to 30 or 40 millimetres.

The only possible way to restore the teeth to the jaw of such a length was to follow the simian form, so far at all events as the size of the teeth and their spacing were concerned; and, since the preserved portions of the jaw and teeth resemble those of the chimpanzee, for the purpose of restoration the teeth have been modeled without projecting canines and on an intermediate plan between those of a chimpanzee and those of the Heidelberg jaw. The breadth of the palate can be fairly accurately gauged, and the rest of the face and nose has been built up by correlation with the already known parts and by comparison with primitive types of human facial bones, rather than with those of simian form.

Most people have always been under the impression, from the study of the later Mousterian types (Neanderthal) of man which had huge overhanging brows, that if an earlier form were discovered, it would conform more nearly to the adult ape-like form of cranium. This new specimen has taught us a lesson which we might have already anticipated, for it is well known that, among mammals at all events, to ascertain the earlier forms of a species we do not look to the fully developed male, but to the embryo, the young of the species, and, in a lesser degree, to the female. For the acquisition and development of new characteristics whether good or bad, higher or lower, we look to the adult male.

Thus it will be noticed on examining the skull of a young chimpanzee that the brow does not bear those great bony ridges that we find in the adult male, but that the conformation is curiously like the skull of *Eoanthropus* and the present European type. We shall therefore probably not be far wrong if we regard the skull of the young chimpanzee as indicating the form of the skull among the most advanced anthropoid apes of Tertiary times; and it is from this early type the human race may have sprung rather than from more degenerate-looking forms of the Mousterian (Neanderthal) types which we know have flattened heads and large overhanging brows like those of the adult chimpanzees and gorillas.

Thus in *Eoanthropus* we have associated a comparatively high forehead, slight orbital ridges and a simian lower jaw very much as we see all these points associated in the existing young chimpanzees. It would therefore appear that *Eoanthropus* may have had contemporary anthropoid forms living in different parts of the world, such as the Heidelberg man or the *Pithecanthropus*; but that while the *Eoanthropus* type has survived in modern man, the lower and degenerate types have long ago become extinct.

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I have frequently been asked how it is possible to say that the skull of *Eoanthropus* is a female skull. It is not possible to say so with certainty, but several well-known and experienced anatomists, accustomed to deal with skulls every day, are agreed that this particular skull is that of a female because of the small backward extent of the temporal muscles and the relatively small size of the mastoid processes. To the cause of sex may also be due to some extent the comparatively small development of the supra-orbital ridges and the general weakness of the mandible; but a full-grown male of the same race could not have developed a supra-orbital ridge approaching that of the Mousterian (Neanderthal) race.

By reason of the left occipital pole being more prominent, making the left hemisphere of the brain to appear larger, it is believed that this individual was right-handed, which is an interesting characteristic in so early a form of man.

The general result of the restoration of the face is less sensational in appearance because, where doubt exists, human lines rather than those more ape-like have been adopted, and yet the general resemblance to the immature chimpanzee is certainly very striking.

Of the other remains found in association with the skull must be mentioned fragments of teeth of two Pliocene species of elephants, namely, the Mastodon, similar to that called *Mastodon arvernensis*, and a primitive form of *Elephas meridionalis*, resembling the early Proboscidiens of the Siwalik formation of India (*Stegodon*), or early Pliocene age. Portions of teeth of the Hippopotamus, Beaver and Horse, and a portion of an antler of the Red Deer, probably belong to the early Pleistocene age.

We have thus representatives of at least two rather different fauna and it has been thought that the older forms may have been swept into the gravel from some earlier deposit which must have existed not far off. The portion of the tooth of the Mastodon is very much rolled and its condition favours such a view, while the other elephant is of so old a form that it is not likely to have co-existed with the fauna of the early Pleistocene. However, with regard to this subject evidence is accumulating which may revolutionise our ideas of geological and palaeontological successions in the later Tertiaries.

Numerous flint implements and "Eoliths" have also been found associated with the animal remains in the gravel and on the adjoining ploughlands at different points over the whole basin of the Ouse. Some of the undoubted implements found with the remains are very roughly struck, like those of the Chellean stage; but the Piltdown specimens are mostly worked on one face only of the implements, a good deal of the rough outside skin or "bark" of the flint remaining where the implement was probably grasped by the hand. The "Eoliths" singularly resemble many of those found in the neighbourhood of Salisbury, and also those of the Ightham hills, but they are rather more tabular than the latter, and resemble more closely the so-called implements which have traveled from above to the lower levels in all the above-mentioned localities.



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Some of the "Eoliths" at Piltdown are hardly worn at all, while others are very much worn. Those that are not much worn may be of the age of the bed as finally deposited, but the more worn specimens may be of Pliocene age. They consist chiefly of "the awl" and "hollow scraper" variety. The true "bulb of percussion" hardly ever shows itself on these supposed implements, except on a very small scale, as the prismatic fracture of the flint does not admit of it, and their form and chipping, whether natural or artificial, were largely governed by this species of fracture.

If these specimens are subsequently proved to be 'artefacts' they must belong to the early dawn of the formation of implements by man. But much work remains to be done, both as to this and other branches of the subject relating to the earliest history of Man, including the correlation of implements and the strata which contain them, and perhaps at no time before the present was the subject so extended and complicated.