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Early prehistory

As we confront our origins we face a major paradox. The being, who through the power of his mind and imagination has come near to mastery over the forces of external nature as they confront him on this planet, and who has already begun to extend his dominion over parts of outer space, is himself an animal. As primitive man has always known, as some even of the higher religions have taught explicitly and as Charles Darwin and others have expressed it in scientific terms, human beings form an integral part of the web of life. Individual men are subject to the same processes of birth, growth, maturity and death as other organisms even if they alone are conscious of their fate. If we seek to understand the process by which man has emerged to civilization through his capacity to adjust to almost every environment encountered on earth and even momentarily on the moon, we need to take some account of his evolution as an organism and to recognize that both his biological and his social evolution have been accomplished in the context of a changing physical setting.

The evolution of man as an organism

If all existing organisms have emerged by imperceptible degrees from antecedent ones, it follows that one can hardly expect to be able to identify the first men merely by examining a succession of skeletal remains. This would be so even if the record were complete. As it is fossils are scarce, as a rule fragmentary and only rarely datable with precision. The position has not been improved by the exuberance of some writers in human palaeontology in respect of nomenclature. The literature is studded with generic and specific terms which enshrine views about the course of Primate evolution based on frequently ill-documented and incomplete fossils. In compiling

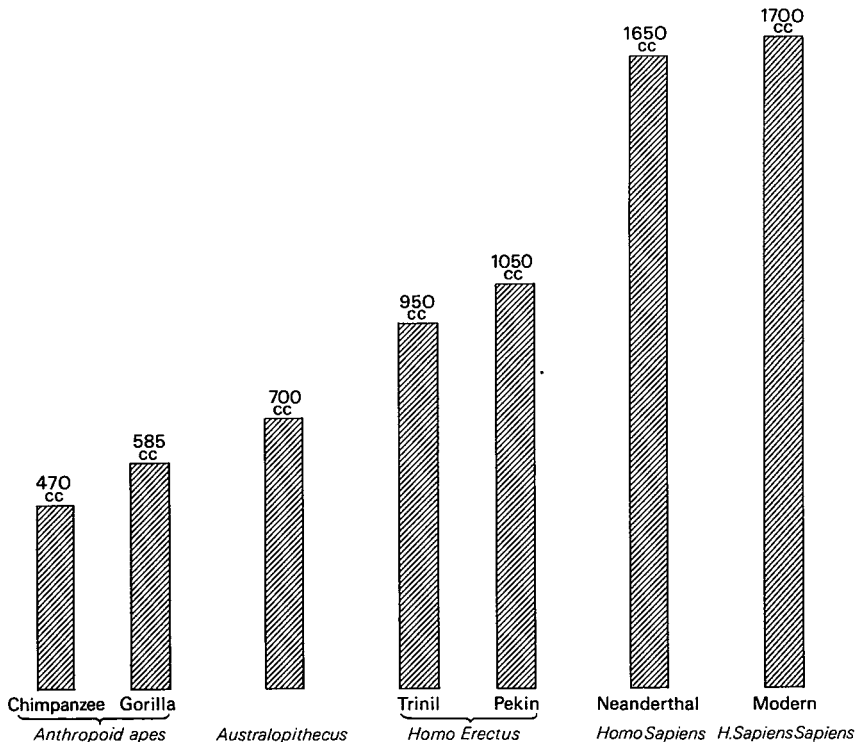
- 2 the highly simplified Tables 1–3 some of the better known obsolete terms are shown alongside their more recent equivalents in order to serve as a guide to the earlier literature.

The Primates

In zoological terms man falls within the hierarchy of the order Primates. Of the two sub-orders we need only concern ourselves with that appropriately termed *Anthropoidea*, leaving on one side for inspection in zoos man's exceedingly remote relatives the miniature and engaging *Prosimii*. Similarly, of the three super-families of the *Anthropoidea* we may ignore those comprising monkeys (*Ceboidea* and *Cercopithecoidea*) and concentrate on the *Hominoidea* comprising the anthropoid apes (*Pongidae*) and the hominids (*Hominidae*).

The physical similarities between men and anthropoid apes have long been appreciated. They are indeed so close as to leave no reasonable doubt about their affinity. Similarities appear whether one considers the general structure of the skeleton, muscular anatomy or the disposition of visceral organs, the evidence of serological reactions and metabolic processes, or even the structure of the brain

1 Growth of the brain in course of Primate evolution.



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itself. The differences are no less pronounced. No competent zoologist would hesitate in attributing particular parts of the skeleton to man or ape. Even the layman cannot help but be impressed by the obvious differences in dentition, limb proportions and size of brain. It follows that the hominids must have diverged from the apes a very long time ago.

The hominid fossils so far available in adequate samples are generally divided into two genera. Each displays characteristics implying that they held themselves upright and walked on two legs. Both share a number of features in respect of the skull, including the height above the orbits, the contour of the forehead and the conformation of the mastoid process. Their dentition also shows points of resemblance. The teeth are comparatively small and are arranged in evenly curved parabolic arcades. The canines are spatulate and there are no diastemic gaps. Yet there is one difference of overwhelming significance for behaviour. Whereas the brains of some Australopithecines were scarcely larger than those of the great apes, those of man were invariably larger and in most species much larger. It was this and all the manifold consequences that flowed from

Table 1. *Some of the main occurrences of Australopithecine fossils showing some obsolete nomenclature*

Locations	Age	Obsolete nomenclature
<i>Australopithecus africanus</i>		
Chad		
Koro Toro (Yayo)	EMP	<i>Tchadanthropus uxoris</i>
South Africa		
Makapansgat	LP	<i>Australopithecus prometheus</i>
Sterkfontein	LP	<i>Pleisanthropus transvaalensis</i>
Swartkrans	EMP	
Taung	LP	
Tanzania		
Garusi, L. Eyasi	LP	<i>Meganthropus africanus</i>
Olduvai FLK.NN I	LP	<i>Homo habilis/A. africanus</i>
<i>Australopithecus robustus</i>		
Ethiopia: Lower Omo	UPlio	
Indonesia: Sangiran	Djetis	<i>Meganthropus palaeojavanicus</i>
Kenya: Kanopoi, L. Rudolph	UPlio	
South Africa		
Kromdraai	EMP	<i>Paranthropus robustus</i>
Swartkrans	EMP	<i>Paranthropus robustus</i>
Tanzania		
Olduvai FLK I	LP	<i>Zinjanthropus boisei</i>
Peninj	LP	<i>Paranthropus cf. boisei</i>

UPlio = Upper Pliocene. LP = Lower Pleistocene. EMP = Early Middle Pleistocene.

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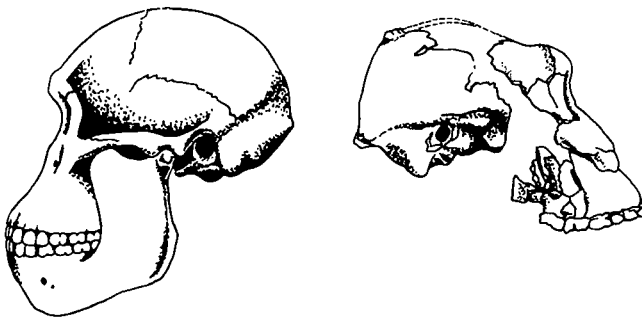
- 4 it that in the opinion of most authorities calls for the recognition of *Australopithecus* and *Homo* as distinct genera. Having said this it is important to recognize that systems of classification are mainly valuable as a generally accepted code for identification. While such codes serve for the majority of fossils, they are liable to break down precisely for those which from an evolutionary point of view are most important. If for instance the genus *Homo* stemmed from the same roots as *Australopithecus*, one could hardly expect fossils dating from the crucial intermediate stage to fall unambiguously into one or the other category.

The Australopithecines

Table 1 Fossils of the Australopithecines have so far been found in several parts of Africa, in the contiguous zone of south-west Asia and in Indonesia. They range in date from Late Pliocene to early Middle Pleistocene with some emphasis on the Early Pleistocene, whereas fossils certainly classifiable as human are at present almost entirely confined to the Middle and Upper Pleistocene. Although there may well have been some chronological overlap, the two genera thus appeared in a broad sense successively in time.

47: ch. 4 As fossils of Australopithecine character came to light they were endowed with a variety of names most of which have since been discarded. Only two species are now generally recognized, *Australopithecus robustus* having a rather heavier jaw adapted to a herbivorous diet, and *A. africanus* rather closer to man and having a lighter jaw possibly related to an omnivorous diet including meat. Reference should be made at this point to fossils from locus FLK.NN I at Olduvai (bed I) to which the name *Homo habilis* was applied by its discoverers on account of its inferred ability to make tools. Since the ability to make tools to standard patterns implies a form of life

2 *Australopithecus*: skulls of the more gracile *A. africanus* (left) and of the heavier *A. robustus* (right).



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radically different from that of other animals and one which underlies the subsequent history of man, it is logical that this characteristic should be given due weight in nomenclature. Whether we adopt this classification or whether we follow the alternative course and include these fossils in the species *A. africanus* would in this case depend on whether or not the hominid in question manufactured the implements with which he was associated (see p. 22).

The genus Homo

47:86-7 It has for some years been accepted that all hominids other than Australopithecines are best classified under the single genus *Homo*. This means that the numerous fossils from localities in Africa, Europe, North China and Indonesia formerly grouped within the genus '*Pithecanthropus*' or even accorded separate generic status have now been transferred to form a new species of man, *Homo erectus*. Another concept to be discarded is that Neanderthal and other more or less closely related forms showing characteristics that mark them off from the living races of men qualify as a distinct species. The modern view is rather that they form sub-specific varieties of *Homo sapiens*, such as *Homo sapiens neanderthalensis* or *soloensis*, and that modern man *Homo sapiens sapiens* is merely the sub-species that happens to have been living during the last thirty thousand years or so.

Table 2. *Present and former designation of the main groups of fossil hominids*

	Modern designation		Former designation
Pleistocene	<i>Homo sapiens</i>	<i>sapiens</i>	<i>Homo sapiens</i>
Upper	<i>Homo sapiens</i>	<i>neanderthalensis</i> <i>rhodesiensis</i> <i>soloensis</i> <i>steinheimensis</i>	<i>Homo neanderthalensis</i> <i>Homo rhodesiensis</i> <i>Homo soloensis</i>
Middle	<i>Homo erectus</i>	<i>africanus</i> <i>heidelbergensis</i> <i>javanensis</i> <i>pekinensis</i>	<i>Pithecanthropus africanus</i> or <i>Atlanthropus</i> <i>Pithecanthropus heidelbergensis</i> <i>Pithecanthropus erectus</i> or <i>javanensis</i> <i>Pithecanthropus pekinensis</i> or <i>Sinanthropus</i>
Lower	<i>Homo habilis?</i> <i>Australopithecus</i>	<i>africanus</i> <i>robustus</i> <i>boisei</i>	<i>Paranthropus</i> <i>Zinjanthropus</i>

6 *Homo erectus*

47: ch. 3 Since fossils of what was then known as *Pithecanthropus erectus* were first found in the Trinil beds in Java, the island has yielded further specimens and there can be no doubt that the species was living there during the Middle Pleistocene. The largest assemblage of fossils is undoubtedly that from Middle Pleistocene beds filling the rock-

57 fissures at Choukoutien near Peking, a discovery all the more important because traces of fire, together with stone implements and utilized animal bones came from the same deposits. More recently traces of the same species (needlessly termed *Atlanthropus mauritanicus*) have come to light in Pleistocene deposits exposed in a sand-pit at Ternifine near Palikao, Algeria. The northern margin of the range is completed by the old find of a mandible from Mauer near Heidelberg, also of Middle Pleistocene age. Morphologically these fossils show as a group a notable increase in the size of the brain: the mean of three crania from Java gave a capacity of 860 cubic centimetres and that of four from Choukoutien 1,075 cubic centimetres, placing the group more or less intermediate between *Australopithecus* and *Homo sapiens*. On the other hand they show a number of characteristics that mark them off decisively from *Homo sapiens*. Thus the skull has a low vault and frontal flattening, a marked ridge at the junction of the two main side bones, and thick walls; the mastoid process is smaller; the palate is enormous and there is marked alveolar prognathism, the lower part of the face projecting noticeably; the mandible is massive and although the teeth are human in general arrangement, in the case of the Java fossils the canines have a tendency to overlap and for a diastematic gap to appear between these and the incisors; and the weight of the mandible is matched by a correspondingly massive development of the supra-orbital and occipital brow-ridges, which, together with the flattened forehead, would probably strike us most forcibly were we to meet an individual in the flesh.

Homo sapiens

Homo sapiens can be presumed to have developed from the old *Homo erectus* stock. One of the few fossils of *Homo sapiens* type known for certain to date from the Middle Pleistocene is the incomplete cranium

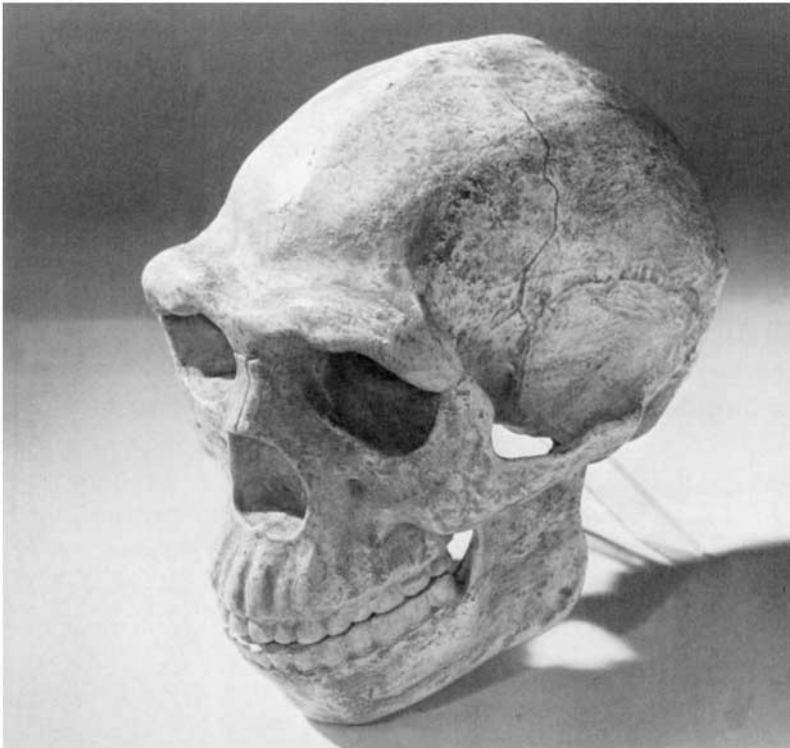
53, 55 from Swanscombe in the lower Thames basin. It is particularly unfortunate that the frontal part is absent, but since the surviving portion agrees more or less closely with a more complete cranium from Steinheim dating from an interstadial of the Riss glaciation, it

is on the whole likely that it shared the massive brow-ridges of the German fossil, a feature that usually goes with large teeth and heavy jaws.

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52 Much the most numerous fossils belonging to this stage in human evolution are those named after the original discovery at Neanderthal in the Rhineland. It is important, if a false impression is not to be formed of the characteristics of this group, that it should be realized that the descriptions found in the early literature are based on what now appears to be an aberrant form, that represented by the early French finds at La Ferrassie and La Chapelle-aux-Saints. This classic west European form, which dates from the first onset of the Würm glaciation, is now commonly regarded as a genetic variation in a territory marginal to and to some extent isolated by ice-sheets; and, indeed, in individual cases pathological deformation has to be taken into account. The leading features of this form of the Neanderthal sub-species include, as is well known, a short stocky build, a flat-vaulted head with pronounced brow-ridges set rather forward on the vertical column, and massive chinless jaws set with

3 Skull and mandible of *Homo erectus pekinensis* from cast based on



- 8 large teeth. The Neanderthaloid fossils from more remote territories like those from North Africa, the Levant, Iraq and Uzbekistan and those from such European localities as Ehringsdorf in Germany and Saccopastore in Italy that date from the interglacial preceding the Würm glaciation share these characteristics but to a less pronounced degree.

Although they show a clear continuity of development from the preceding stage, this whole early *sapiens* group, including the aberrant Westerners, exhibit an outstanding advance in respect of size of brain; the cranial capacity of the Neanderthals was well up to that of the average for modern man. There can hardly be any question, if we leave aside the aberrant form, that this group of fossils marks a significant stage in human evolution. A point which will no doubt be further underlined as discovery proceeds is that this evolution was not by any means confined to Europe or contiguous parts of Africa and Asia. The occurrence of analogous forms as far afield as Broken Hill in Rhodesia and Ngandong on the River Solo in Java has already made this plain.

Homo sapiens sapiens

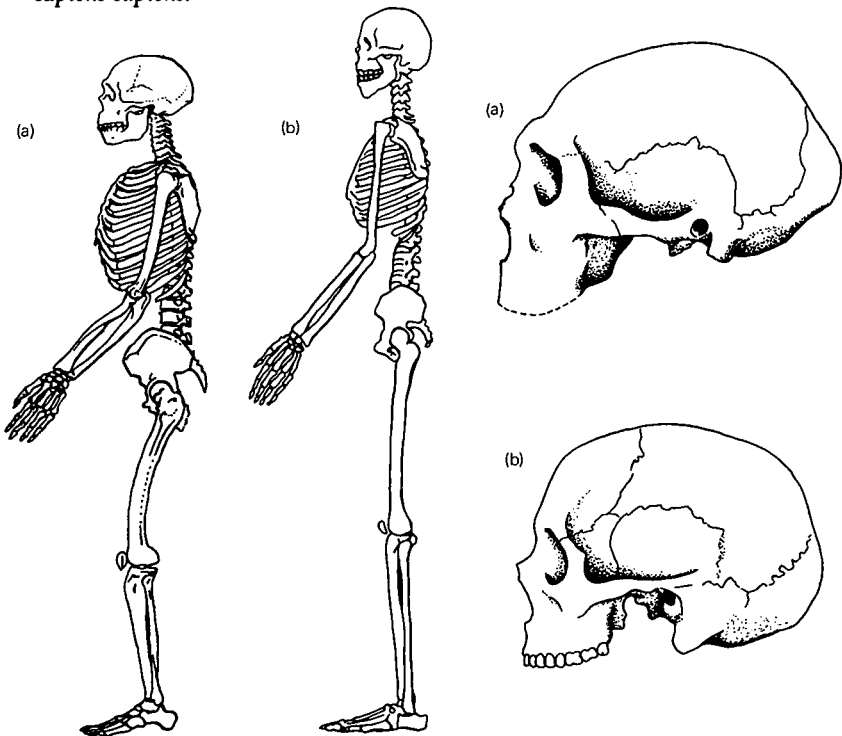
- The earliest exemplars of *Homo sapiens sapiens* so far known are those recovered from cave deposits at Cromagnon and elsewhere in the Dordogne, France, and from other sites with mode 4 Palaeolithic equipment scattered over a territory extending from western Europe to Iran and the Soviet Union, all dating from a fairly advanced phase
- 4 of the last major glaciation. Men of this species were more lightly built than Neanderthal man and his cousins; they stood fully upright; their skulls were free from strong muscle attachments; the forehead was steep and well-rounded; the brow-ridges were only moderately developed and never continuous; the teeth were relatively small; and the chin prominent. This modern type, to which all existing races belong, was associated in the sub-tropical and temperate zones with flint industries in mode 4 and other components of an advanced Palaeolithic technology, as well as with a conceptual endowment far beyond anything available to Neanderthal man and his cousins. Indeed one can assume from his art and the complexity of his technology that the mentality of Cromagnon man can hardly have differed substantially from that of the existing races of man.

The modern races of man

When and where did the various races of man emerge in their existing form? The first question is particularly hard to answer, since so many of the criteria by which racial differences are characterized, such as pigmentation and hair form, can hardly be inferred from skeletal remains. Attempts have been made to infer racial attributes from certain fossils – for instance skeletons from the Grimaldi caves near Mentone have been variously interpreted as Mediterranean or Negroid and one from Chancelade in the Dordogne as Eskimo – but the danger of drawing any such conclusions from miniscule samples of skeletal evidence is clear. It is wisest to recognize that almost everything remains to be discovered in this field. One suggestion might be that racial differences were an outcome of genetic variations linked with the widespread colonization of new territories towards the end of the Pleistocene.

Early types of man were confined to the warmer parts of the world: their remains, cultural and physical, are confined to Africa, to Europe as far north as southern Britain and central Germany, to south western Asia, to India and to south-east Asia as far as the Makassar

4 Skeletons and skulls of (a) *Homo sapiens neanderthalensis* and (b) *Homo sapiens sapiens*.



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- 10 Strait, the major palaeontological divide first recognized by Darwin's collaborator A. R. Wallace. Significant extensions of the zone of settlement were made in a northerly direction, notably in the Soviet Union, by Neanderthal man, but it was left to modern man to colonize the New World and the remainder of the Old, including Australia and the Pacific islands.

The degree of correlation between certain criteria of race and existing environments is sufficiently close to suggest that they were to some extent adaptive. The extent of ethnic movement during recent millennia helps to explain evident exceptions, but at the same time makes more striking the extent to which pigmentation and the width of nasal aperture accord with climate. Thus in the Old World blond fair-skinned people go with the cool, cloudy habitat of the north temperate zone; brunettes with the Mediterranean zone; yellow-skinned crinkly haired people with the tropical rain-forest; and the darkest skins with the hottest, non-forested African savannah. Again, the fact that the Eskimo and north Europeans have narrow nostrils, the Mediterraneans medium ones and the Negroes broad ones suggests a high degree of correlation between this feature and climate, something hardly surprising when one remembers that one function of the nose is to regulate the temperature of the air breathed into the lungs.

58-62 **Environmental change**

Subdivision of the Pleistocene

The Pleistocene or Quaternary epoch has the supreme interest for human beings that it spanned crucial stages in their physical and social evolution. It can hardly be a coincidence that it was a time of repeated ecological change. The extension and contraction of ice-sheets, the rise and fall of land and sea levels and extensive shifts in the distribution of animals and plants in response to climatic change, all these combined to alter more or less radically the physical conditions to which early communities had to accommodate themselves. And the cycle of change was many times repeated during the course of the Pleistocene.

On palaeontological grounds this epoch is commonly divided into three temporal phases. Deposits of Lower Pleistocene age are consistently marked by faunal assemblages of the kind first recognized at Villefranche-sur-Mer, including such well defined forms as *Dinotherium*, *Stylohipparion*, *Sivatherium* and *Elephas (Archidiskodon) meridionalis*. By the Middle Pleistocene these archaic forms had