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SOME PROBLEMS DEALING WITH ANCIENT MAN*

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IN THE past decade our knowledge of fossil man has been advanced as in no earlier period. Not only has the number of newly discovered specimens been considerably increased but also we have become acquainted with some entirely novel types, which enabled us to put the theories bearing on human evolution on a much safer basis than it was possible to do before.

Considering the number of individuals and the abundance of material, the Peking Man—*Sinanthropus pekinensis*—takes the first place.[1] He is represented by skeletal parts of about forty individuals, including male and female, adult and juvenile specimens. None of these individuals, however, are known from the entire skeleton, a great many of them being represented by teeth only. In addition, there is a strange limitation to the kind of the preserved bones, in so far as they chiefly consist of fragments of skulls and lower jaws, whereas limb bones are very scarce, being restricted mainly to the fragments of seven thighbones and one armbone. Nothwithstanding the deficiency of this material, it suffices to provide a fairly good idea of the general appearance of this human type.

To characterize it briefly, *Sinanthopus* was of medium stature and certainly in upright posture, since the proportions of his limb bones do not differ fundamentally from those of recent man. In contrast to the extremities, however, the skull exhibits very primitive features as, for instance, a low braincase with its greatest breadth near the level of the base, an average capacity of about 1000 cc., a low and receding forehead with heavy and projecting supraorbitals, strongly prognathous upper and lower jaws, absence of the chin and a great many of other less conspicuous peculiarities. In addition, size, proportions and pattern of the *Sinanthropus* teeth resemble those of the great apes much more than those of recent man.

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[1] Franz Weidenreich, *Six lectures on* Sinanthropus pekinensis *and related problems* (Bulletin of the Geological Society of China, Vol. 19, No. 1, 1939), pp. 1–110.

Sinanthropus has, therefore, to be ranged within the most primitive group of fossil man known hitherto.

The next finds of not less importance concern the Java Man—*Pithecanthropus erectus*. The type consists of a skull cap found by Eug. Dubois near Trinil, a femur and three teeth presumed to belong to one and the same individual. For many years it was debated whether the skull cap should be attributed to man or rather to a gibbon-like ape or to some intermediate form. The fortunate discoveries made by Dr. R. von Koenigswald in recent years have radically solved this problem, proving beyond any doubt that *Pithecanthropus* represents a genuine hominid. Apart from the Trinil skull cap (Skull I), there are now at our disposal a second skull (Skull II)[2] with both temporal bones preserved and resembling the first skull as one egg resembles another; furthermore, a skull fragment of a juvenile individual (Skull III)[3] and finally a fourth skull, consisting of the entire braincase, except the region of the forehead (Skull IV).[4] *Pithecanthropus* jaws are now represented by the fragment of the right body of a lower jaw[5] and an upper jaw belonging to Skull IV.[6] A very small mandible fragment found by Dubois and named the mandible of Kedung Brubus must also be ascribed to *Pithecanthropus*. The same is true of the baby skull of Modjokerta, some particularities of which indicate indisputably its *Pithecanthropus* character.[7] Skull IV, the largest and thickest of all *Pithecanthropus* skulls, apparently belonged to an adult male individual.[8] The Trinil cap and Skull II, because they are smaller and less robust than Skull IV, have to be attributed to females. All *Pithecanthropus* skulls have the following peculiarities in common: a very low braincase with its greatest breadth near the base, an extraordinary flatness in particular of the forehead, a broad and rounded occiput, a pronounced postorbital constriction and

[2] G. H. R. von Koenigswald, *Ein neuer* Pithecanthropus *Schädel* (Proceeding, Royal Academy of Amsterdam, Vol. 41, 1938), pp. 185–192.

[3] G. H. R. von Koenigswald and Franz Weidenreich, *Discovery of an additional* Pithecanthropus *skull* (Nature, Vol. 142, 1938,) p. 715.

[4] G. H. R. von Koenigswald, *Anthropological and historical studies relating to the earliest evidence of Man* (Carnegie Institution of Washington Year book 1939) pp. 319–325; and G. H. R. von Koenigswald and Franz Weidenreich, *The relationship between* Pithecanthropus *and* Sinanthropus (Nature, Vol. 144, 1939), pp. 926–929.

[5] von Koenigswald, *Ein Unterkieferfragment des* Pithecanthropus *aus den Trinilschichten Mitteljavas* (Proceedings, Royal Academy of Amsterdam, Vol. 40, 1937), pp. 883–893.

[6] von Koenigswald and Weidenreich, *The relationship between* Pithecanthropus *and* Sinanthropus, *op. cit.*

[7] von Koenigswald, *Erste Mitteilung über einen fossilen Hominiden aus dem Altpleistocän Ostjavas* (Proceedings, Royal Academy of Amsterdam, Vol. 39, 1936), pp. 1000–1009.

[8] Franz Weidenreich, *Man or Ape?* (Natural History, Vol. 45, No. 1, 1940), pp. 32–37.

heavy and projecting supraorbitals. The average capacity amounts only to 900 cc. The teeth, in spite of the more human-like character of their pattern, resemble very closely those of the great apes with respect to size and proportions of the molars and the existence of a wide diastema in the upper jaw.

Pithecanthropus and *Sinanthropus*, therefore, have to be regarded as representatives of the most primitive hominid group known hitherto. They are, however, not at all identical, both showing certain properties specific for one type but missing in the other. Yet the differences are not greater than those found among different races of present mankind settling in different regions of the earth. Which is the more primitive is difficult to tell because of the peculiar combination of primitive and advanced features in each of the types. In any case, the male *Pithecanthropus* individual exhibits certain primitive properties which have not been observed in any *Sinanthropus* specimen now at hand. The distinct gap separating the two types from Neanderthal Man justifies their being arranged in a special group which Boule[9] proposed to designate as Prehominids. Whether or not the very fragmentary fossil skull of East Africa discovered by Larsen and described as *Africanthropus* by H. Weinert[10] is to be included in this group, as the latter author insists, remains uncertain. Its deficiency renders a decision difficult all the more because its general shape even in Weinert's restoration contradicts such a subsuming.

The next stage of evolution immediately sequent to the *Pithecanthropus–Sinanthropus* phase is represented by *Homo soloensis*, discovered by Oppenoorth in Central Java in 1932.[11] This type is represented by eleven skulls and skull fragments and two tibiae. The skulls display an astonishing conformity in their general form as well as in certain details. As size and form of the braincase indicate, *Homo soloensis* corresponds to that kind of hominids which has been grouped under the name of Neanderthal Man. According to Oppenoorth's computation the average capacity of the skulls amounts to about 1200 cc. In accordance with this relatively great capacity, the greatest breadth of the braincase is situated at a higher level then is the case in the Prehominids but as is the rule in Neanderthal Man and recent man. On the other hand, in all essential details which define the *Homo soloensis* type, there is a surprising correspondence to *Pithecan-*

[9] Marcellin Boule, *Le Sinanthrope* (L'Anthropologie, Vol. 47, 1937), pp. 1–22.

[10] Hans Weinert, *Africanthropus, der neue Affenmenschfund in Ostafrika* (Zeitschrift für Morphologie und Anthropologie, Vol. 38, 1939), pp. 18–24.

[11] W. F. F. Oppenoorth, *The Place of* Homo Solonesis *among Fossil Man* (Early Man), pp. 349–360.

thropus. From this fact it follows that *Homo soloensis* has to be regarded as a direct descendent from *Pithecanthropus* and represents really a succeeding phase.

All these discoveries yield still another result of not less importance than their classification. As form and proportions of the limb bones of *Sinanthropus* reveal, and the manifold traces of his cultural achievement confirm, *Sinanthropus* had already acquired upright position. Although it still remains doubtful whether the Trinil femur and five more thighbones subsequently recognized by Dubois and also attributed to *Pithecanthropus* really belong to this type, the evidence that *Pithecanthropus* had adopted an erect posture did come from quite another fact. The situation of the foramen magnum and the character of the entire base of *Pithecanthropus* Skull IV indicate that this individual must have balanced the skull on the spine in the same way as *Sinanthropus* did. If these morphological signs do not deceive, the upright position was even still more pronounced in *Pithecanthropus* than in the former. This suggests that the questionable femora, notwithstanding their distinctly human character, may nevertheless belong to *Pithecanthropus*. That *Homo soloensis* certainly was erect can be gathered from the preserved tibiae, which resemble in all characteristics the tibia of recent man.

New discoveries which have to be ranged within the Neanderthal group include types found in places so far distant as Italy, on one hand, and Turkestan in Central Asia, on the other. In the latter case, Hrdlička[12] recognized the skull as that of a child of 8–9 years of age, with all characteristics of Neanderthal Man. The importance of this find depends on its location, which proves that that fossil human form was really spread over the whole old world. If and how the Asiatic specimen differs from the European, African and Javanese Neanderthal types, as may be expected, remains open for the present.

The Italian group of Neanderthal Man now includes three specimens. The first one found in Saccopastore, a suburb of Rome, has been briefly described by S. Sergi.[13] At the same site a fragment of a second skull, consisting mainly of an upper jaw, was secured some years later.[14] Recently one more skull came to light, this time in an ancient cave of the Monte Circeo situated directly on the coast half-way between Rome and Naples.[15]

[12] Ales Hrdlička, *Important Paleolithic Find in Central Asia* (Science, 1939), pp. 296–298.

[13] Sergio Sergi, *La scoperta di un cranio del tipo di Neandertal presso Roma* (Revista di Antropologia, Vol. 28, 1928–29), pp. 457–462.

[14] A. C. Blanc, *Saccopastore* (Revista di Antropologia, Vol. 30, 1933–34), pp. 479–482.

[15] *Ibid*, *L'Uomo fossile de Monte Circeo: un cranio neandertalino nella Grotta Guattari a*

Since this cave remained completely untouched all the time, the skull, including the lower jaw, has been excellently preserved. Judging from the preliminary descriptions and illustrations, the first and second skulls show the same characteristics: they differ in some regards from the classic European Neanderthal type as represented, for instance, by the skulls of Spy and La Chapelle-aux-Saints but resemble more the Gibraltar Skull.[16] This fact is of far-reaching significance, for it proves that the so-called Neanderthal Man of Europe, notwithstanding his uniformity when compared with the Rhodesian Man of South Africa or the *Homo soloensis* of Java, has produced certain regional variations which are equivalent to racial differences of today.

The remaining new discoveries include various types, all falling, however, within the wide interval between Neanderthal Man and recent man. First we have the skeletons of Et-Tabūn and Mugharet Es-Skhūl of the Mt. Carmel region in Palestine. According to Sir Arthur Keith and Th. McCown,[17] the skulls are characterized by heavy and projecting supraorbitals combined with a high and large braincase typical of recent man. This association proves that the Mt. Carmel type has to be considered as morphologically intermediate between the Neanderthal group and recent man. Skulls found by R. Neuville in the cave of Kafzeh in Judea belong apparently to the same category. The same strange junction of primitive features of face and forehead, on one hand, and a large and well-vaulted braincase, on the other, marks the skull of Steinheim in Germany discovered by Berckhemer.[18] There that coalition is all the more surprising as the skull, according to all available data, belongs to a much earlier geological period, namely, the Middle Pleistocene. On the other hand, it fits very well into this picture that the skull of Swanscombe unearthed by Maston from a gravel terrace of the Thames of the same age does not differ fundamentally from recent man, so far at least as the preserved parts of the skull reveal.[19] The frontal bone, which would be decisive in this case for the right classification, unfortunately, is missing in the Swanscombe Skull.

San Felice Circeo (Atti de la Reale Accademia Nazionale dei Lincei. Rendiconti, Classe di Scienza fisiche, matematiche e naturali, Vol. 29, Ser. 6a, 1939), pp. 205–210.

[16] Sergio Sergi, *Some comparisons between the Gibraltar and Saccopastore skulls* (Science, London, 1932), pp. 50–52.

[17] Theodore McCown and Sir Arthur Keith, *The Stone Age of Mount Carmel, Vol. II*, (Oxford, 1939).

[18] Hans Weinert, *Der Urmenschenschädel von Steinheim* (Zeitschrift für Morphologie und Anthropologie, Vol. 35, 1936), pp. 463–518.

[19] *Report on the Swanscombe Skull* (Journal of the Royal Anthropological Institute, Vol. 68, 1938), pp. 17–98.

All the new specimens, along with the older material, form a rather continuous line of evolution which begins with the Prehominids and ends with recent man. Thus the question arises whether this line means an actual pedigree, assuming that *Pithecanthropus* and *Sinanthropus* are direct ancestors of Neanderthal Man and, furthermore, recent man a scion of the latter, or whether these various types have to be accounted as but specialized and discontinued side branches leading away from the main line of human evolution. This problem presents two sides, a morphological as well as a chronological one.

Regarding the first alternative, it can be taken for granted that none of the new specimens reveals any particularity which could be interpreted as a plain indication of a separate development. But the more fossil material comes to light the greater appears the variability and the greater, consequently, the uncertainty as to what is to be interpreted as primitive. More and more I am coming to the impression that, just as mankind of today represents a morphologic and generic unity in spite of its being divided into manifold races, so has it been during the entire time of evolution. While man was passing through different phases, each one of which was characterized by certain features common to all individuals of the same stage, there existed, nevertheless, within such community different types deviating from each other with regard to secondary features. These secondary divergencies have to be rated as regional differentiations and, therefore, as correspondent to the racial dissimilarities of present man.

Concerning the chronological side of the problem, an insurmountable difficulty seems to exist when one dares to proclaim primitive types like the Asiatic Prehominids as "ancestors" of more advanced hominids as they are represented, for instance, by the Men of Steinheim or Swanscombe in Europe, which were living in about the same time. However, it has to be borne in mind that the word "ancestor" in this sense should not have the meaning of direct consanguinity but stand only for designating an antecedent evolutionary type of similar character. That is to say, the Men of Steinheim and Swanscombe had their own European Prehominids, which may have lived in Europe or somewhere in the west of the Old World but in a much earlier period than the Asiatic Prehominids.

The first of the two appended tables[20] represents the morphological sequence of hominid forms and the second their chronologic succession. The discrepancies between the two lists are plain. Even conceding the

[20] These tables correspond to the tables published in my paper *Six Lectures on* Sinanthropus pekinensis, *etc.* (Bulletin of the Geological Society of China, Vol. 19, No. 1, 1939, pp. 1–110), which are here brought up to date.

probability that the geological determination of some of the specimens enumerated in the second list are not above all doubt, there remain nevertheless several cases in which the discordance can be taken as a sure fact.

If we admit that mankind of today, uniform regarding its general character but differing in special appearance, has developed from various regional stocks starting even from on earlier stage than that represented by

TABLE I. MORPHOLOGICAL SEQUENCE OF HOMINID REMAINS

General classification	*Sub-division*	*Type*	*Distribution*
Prehominids	—	Pithecanthropus erectus Sinanthropus pekinensis	Java North China
Homo neanderthalensis	I Rhodesian	Homo soloensis Homo rhodesiensis	Java South Africa
	II Spy Group	Spy Gibraltar Saccopastore La Chapelle-aux-Saints, etc. Mauer (mandible)?	Western Europe South Europe Western Europe Central Europe
	III Ehringsdorf Group	Ehringsdorf Krapina Steinheim Tabūn (Mt. Carmel)	Central Europe Palestine
Homo sapiens intermed.	—	Swanscombe ? Skhūl-type (Mt. Carmel)	England Palestine
Homo sapiens fossilis	—	Piltdown (braincase)	England

the Prehominids, and if we assume, furthermore, that development was not going on simultaneously everywhere but was accelerated in one place and retarded in another, perhaps as a consequence of local influences, then all the discrepancies between the morphologic and chronologic sequence of the known types of fossil man can be understood. The old theory, claiming that man evolved exclusively from *one* center whence he spread over the Old World each time afresh after having entered a new phase of

evolution, no longer tallies with the palaeontological facts. For *Pithecanthropus* and *Homo soloensis*, both inhabitants of the same region, represent undoubtedly subsequent stages of one and the same local Javanese branch of early man and prove thereby, at least so far as Java is concerned, that Java Man was tracing his own way in the direction of recent man inde-

TABLE II. CHRONOLOGICAL SEQUENCE OF HOMINID REMAINS

Glacial periods	*General and special classification*	*Type*	*Distribution*
Günz	Homo sapiens	Piltdown (braincase)	Western Europe
Günz-Mindel	Prehominids	Pithecanthropus erectus	Java
Mindel	Prehominids	Sinanthropus pekinensis	North China
Mindel-Riss	Homo neanderthal. II Homo neanderthal. III Homo sapiens intermed.	Mauer (mandible) Steinheim Swanscombe	Central Europe Western Europe
Riss	?		
Riss-Würm	Homo neanderthal. I Homo neanderthal. II Homo neanderthal. III Homo sapiens intermed.	Homo soloensis Saccopastore Ehringsdorf Tabūn-type Skhūl-type	Java Southern Europe Central Europe Palestine Palestine
Würm	Homo neanderthal. II Homo sapiens	Monte Circeo Spy-Group Grimaldi	Southern Europe Central Europe Western Europe
Post-Würm	Homo sapiens	Homo sapiens fossilis	Europe, Africa, Asia

pendent of what may have happened to similar stages in other parts of the world.

As *Pithecanthropus* and *Sinanthropus* reveal, furthermore, man must have branched off very soon from a common anthropoid-like stem which had already adopted an upright posture, while braincase, jaws and dentition still retained their anthropoid characteristics. This early manifested

independence from traits specific for the anthropoids of today, together with the uniformity of typical human characters preserved in all the stages of evolution, should be recognized by corresponding alteration of the nomenclature. Those terms which are generally used to designate different human types involve the idea that each one represents a more or less divergent genus without generic connections. In order to avoid this incorrect interpretation, the time has come, as I think, to eliminate all those names which may lead to some misunderstanding in this regard. Instead of *Pithecanthropus erectus* we should speak of *Homo erectus javanensis*. *Sinanthropus pekinensis* should be replaced by *Homo erectus pekinensis* or *sinensis* and *Homo soloensis* by *Homo neanderthalensis soloensis*, etc. I want only to broach this question here but not to enter into a special discussion.

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