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Report on the Latest Discoveries of Early Man in the Far East

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Surprising discoveries in the field of palæontology have been made in recent years. The war and the restriction of international communication barred the spread of this information beyond the Americas, although the character of the new finds demands a complete rectification of the usual conception of the appearance of early man and his relation to later hominid types already known.

Therefore, I was glad to accept the invitation of the Editor of "Experientia" to make a brief report on these discoveries and their bearing on the problem of human evolution. For details, the reader is referred to the bibliography annexed. The long list of my own papers asks for indulgence and explanation. All the new finds come from Java and China. We owe them to the initiative and enthusiastic inquisitive mind of Dr. G. H. R. VON KOENIGSWALD of the Geological Survey of the Netherlands Indies. The "vicinity" of Bandoeng and Peiping provided for a number of years a working community between VON KOENIGSWALD and myself. The well-equipped Cenozoic Research Laboratory of the National Geological Survey of China and of the Peiping Union Medical College offered the opportunity, the only one in the entire Far East, to study the fossil material collected in Java with the approved anthropological methods and to compare it with adequate simian and human material. A grant from the Carnegie Institution in Washington enabled VON KOENIGSWALD to spend some months in the laboratory in Peiping. Earlier, I had the chance to visit the sites in Java and to see the original specimens of *Homo solœnsis*.

When the events in Europe and the increasing political tension in Eastern Asia forced me to move from Peiping to New York in the Spring of 1941, casts, photographs, drawings and measurements of all the Chinese und Javanese materials known at the time were ready, so that I was able to continue my research work. Since 1937 there has been no possibility of increasing our *Sinanthropus* material, for the Japanese army of occupation in North China persisted in refusing us access to the site of Choukoutien. An attempt which the commander of the Japanese garrison at Choukoutien had himself made to dig for *Sinanthropus* skulls fortunately failed from the very beginning so that the cave deposits remained intact. New discoveries can be expected if the political situation and new grants will permit us to resume our activities.

Summarizing what we know thus far: *Sinanthropus pekinensis* undoubtedly represents an early human type

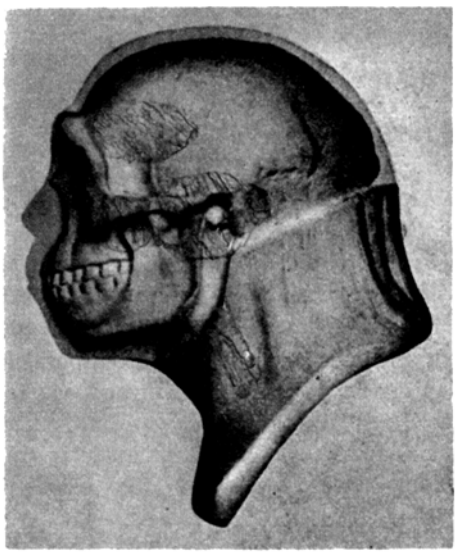


Fig. 1. Reconstructed head of a *Sinanthropus* woman, with the left half of the skull exposed. Norma lateralis sinistra.

which be assigned to the early period of the Middle Pleistocene. A more accurate timing and synchronizing with European sites will be possible if the geology of the Ice Age and the fauna of the vast space separating Europe from the Far East are more systematically explored. The anatomical data prove that *Sinanthropus* stood and walked in an upright posture. His stature equalled that of a medium-sized man of today. The proportion of the length of his lower extremities to his upper ones was the same as that of modern man; perhaps *Sinanthropus*' arms were a little longer. Furthermore, there are indications that he possessed a stout nape, and the head slightly stooped (Fig. 1).

The head as a whole looked human. Upper jaw and cheeks projected, but there was no chin (Fig. 2). The teeth were, in general, larger than those of modern man. The upper canine was a big tooth but projected only slightly beyond the occlusal surface. There was

[1] American Museum of Natural History.

no diastema in either the upper or lower jaws. The third molar was reduced in both upper and lower jaws.

Despite this generally human character, the dentition shows several very primitive features which assign *Sinanthropus* to a much lower phase of evolution than any other known form—especially Neanderthal man. This primitiveness is furthermore attested by certain peculiarities of the braincase. The volume of the cranial cavity varies from 915 cm^3 to 1215 cm^3, with an average volume of 1025 cm^3.

The cavity, therefore, appears distinctly smaller than that of Neanderthal man which exceeds even 1600 cm^3. The most conspicuous peculiarity of the braincase, however, is, in addition to flatness (Fig. 3, *a*), the breadth at its base. The greatest breadth is found in *Sinanthropus* a little above the ear opening; beyond this point the breadth decreases gradually (Fig. 2, *b*). In modern man, the greatest breadth is higher up, either on the scale of the temporal bone or on the parietal bone, from where it again decreases toward the base. This is a typical simian feature, while all the Neanderthalians display in this respect the pattern of recent man.

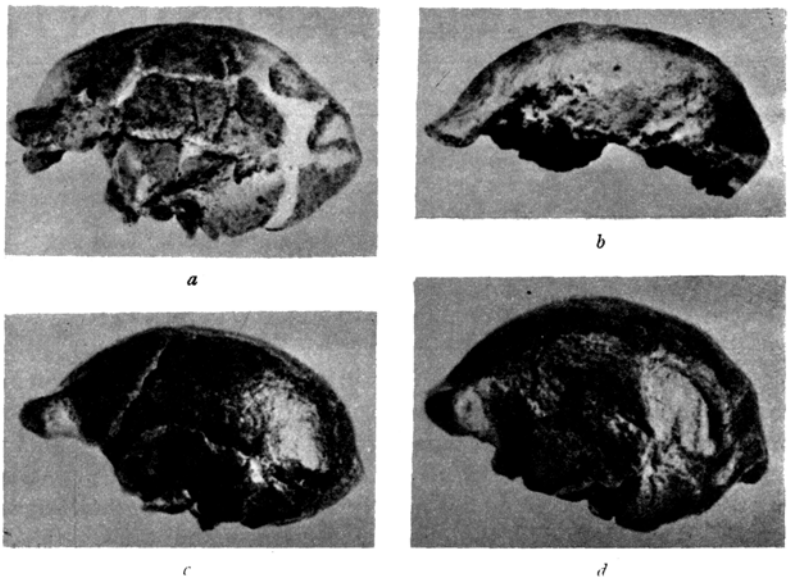


Fig. 3. Normæ laterales sinistræ of: *a Sinanthropus* Skull XI (female); *b Pithecanthropus erectus* Skull I (DUBOIS); *c Pithecanthropus erectus* Skull II (VON KOENIGSWALD); *d Homo solœnsis* Skull IX (OPPENOORTH). The four skulls are reduced to the same lenghts. *a*, *b*, *c*: photographs from the originals; *d*: from the cast.

Certain structural details of the temporal bone, in particular of the petrosal part, turned out to be the most decisive features in the determination of the evolutionary phase of a given human form. In *Sinanthropus* they deviate strikingly from the features of recent man and approach in the same degree those occurring in anthropoids; whereas all the Neanderthalians, even including the Rhodesian man, show the recent human type. A marked characteristic of the *Sinanthropus* skull is finally the thickness and massiveness of the cranial bones; this is not confined to the walls of the braincase, but involves also the bones of the base and the entire facial skeleton.

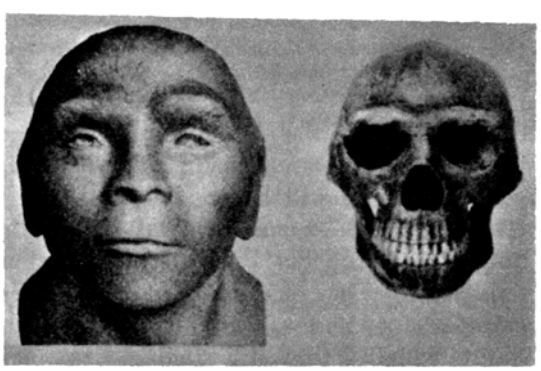


Fig. 2. Reconstruction of the head of a *Sinanthropus* woman (*a*); the skull on which the reconstruction is based (*b*). Norma frontalis.

As to habits of living and the culture of *Sinanthropus* he was certainly a hunter whose main-game was the deer. He knew the use of fire and made implements, crude as well as more refined. Whether he lived in the cave from which his remains together with animal bones were gathered, or whether he found shelter under overhanging rocks at the entrance to the cave, which may have been used in this case as a garbage pit for the left-overs from his meals, remains in doubt. The discovery of long bones split lengthwise, among them some of his own kind, and the absence of bones of the skull base itself in all *Sinanthropus* skulls indicates that he was fond of bone marrow and brain and did not much mind about their provenance.

The recovery of the first *Sinanthropus* skull, in 1929, had already shed light on the classification of *Pithecanthropus erectus*. The general form of the calotte of Trinil resembled that of *Sinanthropus* so perfectly that little doubt was left about the human character of *Pithecanthropus*. When, in 1937, VON KOENIGSWALD collected an almost complete calvaria (Fig. 3, *c*) as similar to the Trinil cap (Fig. 3, *b*) as one egg to another, that assumption turned into certainty.

The new *Pithecanthropus* skull was surprising because of its smallness. Its capacity is only 775 cm^3, which is considerably less than the smallest *Sinanthropus* skull. Nevertheless, fusion of most of the sutures reveals that the skull is that of an individual of advanced age. A find of a mandibular fragment at the same site (Trinil beds of Sangiran), which preceded the discovery of the second skull, gave evidence that

Pithecanthropus, judged by size and form of the jaw and the character of the dentition, cannot have differed substantially from *Sinanthropus*. Even the multiplicity of the apertures of the mental foramen, so

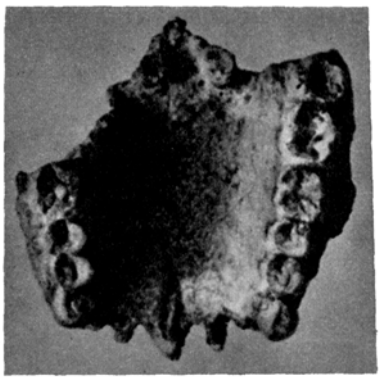


Fig. 4. *Pithecanthropus robustus*. Palate and upper teeth. Photograph from the original. c. $^2/_3$.

typical of *Sinanthropus*, appears in *Pithecanthropus* (cf. Fig. 7, *d*). On the other hand, the third molar is not reduced as it is in *Sinanthropus*, but is distinctly longer than the first and second molars.

The surprise came, however, when, in 1939, VON KOENIGSWALD'S[1] native collector picked up a strange upper jaw from the same Trinil beds in Sangiran. Its alveolar portion (Fig. 4), although somewhat compressed, was almost completely preserved: ten teeth were still *in situ*; both canines and the entire right row of teeth, from the canine to the third molar backward, were intact. The teeth are undoubtedly human; they are bigger than *Sinanthropus* teeth, and the canines (Figs. 5 and 6) project more than in the latter.

The dental arch is narrow and the two molar rows form a straight line. Not enough: there is a wide diastema on either side between the canine and the lateral incisor (Fig. 5), and, in addition, the palate (Fig. 4) is even and smooth, without revealing any trace of ridges and furrows which are so characteristic of modern man, Neanderthal man and even *Sinanthropus*. Moreover, jaw and palate are much longer and broader than those of any recent or fossil human specimen. Therefore, the upper jaw of Sangiran is unique in every respect.

Nevertheless, the discovery was put into the shade when, shortly afterwards, the braincase which pertained to the jaw was discovered from the same spot that had yielded the jaw. Like the jaw, the braincase was crushed and its bones partly telescoped, apparently before any fossilization had taken place. The entire frontal bone, with the facial bones above the alveolar process, are missing (Fig. 6). But what has been preserved suffices to complete the picture of the skull. The braincase as well as the upper jaw are unique: the bones are of extraordinary thickness and massiveness. Although the whole skull is considerably larger than that of *Pithecanthropus* Skulls I and II, its capacity cannot have been much greater than 900 cm³. The form of the calvaria is the same as in *Pithecanthropus* Skull II and in all *Sinanthropus* skulls; the breadth is the greatest at the base and decreases

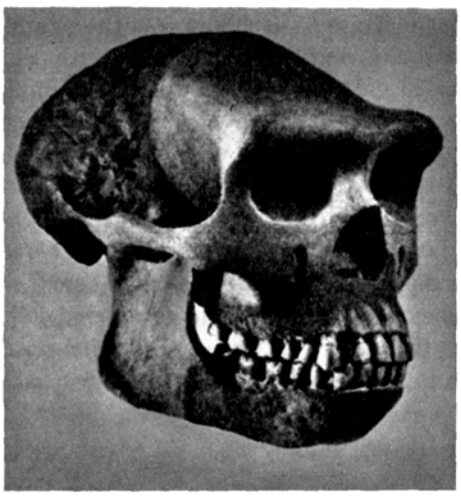


Fig. 5. Reconstruction of the skull of *Pithecanthropus robustus*, combined with a reconstruction of the mandible B of *Pithecanthropus erectus* (cf. Fig. 7, *d*). Three-quarters profile. c. $^1/_4$.

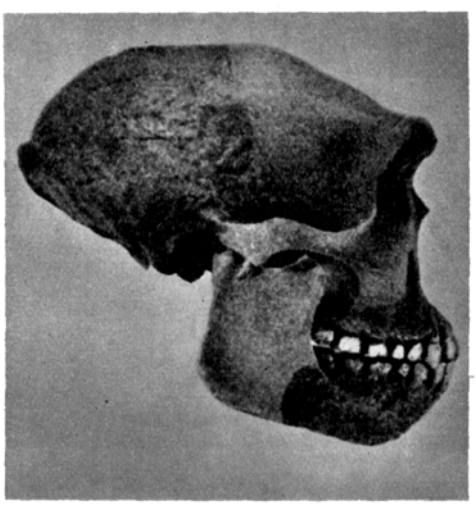


Fig. 6. The same skull and mandible as in Fig. 5. Norma lateralis dextra. c. $^1/_4$.

toward the top. This feature is even more pronounced than in *Sinanthropus* and *Pithecanthropus* Skull II. The occipital torus is enormous in extension and heaviness (Fig. 6). A chain of more or less isolated knob-like elevations runs along the mid-sagittal line of the vertex region; they keep in fair distance from the temporal line (Fig. 6). The muchal planum is very large,

[1] G. H. R. VON KOENIGSWALD and FRANZ WEIDENREICH, The relationship between *Pithecanthropus* and *Sinanthropus*. Nature, vol. 144, No. 3657, pp. 926—929 (1939).

exhibits a well-developed muscular relief and makes almost a right angle with the occipital planum (Fig. 6). The occipital foramen occupies a rather central position. The structural peculiarities of the temporal bone are the same as in *Sinanthropus* as mentioned above; but the bone is still more massive.

When we prepared this skull in Peiping, we did not doubt that we had before us a *Pithecanthropus* skull although we were fully aware of its uniqueness. But since we were still under the spell that the Trinil beds of Sangiran could only lodge *one* type of human form, we did not hesitate to attribute also the new skull to *Pithecanthropus erectus* as was done with Skull II. We conceded only that it was probably a male individual, considering its size and clumsiness when compared with the relatively small and gracile other skulls. Therefore we regarded the latter as females.

When VON KOENIGSWALD, in the Spring of 1939, was back in Java and sifted the materials gathered from Sangiran during his absence, he came across another odd fragment of lower jaw. He considered it human, although the piece surpassed the *Pithecanthropus* mandible in size of bone and teeth. Unfortunately, it

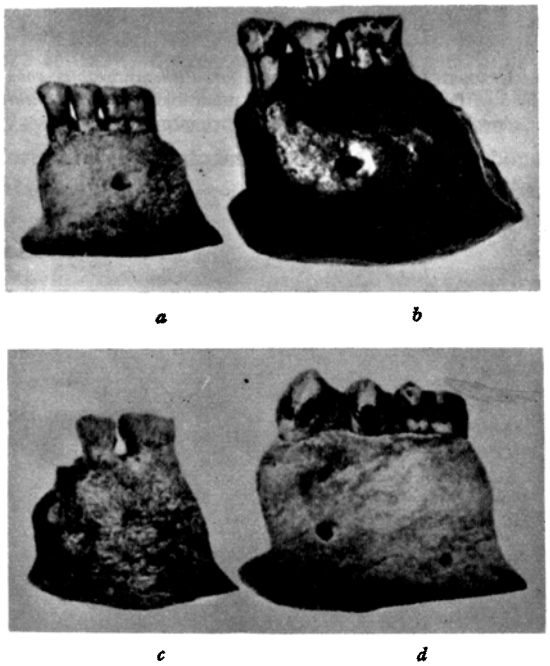


Fig. 7. Mandibular fragment of *Meganthropus palæojavanicus* VON KOENIGSWALD (*a*) compared with the same portions of a mandible of recent man (*b*); male gorilla (*c*); and *Pithecanthropus erectus* (*d*) (Mandible B). Lateral view. The four mandibles: c. $^2/_3$.

is a small fragment. In the critical region of the premolars and the canine, the alveolar process is damaged, and the teeth missing or their crowns broken off. Under these circumstances, it is hazardous to make a diagnosis as long as only the cast is available. Pending better information, it must be in abeyance whether the jaw is human or belongs to a short-snouted anthropoid, a type unknown so far.

A second fragment of a mandible, which was collected toward the end of 1941, is much less am-

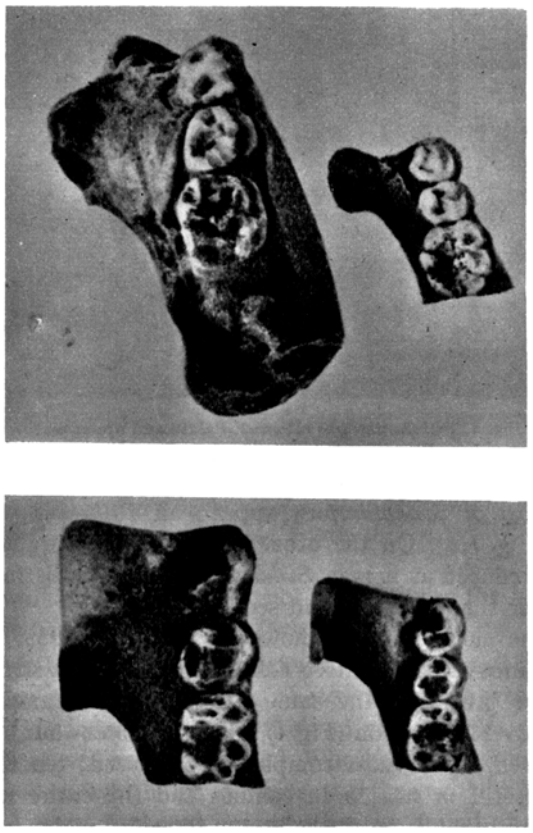
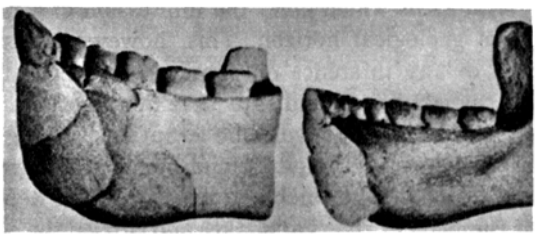


Fig. 8. The same mandibular portions as in Fig. 7, seen from above: *Meganthropus* (*a*); recent man (*b*); male gorilla (*c*); male chimpanzee (*d*). All mandibles: c. $^5/_6$.

biguous. VON KOENIGSWALD sent a cast of it to New York where it arrived a few days before the Japanese occupation of Java. The piece was labeled "*Meganthropus palæojavanicus*", indicating by the name VON KOENIGSWALD'S belief that it belonged to a human being of gigantic dimensions. The fragment, a part of the right body, extends from the mid-line at the symphysis backward to the second molar (Fig. 7, *a*). The two premolars and the first molar are in very good condition. The canine is missing, but the inferior half of its socket has been preserved (Fig. 8, *a*). The character of the dentition and the pattern of the lingual side of the symphysis admits of no doubt that VON KOENIGSWALD'S determination is correct. Indeed, the bone and the teeth surpass in size and massiveness all that is known thus far of any human mandible (cf. Fig. 7, *a* and *b*). And even more than this: the thickness of the body is twice that of the corresponding region of a male gorilla, while the height is equal. In addition to this difference, the piece is distinguished from any other mandible, *Sinanthropus* and *Pithec-*

anthropus included, by the character of the labial surface of the body and symphysis. That of the body forms a continuous bulge without any particular pattern (Fig. 7, *a*); the details of the lingual symphyseal area show a strange combination of early human and simian features (Fig. 9, *a*). Apart from their extra-



a *b*

Fig. 9. Reconstruction of the mandibles of *Meganthropus palæojavanicus* VON KOENIGSWALD (*a*) mid-sagittal section—reconstructed parts in lighter color—compared with a mid-sagittal section through the Heidelberg mandible (*b*). Both reduced in the same proportions.

ordinary size, the premolars and the first molars (Fig. 8, *a* and *b*) display some of the same primitive peculiarities which are typical of *Sinanthropus*. Therefore, *Meganthropus* is certainly a giant, but also the most primitive form ever found.

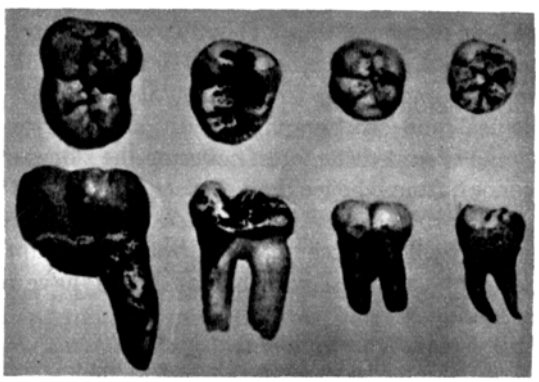
With the acceptance of this fact the odd "male" *Pithecanthropus* maxilla appears in a new light. It combines size and massiveness with primitiveness, exactly like the *Meganthropus* mandible. Nevertheless, the two pieces cannot belong to the same type, for the *Meganthropus* jaw and teeth are too large for *Pithecanthropus* (cf. Fig. 7, *a* and *b*). But compared with the two "female" *Pithecanthropus* skulls, the "male" *Pithecanthropus* skull is in all its characteristics intermediate between *Meganthropus* and the smaller *Pithecanthropus* forms. For this reason, I considered it necessary to distinguish between DUBOIS' *Pithecanthropus erectus* type, represented by the smaller skulls, and the big new type for which I have proposed the name *Pithecanthropus robustus*.

The discovery of *Meganthropus palæojavanicus* and the recognition of his human character were, however, not the end of all surprises. In 1935, VON KOENIGSWALD has described the tooth of a fossil ape under the name *Gigantopithecus blacki*. The tooth had been purchased by VON KOENIGSWALD in a Chinese chemist's shop in Hong Kong. In the same drawer from which this tooth was picked up, there were more teeth of fossil animals, particularly those of Stegodon, tapir and orang-utan. In every case the roots of the teeth were missing. The giant tooth was badly worn. Nevertheless, the shape of the crown and what was left of the occlusal surface were sufficient to identify the tooth as a lower third left molar. Beyond this fact, the only thing that seemed certain was that the tooth belonged to a primate with the characteristic pattern of an anthropoid. Since Stegodon, tapir and orang-utan are representatives of the fauna of the Trinil beds of Java and since the assemblage in the chemist's drawers in Hong Kong were certainly collected somewhere in Southern China, VON KOENIGSWALD placed this group under the term "Sino-Malayan fauna". (PÈRE TEILHARD[1] now calls the Chinese branch of the group the South Tsinling fauna.)

It has become VON KOENIGSWALD'S habit to visit Chinese dispensaries and to rummage in the drawers whenever he passes through cities of Chinese population. SCHLOSSER'S famous human tooth, the discovery of which anticipated that of *Sinanthropus*, was picked up in exactly the same way.

VON KOENIGSWALD'S method again proved successful. A second giant tooth was discovered some years later—again in Hong Kong. This time it was an upper molar. As in the first case, it was without roots but was much less worn. On a third journey, he had the good fortune to pick up a third tooth of the same type, a scarcely worn, lower third right molar, with the posterior root preserved in its total length (Fig. 10, *a*). These two teeth have not been described by VON KOENIGSWALD, but he has provided me with casts.

The evidence of the occurrence of giant human types as members of the Sino-Malayan fauna prompted me to subject these so-called *Gigantopithecus* teeth to renew-



a *b* *c* *d*

Fig. 10. Third lower molar (left) of *Gigantopithecus blacki* VON KOENIGSWALD (*a*); the same molar of a male gorilla (*b*); first lower molar of the same side of *Sinanthropus pekinensis* (*c*); first lower molar of the same side of recent man—Amerindian—(*d*). Upper row, occlusal view; lower row, lateral view. c. $^3/_4$.

ed scrutiny. This resulted in the conviction that the teeth are not those of an ape but those of a true man (Fig. 10, *a*) although of enormous dimensions, compared with which *Meganthropus palæojavanicus* is almost a dwarf. Therefore, there existed in the Sino-Malayan fauna group, in addition to *Pithecanthropus erectus*, no less than three early human types, namely, *Pithecanthropus robustus*, *Meganthropus palæojavanicus*, and *Gigantopithecus blacki*, which surpass all

[1] P. TEILHARD DE CHARDIN, Early Man in China. Institut de Géo-Biologie, No. 7, pp. 1–99, Peiping 1941.

known Neanderthalians and all variations of recent human form, their size and heaviness rising in the foregoing sequence. Compared with anthropoids, *Pithecanthropus robustus* may have reached the size of a male gorilla; *Meganthropus* must have been a good deal larger than a male gorilla, and *Gigantopithecus* may have had almost double the size of a gorilla. In these three cases, the primitive characteristics become more pronounced as the forms increase in size. In other words, we may assume more gigantic proportions the farther back the line is traced. Whether this giantism represents a general phenomenon or is limited to the Southern Asiatic branch of the human stem, or whether it is only a local variation beside which even normal and small-sized individuals may have occurred, it is impossible to determine from the scanty data available at this moment.

Two already known facts, however, point to the first-mentioned possibility. These are heaviness and massiveness of cranial bones observed in all human types preceding that of modern man, and their tendency to diminish as evolution proceeds; and the occasional outstandingly big and massive structures of skulls recovered from widely separated localities, such as the skulls of *Homo solœnsis* in Java (Fig. 3, *d*), Rhodesia man in Africa, the calotte of the Neanderthal man of Düsseldorf, and the Heidelberg jaw.

Unfortunately, no extremity bones of the giants have been recovered thus far; nor do we know anything concerning their habits of living. All the finds in Java have been picked up from secondary deposits. The geological and stratigraphic conditions indicate that early man roamed the forest covering the slopes of the volcanoes, from whence their corpses or skeletons were carried down to the valleys by ash falls and streams of mud which accompanied volcanic eruptions. Implements, together with human bones, have never been found.

Still less is known about *Gigantopithecus*. What, however, can be taken as certain is that the teeth come from the "Yellow Deposits" (TEILHARD DE CHARDIN, in his most recent publication, speaks of the "Red Earth of South China") of caves south of the Yangtse River, probably from Kwangsi Province. Whether the giants lived in caves, or whether their bones were carried there together with those of the animals found in their company, remains to be ascertained. *Pithecanthropus robustus* had already adopted the erect posture as the position of the occipital foramen indicates. The same may be supposed of *Meganthropus* and of *Gigantopithecus*. Whether they were vegetarians or eaters of flesh or preferred a mixed diet, is unknown; the character of their dentition does not give any special hint in this respect.

Regarding the geological age in which the early human types in Java and Asia lived, nothing more definite can be said than that they belong, at the latest, to the Middle Pleistocene. *Sinanthropus* and *Pithecanthropus erectus* were probably contemporaneous; both may have extended into the Lower Pleistocene. Whether *Pithecanthropus robustus*, *Meganthropus* and *Gigantopithecus* are geologically older, each in accordance with its morphological character, cannot be decided. All the finds of Java come from the Trinil beds which gives the impression of a rather uniform geological horizon. This, however, does not permit of any inference on simultaneity. The stratigraphical conditions indicate that Central Java was the scene of violent volcanic eruptions during the whole Pleistocene period. Cloud-bursts and torrents produced by this volcanic action scooped the deposits from the beds of rivers and lakes and carried the earth, together with the skeletal material embedded, over vast distances, and this may have happened repeatedly.

How long the Sino-Malayan faunal community was in existence, we do not know. It must have reached temporally back to the Pliocene and spatially to India. That some of their components (tapir and orang-utan) occur even up to the present testifies to the constancy of the fauna over long periods of time.

The much debated question as to the relation of the early human types to those of today has been brought closer to solution by these reported discoveries. The frequently advanced opinion which considered all forms preceding the *Homo-sapiens* phase as side branches of the human stem, led into blind alleys and turned out to be quite arbitrary claims, not verifiable by any conclusive morphological fact. A thorough analysis of the characteristic features of each known type has proved that none of them can be interpreted as a specialization leading away from the general line. On the contrary, each peculiarity of the recent human form can be traced back step by step to less "specialized" structures. The skeletons of the Mount Carmel population of Palestine give evidence that the Neanderthal type not become extinct, leaving behind no descendents, but has "survived" by transmuting into *Homo sapiens*. Features typical of the Neanderthal man combined with those characteristics of recent human forms occur in one and the same skull. In addition, some skulls have been found which resemble more the Neanderthal man and others which are more similar to modern man. The discovery of a paleolithic infantile skull in the Teshik-Tash cave in Southern Usbekistan, which represents an intermediate type like the Skhūl skulls from Mount Carmel, suggests that transmutation of Neanderthalians into *Homo sapiens* took place in Central and Western Asia. As far as Java is concerned, the evolutionary line runs from *Pithecanthropus robustus* to *Homo solœnsis* (Fig. 3, *d*), farther to the Wadjak man (DUBOIS' Proto-Australian), and ends in the Australian aborigine of today. A skull which can pass as a duplicate of the Wadjak man (KEILOR skull) came to light quite recently in Australia itself.

Not less than twelve specific features of *Sinanthropus* can be found again in certain living Mongolian groups. Also, the Rhodesian man is not a morphologically isolated type as was at first believed: the FLORISBAD and BOSKOP skulls link him with South African racial groups of today. All this indicates that early human forms have not disappeared without leaving descendents, and have continued somehow into modern mankind. Catastrophies may have annihilated many variations in the course of time, but man's tendency to migrate and interbreed prevented those more or less local events from discontinuing entire lines of evolution.

The problem of extinction is closely connected with the question of localization and date of human evolution. Some writers have regarded Africa, others Asia as "the cradle" of mankind, but almost all limit the origin of man to not earlier than Pleistocene. However, the known facts suggest that the human line branched off from the common primate stem much earlier, possibly already in the Miocene, and that the forms from which man originated were not restricted to a certain central area, but were spread over the greater part of the Old World. Evolution must have started wherever the conditions were favorable, and each line must have had its own special character from the outset. In other words, regional variations and differentiations (races) have always run parallel with evolution.

The idea that human races are a late product of human evolution which did not appear before the phase of recent man was reached, and, furthermore, the axiom that races were "pure" from the beginning and have deteriorated by crossing, are contrary to all available paleontological data. Races are not more constant than species; like the latter, they continuously change their character in the course of time.

Zusammenfassung

Die letzten Jahre haben eine Reihe wichtiger und unerwarteter Entdeckungen auf dem Gebiete der Paläoanthropologie gebracht. Sie kamen alle von Java und Südchina. Seit 1937 konnte kein neues *Sinanthropus*-material unserer Liste hinzugefügt werden, da die Japaner die Fortsetzung der Grabungen in Choukoutien nach ihrer Besetzung Nordchinas nicht gestatteten. Die Bearbeitung der alten Fundstücke bestärkte nur, daß *Sinanthropus* eine frühmenschliche Form ist, die in den Besonderheiten der Schädelform, der einzelnen Schädelknochen und des Gebisses weit unter allen bekanntgewordenen Typen des Neandertalmenschen steht. *Sinanthropus* ging aufrecht, war ein Jäger mit offenbar kannibalischen Neigungen, kannte den Gebrauch des Feuers und benutzte Steinwerkzeuge, solche, die er nicht weiterbearbeitete, und solche, die er für seine Zwecke zuschlug.

Den unermüdlichen Bemühungen Dr. G. H. R. VON KOENIGSWALDS vom Geologischen Landesdienst in Niederländisch-Indien verdanken wir es, daß in der Folgezeit neue frühmenschliche Typen in Java bekanntgeworden sind. Das ist zunächst eine Calvaria von *Pithecanthropus erectus*, die DUBOIS' Kalotte von Trinil in allen Einzelheiten gleicht, aber viel vollständiger ist, so daß der menschliche Charakter von *Pithecanthropus* über allen Zweifel erwiesen gelten kann. Dann kommt das Bruchstück eines Oberkiefers mit 10 sehr gut erhaltenen Zähnen *in situ*. Der Kiefer und die Zähne übertreffen an Größe alle bekannten menschlichen Oberkiefer, einschließlich die von *Sinanthropus*. Ausgesprochen äffisch sind ein weites Diastema zwischen Eckzähnen und seitlichen Schneidezähnen und eine vollständig glatte Gaumenfläche. Beide Besonderheiten sind bisher noch nie bei einer Form mit menschlichem Gebiß beobachtet worden. Der Gehirnschädel ist teilweise zusammengepreßt und die Knochen sind ineinandergeschoben, auch fehlt die ganze Stirn- und Obergesichtsgegend; jedoch genügt der erhaltene Rest, um den primitiven Charakter des Stückes zu erweisen. Ich habe neuerdings diese Form von *Pithecanthropus erectus*, dem wir sie zuerst zurechneten, getrennt und sie als *Pithecanthropus robustus* bezeichnet, um die außerordentliche Massigkeit der Schädelknochen zu betonen.

Daß wir es hierbei mit einem Typus zu tun haben, der zu riesigen Dimensionen neigt, geht aus der weiteren Entdeckung des Bruchstückes eines menschlichen Riesenunterkiefers hervor. VON KOENIGSWALD gab diesem völlig neuen Typus den Namen *Meganthropus palaeojavanicus*. Das Stück übertrifft den mächtigen Unterkiefer eines männlichen Gorillas bei weitem an Stärke und erreicht ihn in seiner Höhenausdehnung und den Ausmaßen der Zähne.

Doch selbst dieser Fund wird in den Schatten gestellt durch die Zahnfunde, die aus den Höhlen Südchinas stammen. VON KOENIGSWALD hatte schon vor einigen Jahren einen Riesenzahn beschrieben, den er *Gigantopithecus blacki* nannte, weil er den Typus für einen Menschenaffen hielt. Die Funde zweier weiterer und viel besser erhaltener Zähne derselben Art ließen es aber nicht länger zweifelhaft erscheinen, daß es sich nicht um einen Menschenaffen handelt, wie VON KOENIGSWALD glaubte, sondern um eine echte Frühmenschenform mit allerdings bisher unerhörten Dimensionen. Dieser Riese muß wohl die doppelte Größe eines Gorillas erreicht haben.

Da die primitiven Charaktere aller dieser Funde beinahe proportional zu ihrer Größe zunehmen, darf wohl gefolgert werden, daß die menschliche Entwicklungsreihe zu Riesenformen führt, je weiter sie zurückverfolgt werden kann. Ob es sich dabei um lokale Varianten oder um eine allgemeine Erscheinung handelt, kann vorerst nicht ausgemacht werden. Doch bestehen Anzeichen dafür, daß die letzte Alternative die wahrscheinlichere ist.

Über die geologische Datierung der Funde läßt sich zur Zeit nur soviel sagen, daß alle Funde von Java aus den Trinilschichten von Sangiran (Zentraljava) stammen und daß sie dem stratigraphischen Charakter der Schicht nach dem Mittleren Pleistozän zugerechnet werden müssen. Aber die Frage ist, ob sie alle gleich alt sind. Die Lagerstätten sind sicherlich sekundär. Offenbar haben wiederholte Umlagerungen stattgefunden als Folge vulkanischer Ausbrüche und ihrer Begleiterscheinungen, wie Wolkenbrüche, Schlammströme, Flußabriegelungen usw. Über die Kultur und Lebensgewohnheiten dieser Menschen ist nichts bekannt.

Die Riesenzähne von China kommen aus der «roten Erde» (Yellow Deposits), die charakteristisch für die Ablagerungen der Höhlen südlich des Yangtze sind und wohl sicher dem Unteren Pleistozän angehören.

Eine beinahe kontinuierliche Formenreihe führt von *Gigantopithecus* über *Meganthropus*, *Pithecanthropus*

robustus, *Pithecanthropus erectus*, *Homo soloensis* und Wadjakmensch zu den Australiern von heute. Sie stellt *eine* Linie der Menschheitsentwicklung dar. Eine andere, die noch sehr unvollständig belegt ist, hat wohl von *Gigantopithecus* über *Sinanthropus* zu gewissen Mongolentypen von heute geführt. Der Rhodesiamensch ist wahrscheinlich der Vorläufer von heutigen südafrikanischen Negerformen, mit denen er durch fossile Funde verbunden ist. In keinem einzigen Falle ließen sich bisher Spezialisierungen von solchen Ausmaßen und von solcher Bedeutung finden, daß die Annahme des Aussterbens irgendeiner dieser Linien gerechtfertigt wäre. Die Funde vom Berg Karmel in Palästina haben gezeigt, daß typische Neandertalformen durch Zwischenglieder mit *Homo sapiens* verbunden sind. Die Existenz einer im Zentrum der Alten Welt lokalisierten «Wiege» der Menschheit ist bisher nicht aufgezeigt worden. Weiterentwicklung und regionale Differenzierungen gingen vielmehr überall, wo Frühmenschen lebten, Hand in Hand. Die heutigen Menschenrassen entstammen solchen älteren Differenzierungen und ihren Vermischungen. Rassen können ebensowenig «rein» und «konstant» sein oder bleiben wie Arten.

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Zum Problem der menschlichen Stammesgeschichte

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Wenn heute das Problem der Menschwerdung wieder besonders aktuell erscheint, so sind dafür nicht nur die neueren paläontologischen Dokumente verantwortlich. Denn die fortschreitende Abklärung stammesgeschichtlicher und morphologischer Methodik (auf welche sich alle Phylogenetik stützt) muß ebenso wie die allgemeinen Ergebnisse der Evolutionsforschung Berücksichtigung finden, wenn es sich darum handeln soll, jenes Bild vom Werden des menschlichen Bion aufzubauen, das den heute vorliegenden Tatsachen als Arbeitshypothese am besten entspricht. Und dies gilt sowohl für die eigentliche «Stammbaumfrage» als auch für das «Faktorenproblem».

Die Verschiedenheit der Hypothesen, welche immer noch über Wege und Kausalität der Menschwerdung verfochten werden, läßt keine andere Deutung zu, als daß die evolutiven Bewertungen, welche die morphologischen Gegebenheiten durch die einzelnen Forscher erfahren, noch weit auseinandergehen. Die Ursache dieser Situation liegt in dem vorliegenden Mangel an Sicherheit und Einsicht über die methodologischen Prinzipien, ohne welche einwandfreie stammesgeschichtliche Forschung unmöglich ist. Wobei allerdings die kritische Anwendung jener Prinzipien gerade bei der Phylogenese der Hominiden besondere Schwierigkeiten bietet. Diese fließen vor allem aus der großen Diskrepanz, welche zwischen den ins Blickfeld gerückten taxonomisch-systematischen Übereinstimmungen des Menschen mit den Anthropoiden und seinen typenhaften Sonderheiten vorliegt. Es sind Sonderheiten, die sich nicht nur in jenem begriffsbedingt eigentätigen Handeln äußern, durch welches der Mensch aus seiner Umwelt die Welt der Kulturen aufbaut, sondern auch in einer Fülle biologischer und nicht zuletzt gestalthafter Eigentümlichkeiten, die damit in Korrelation stehen.

Bei den aktuellen Stammbaumtheorien geht die Diskussion in erster Linie darum, ob die Hominiden phyletisch mit einem mehr oder weniger genau definierten Anthropoidentypus verknüpft seien. So glaubt WEINERT (1933, 1941) an eine engere Blutsverwandtschaft des Menschen mit der Gorilla-Schimpanse-Gruppe, wobei er besonders Gewicht legt auf die Ähnlichkeit der aus den Siebbeinzellen entstehenden Stirnhöhlen, während W. K. GREGORY (1926, 1929) zur Ableitung der Hominiden aus einem dem miozänen *Dryopithecus* ähnlichen Anthropoidenstock sich hauptsächlich auf das Gebiß stützt. Nach ADLOFF (1927) dagegen würde das Gebiß vor allem wegen den Verhältnissen an den Canini und Prämolaren eine Ableitung der Hominiden aus Anthropoiden unmöglich machen. MORTON (1922, 1924) und O. ABEL (1931) führen die Menschheit auf stemmgreifkletternde Anthropoiden zurück, wobei sie sich weitgehend auf die vergleichende Anatomie der

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