

PRELIMINARY NOTE ON ADDITIONAL *SINANTHROPUS*
MATERIAL DISCOVERED IN CHOU KOU
TIEN DURING 1928. *

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WITH SIX PLATES AND TWO TEXT FIGURES.

In the course of the excavations continued by the Cenozoic Laboratory of the Geological Survey of China at Chou Kou Tien during the season of 1928 a new aggregation of *Sinanthropus* material has been discovered at the north eastern corner of the main deposit and at a level some ten meters above the stratum in which occurred the type lower molar tooth described last year. (Pal. Sin., Ser. D, Vol. VII, Fasc. 2, 1927). For convenience in reference the region in which this new material occurred may here be designated *Locus B*, the original *Sinanthropus* level being then termed *Locus A*. There can be no doubt as to the contemporaneity of these sub-localities within the main deposit nor of their geological age, the rich associated mammalian fossil fauna being identical in the two and typical of the Lower Quaternary (Pliocene) Age. (cf. Zdansky: Die Säugetiere der Quartärfauna von Chou Kou Tien. Pal. Sin., Ser. C, Vol. V, Fasc. 4, 1928).

The Chou Kou Tien field work, which this year has been ably carried on by Dr. Birger Bohlin, Dr. C. C. Yang and Mr. W. C. Pei, has resulted in the discovery and complete excavation of *Locus B*, and in the further extensive though not complete excavation of *Locus A*. A brief report on the 1928 field work has already been made before this Society at its Meeting of December 14, 1928.

Up to the present the following additional specimens undoubtedly referable to the genus *Sinanthropus* have been recovered from *Locus A*, either in the field itself or during laboratory preparation of material from this sub-locality:- the greater part of the right horizontal ramus of an adult lower jaw with three molar teeth in situ and having the premolar, canine and distal half of the lateral incisor sockets preserved; a somewhat worn right upper molar tooth (*M* 1 or *M* 2) showing definite evidences of injury during life; the labial side of the crown and portion of the root of a permanent upper median incisor; and immature lower (?) permanent incisor; and lastly the labial half of the crown and root of a worn lower median

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permanent incisor, posthumously crushed and deformed. These specimens are deeply pigmented and mineralized in a manner characteristic of all fossils recovered from Locus A.

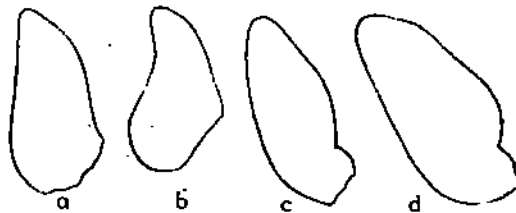
In contrast to the material from Locus A, no fossils from Locus B are deeply pigmented, most of them being quite white or of light buff color. For the most part they are imbedded in a hard yellowish travertine which in places has been very irregularly reduced to a clay-like consistency apparently as the result of weathering action. On account of the difficulty of working this matrix but a small part of the hominid material from Locus B has yet been prepared, but sufficient preliminary work has been done to warrant its definite reference to the genus *Sinanthropus*. A score or more of teeth both deciduous and permanent, representing many phases of wear and ontogenetic age, together with the complete symphysis region of the lower jaw of a very young individual have already been prepared. Though the greater part of the right ramus of the jaw of this immature specimen together with parts of the calvaria of both immature and adult individuals, are already partly exposed in various blocks of travertine, no description of this material will be possible until it is completely prepared. However, even at this early stage of the work, it is evident that despite the archaic structure of its lower facial region, *Sinanthropus* like *Boanthropus* was a large brained form, though unlike the latter the calvaria of *Sinanthropus* does not appear to be unduly thick.

Since many months must elapse before any adequate description of all this new material can be prepared, and since the morphology of the two jaw specimens in particular presents features of unusual interest, this preliminary report has been illustrated with line drawings, photographs and skiagrams of selected specimens from the material exhibited in the Geological Survey's Museum during these meetings.

The character of the material occurring in Locus B is illustrated by the two photographs reproduced here in Plate I. These have been selected from among the photographs taken as a routine during the course of preparatory work in the laboratory. The relation of the symphysis region of the immature *Sinanthropus* specimen to a fragment of an immature parietal bone is evident in Plate I, Figure 1. The jaw fragment here shown has subsequently been completely freed from the matrix and is briefly described in the paragraphs that follow. The adult parietal fragment illustrated in Plate I, Figure 2 though massive does not appear to be unduly so. It has evidently been subjected to considerable strain within its matrix and as a result is traversed by numerous fracture lines of varying width

and direction, the interstices of which are filled with a travertine of greater hardness than the fossilized bone itself.

In Text figure 1 the two diagraph tracings at the left represent normal variations in chin development within the genus *Homo* and each shows the characteristic morphology of the lingual surface of the symphysis within that genus. The complete absence of the mental prominence and the peculiar morphology of the lingual aspect of the symphysis in the genus *Sinanthropus* become evident at a glance. In *Sinanthropus* a genioid pit takes the place of the upper mental spines for the attachment of the genio-glossus muscles, the genioid tubercle below this depression is prominent and unpaired while the digastric depressions in this form differ markedly from those characterising any member of the genus *Homo*. Though the so-called ape-shelf is not extensively developed in this immature *Sinanthropus* jaw, the general architecture of the symphysis region makes it evident that the very generalized hominid dentition of this specimen is supported within a framework of a type which has heretofore only been encountered among forms having relatively formidable canines.

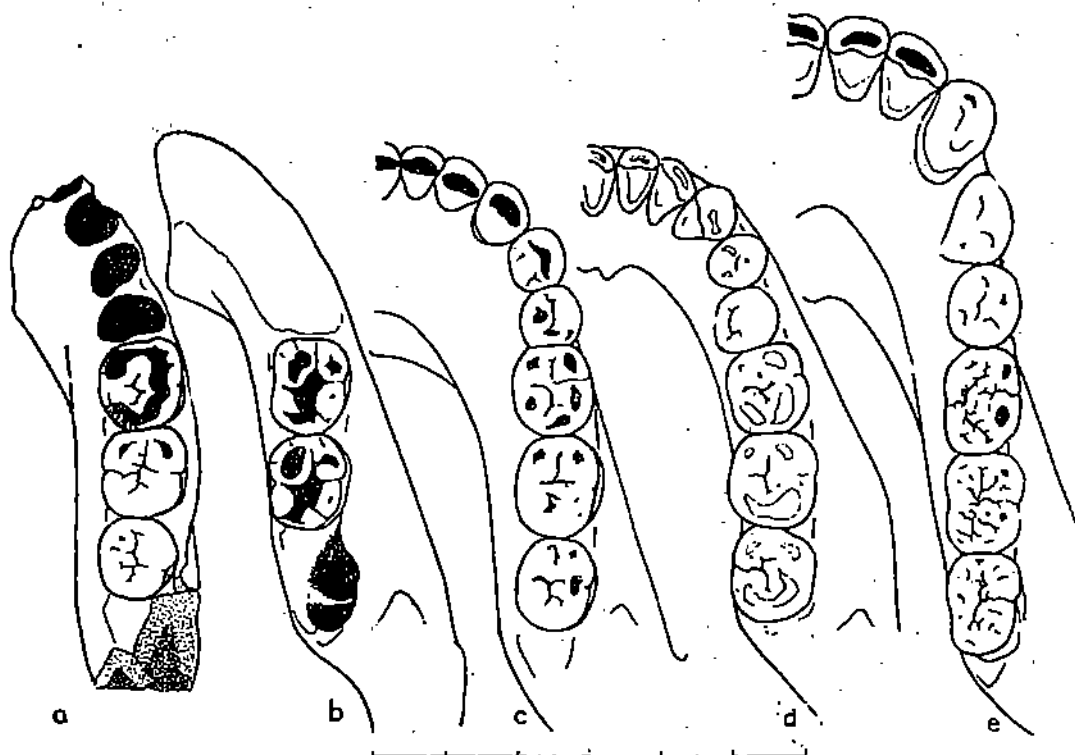


Text Figure 1. Mid-sagittal diagraph tracings of the symphysis mandibulae of various immature individuals in each of which the two deciduous and first permanent molar teeth were together functional. a, Copper Age child (*Homo* 404-11) from Kansu; b, recent North China child (*Homo* 44 5); c, *Sinanthropus*; d, chimpanzee. The specimens have all been similarly oriented, the place of the infradentale being indicated in each case by a short horizontal line. In a, b, and c, the permanent incisors are erupted and worn though their root apices are not completely formed; in d, the milk incisors are still in situ. Natural size.

The general morphology of the symphysis region of this immature jaw is illustrated in the photographs reproduced in Plates II. and III, where it is shown in comparison with jaws of various other forms of similar ontogenetic age. It may be noted here in parenthesis that the crown of the left milk canine of the young *Sinanthropus* specimen, that of the right milk canine and the crowns of the two milk molars are preserved together with the greater part of the right half of the

jaw in which are imbedded the corpus and roots of the first permanent molar and the whole of the unerupted second permanent molar. A very complete restoration of this important specimen will thus eventually be possible.

One of the most striking characteristics of the immature *Sinanthropus* specimen is brought out on comparison of the skiagrams of the symphysis region illustrated in Plate V. Figures 1, 2, 3, 4 and 5. Here it will be observed that though the roots of the permanent incisors in *Sinanthropus* are not fully formed, yet even at this ontogenetic stage they far exceed in length and stoutness those of the adult incisors of modern *Homo* and approach in these attributes the modern anthropoid condition.



Text Figure 2. Outline drawings traced from photographs of the right horizontal rami of various similarly oriented adult lower jaws, the molar occlusal plane in each being approximately horizontal. The drawings have been arranged for comparison with the mesial margins of the first molar teeth in the same transverse plane, the alignment of the lingual margin of the molar series in each case being approximately at right angles to this. a, *Sinanthropus*; b, *Moanthropus* (from cast); c, *Palaeoanthropus* s. *H. heidelbergensis* (from cast); d, recent North China male (*Homo* 39 ♂); e, adult female orang. Natural size.

In Text figure 2 the lower jaw fragment of the adult *Sinanthropus* specimen from Locus A is illustrated in comparison with drawings of similarly oriented adult jaws of other forms. The permanent molars in the *Sinanthropus* specimen though considerably worn display in their form and proportions the characteristic tooth morphology of the genus (cf. et. Plate IV, fig. 3). The form and size of the socket for the canine makes it evident that the root of this tooth in adult *Sinanthropus* was but slightly longer and more massive than those of the premolars. There is further a very evident diminution in the size of the molar teeth from before backward.

The general morphology of the adult *Sinanthropus* jaw fragment is further illustrated in the six photographs reproduced in Plate IV. and its massive structure becomes evident on examination of the fractured surfaces. Four mental foramina occur, the largest being situated slightly below the mid-point between the socket for the second premolar and the lower margin of the ramus which is uninjured in this region. Both roots of the first molar and the mesial root of the second give rise to corresponding elevations on the labial surface of the ramus. There is a well marked prominent and roughened area over the sites for attachment of the platysma and quadrangularis muscles, an area along the labial alveolar border being similarly produced over the buccinator line. The mylohyoid ridge is evident as far forward as the level of the first molar, at which point it lies close to the lower uninjured margin of the ramus. The occlusal plane of molar wear is tilted lingually in the case of the third molar, is approximately transverse in the second and becomes tilted slightly labially in the first molar. In the latter tooth the enamel has been split off the dentine at the mesio-lingual and disto-lingual angles, but a small part between these points remains intact. The other molar teeth are perfectly preserved.

The comparative series of skiagrams reproduced in Plate VI. serve to show the essentially hominid relations of the molar roots to the dental canal in *Sinanthropus* and at the same time to demonstrate the absence in this form of true taurodonty, except possibly in the case of the third molar. The roomy pulp cavities of the first and second molar teeth in *Sinanthropus* lie almost wholly above the alveolar margin though not quite to the same degree as obtains in *Boanthropus*. Further in Plate V. it is noticeable in the occlusal view skiagrams that in this orientation

* For the excellent photographs from which the plates illustrating this note have been prepared I am again indebted to Mr. Wang Ho-shan of the Photographic Bureau of the Peking Union Medical College.

the first molar tooth in *Sinanthropus*, as in *Eoanthropus* and anthropoids, does not lie almost vertically above the lingual margin of the jaw as usually obtains among adult members of the genus *Homo*, a relation which is also evident in Text figure 2.

In adult *Sinanthropus* the architecture of the jaw appears to be much less hominid than that of the teeth which it supports and, as in the immature specimen, represents a framework which till the discovery of *Eoanthropus* had been supposed to be associated only with anthropoid types of dentition. It can no longer be doubted that distinctive hominid teeth characters were evolved in the human family long before the architecture of the supporting jaw lost its anthropoid form.

It thus becomes evident that the conclusions based on the earlier study of the type lower molar tooth of *Sinanthropus* have been verified in detail and in addition it is now possible to state that in spite of the archaic structure of its lower facial region, *Sinanthropus* was a large brained form, probably having a cranial capacity well within the range of normal variation of this character in the modern genus *Homo*. On completion of the work of preparation and restoration, a full and adequately illustrated report on this new material will be published in Volume VII, Series D, *Palaeontologia Sinica*.

EXPLANATION OF PLATE I

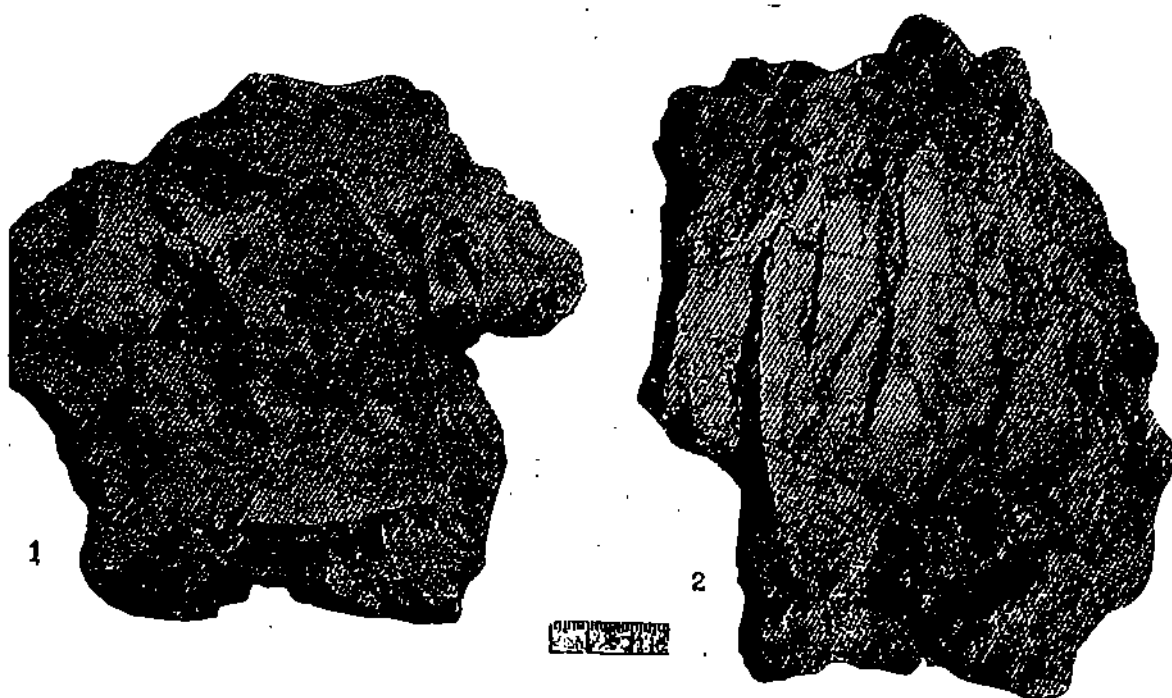
PLATE I.

Photographs of partly prepared specimens of *Sinanthropus* material in blocks of travertine from Locus B. Figures 2/3 x natural size.

Figure 1. The symphysis region of the immature *Sinanthropus* jaw described in the foregoing pages is here shown partly freed from the matrix of travertine and in its original relation to a fragment of the skull vault of an immature individual.

Figure 2. Skull fragment from the parietal region of an adult individual, partly exposed within a block of travertine. The specimen has evidently been distorted and fractured while in situ within the deposit, the slightly separated fragments being subsequently cemented together by a matrix of travertine much harder than the fossilized bone itself.

PLATE I



EXPLANATION OF PLATE II

PLATE II.

The symphysis fragment of the immature *Sinanthropus* jaw in comparison with the mandibular symphysis of other forms of similar ontogenetic age. The specimens here illustrated are those from which were drawn the diagraph tracings shown in Text figure 1. All figures natural size.

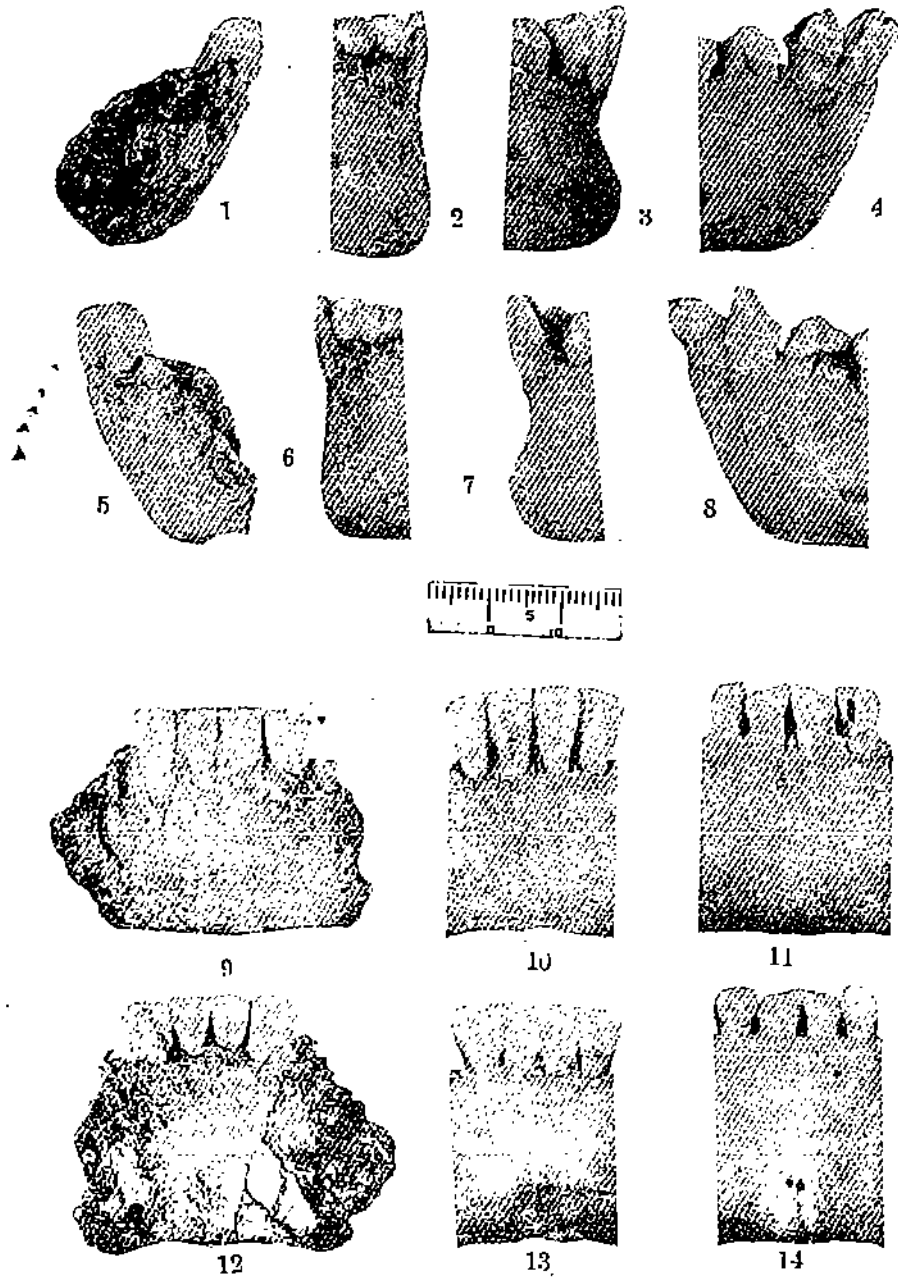
Figures 1, 5, 9 and 12. *Sinanthropus* juv., respectively right and left profile, labial and lingual views. The unerupted left permanent canine is to be seen on the fractured surface in figures 5 and 12; the unerupted right permanent canine also being exposed in figures 1 and 9 by the breaking through of the thin lamella of bone overlying its labial surface.

Figures 2 and 6. Copper Age child (*Homo* 404-11), respectively right and left profile views.

Figures 3, 7, 10 and 13. Recent North China child (*Homo* 44 0), respectively right and left profile, labial and lingual views. The left deciduous canine has been removed from the specimen.

Figures 4, 8, 11 and 14. Young chimpanzee (*Anthropopithecus* 18), respectively right and left profile, labial and lingual views.

PLATE II



EXPLANATION OF PLATE III

PLATE III.

The symphysis fragment of the immature *Sinanthropus* jaw in comparison with the mandibular symphysis of other forms of similar ontogenetic age. The specimens here illustrated are those from which were drawn the diagraph tracings shown in Text figure 1. All figures natural size.

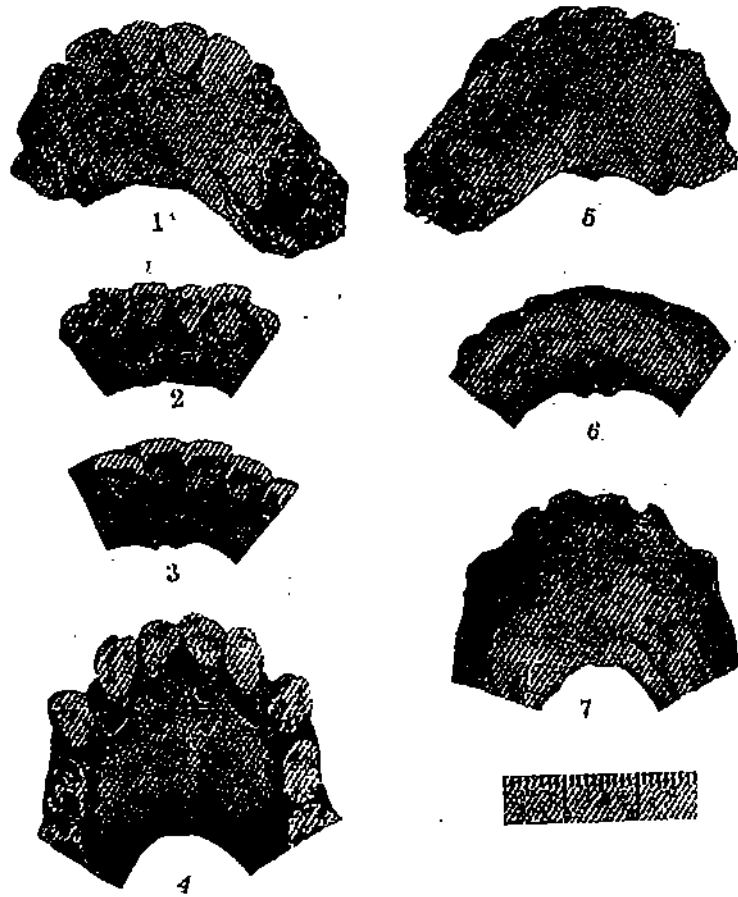
Figures 1 and 5. *Sinanthropus* juv., respectively occlusal and rameal views.

Figure 2. Copper Age child (*Homo* 404-11), occlusal view.

Figures 3 and 6. Recent North China child (*Homo* 44, ♂), respectively occlusal and rameal views.

Figures 4 and 7. Young chimpanzee (*Anthropopithecus* 18), respectively occlusal and rameal views.

PLATE III

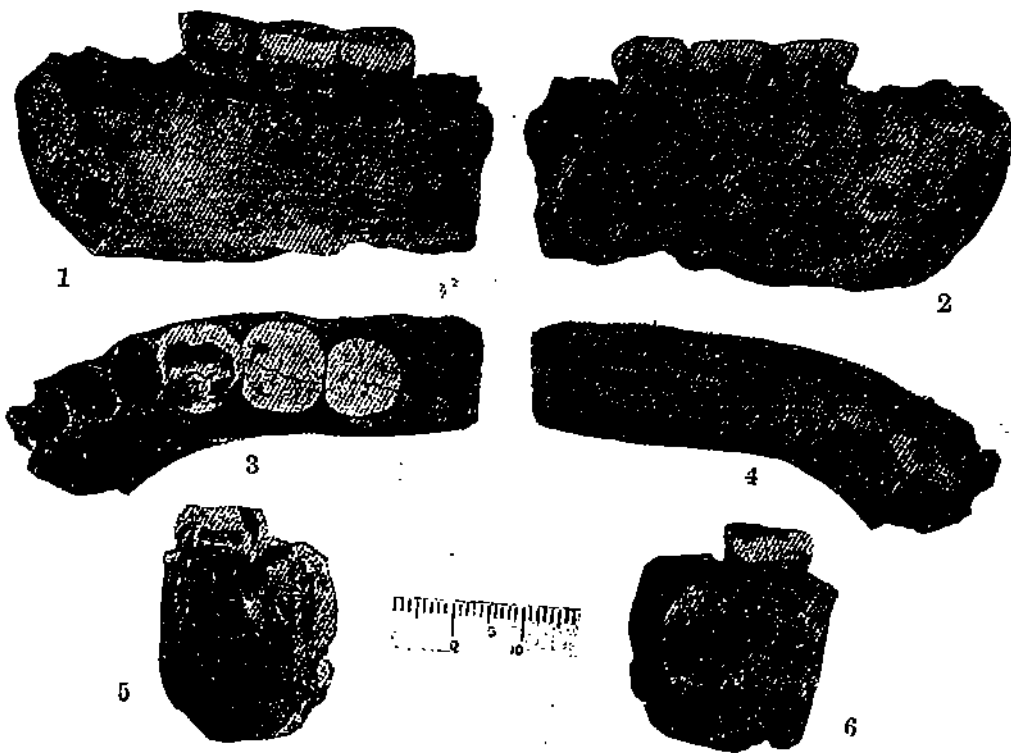


EXPLANATION OF PLATE IV

PLATE IV.

The six normae of the adult *Sinanthropus* jaw fragment. All figures natural size. 1, lingual view; 2, labial view; 3, occlusal view; 4, ramal view; 5, mesial view; 6, distal view.

PLATE IV



EXPLANATION OF PLATE V

PLATE V.

Skiagrams of *Sinanthropus* jaw fragments and comparative material. All figures natural size.

SYMPHYSIS REGION: (specimens in each case oriented with labial side resting on the film).

Figure 1. *Sinanthropus* juv.

Figure 2. Copper Age child (*Homo* 404-11).

Figure 3. Recent North China child (*Homo* 44 ♂).

Figure 4. Recent North China adult (*Homo* 69 ♂).

Figure 5. Adult female orang (*Simia* 247 ♀).

RIGHT RAMI IN OCCLUSAL VIEW: (specimens oriented in each case with the inferior border of the ramus resting on the film).

Figure 6. *Sinanthropus* adult.

Figure 7. *Eoanthropus*. (after Underwood, 1913, Brit. Jour. Dent. Sci., Vol. 56, pp. 650-652). In copying Underwood's figure for this comparison, its original orientation has been reversed to correspond with his description (q.v.) and to conform to the orientation adopted for the other occlusal view skiagrams reproduced here.

Figure 8. Recent North China adult (*Homo* 69 ♂).

Figure 9. Adult female orang (*Simia* 247 ♀).

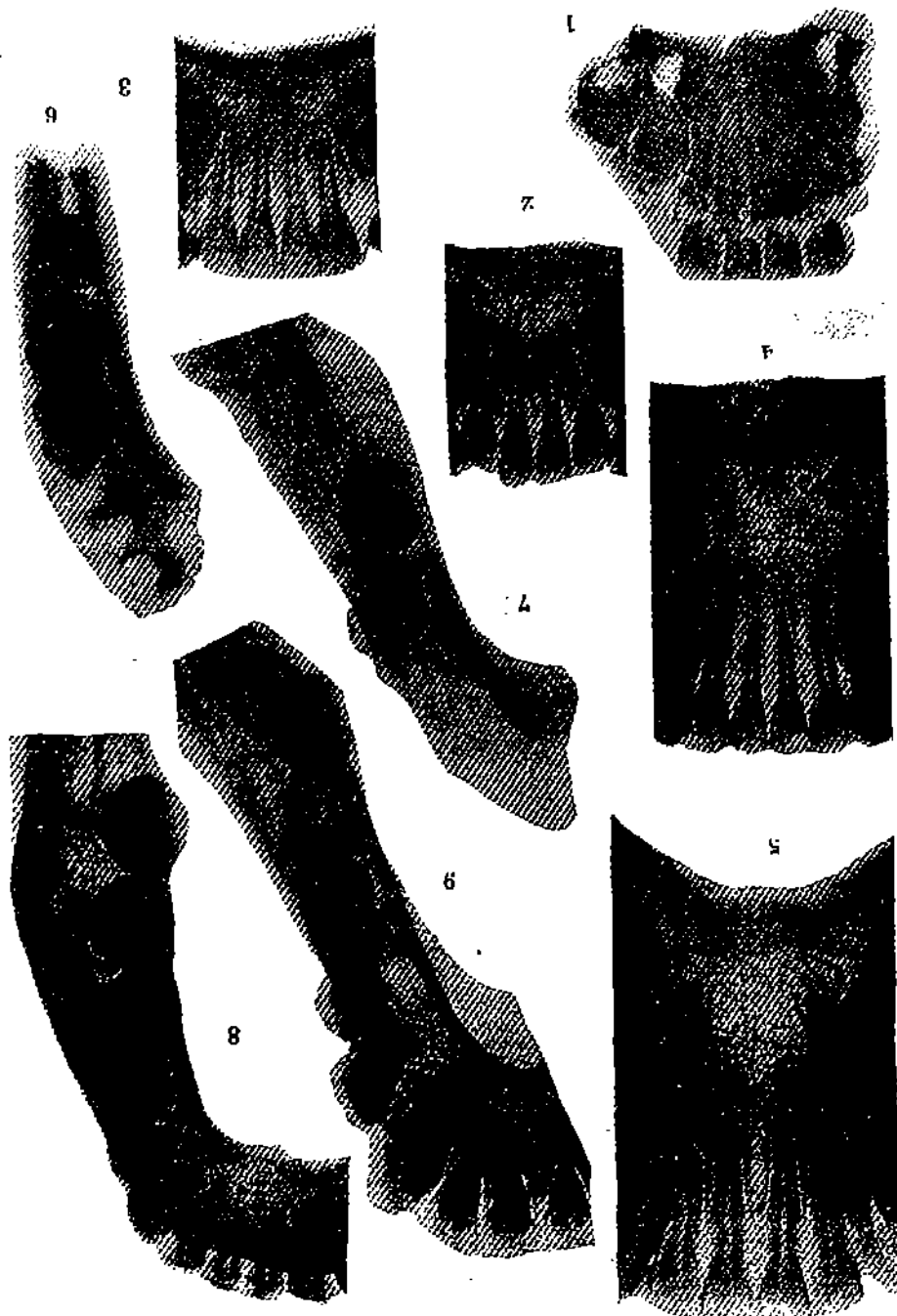


PLATE V

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EXPLANATION OF PLATE VI

PLATE VI.

Skiagrams of the adult *Sinanthropus* jaw fragment and comparative material. Specimens in each case have been oriented with the lingual surface of the ramus resting on the film.

Figure 1. *Sinanthropus* adult.

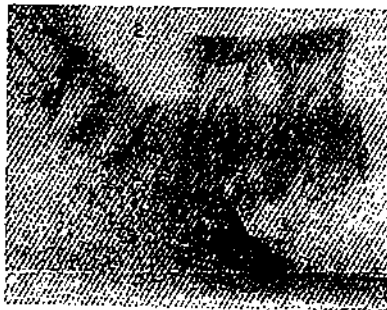
Figure 2. *Eoanthropus*. (after Underwood, l. c. supra).

Figure 3. *Palaeoanthropus* s. *Homo heidelbergensis*. (after Schoetensack, 1908, Der Unterkiefer des *Homo heidelbergensis*. Plate IX, Figure 33).

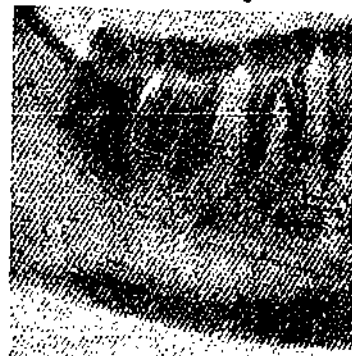
Figure 4. Recent North China adult (*Homo* 40 ♂).

Figure 5. Adult female orang (*Simia* 247 ♀).

PLATE VI



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