NEW DISCOVERY OF *SINANTHROPUS* MANDIBLE FROM CHOUKOUTIEN

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The excavation of 1959 in Choukoutien started at the middle of June. In July 6, a fragment of mandible was recovered *in situ* within the level 27 (upper part of layer 10) near the west entrance of the Kotzetang Cave of Locality 1. Another mandible fragment was found nearby in the same level. They were identified to be the right and left parts of the bodies of the mandible of *Sinanthropus*.

The right fragment represents the greater part of the body. The front end is broken off in an oblique line running from the alveolar border in the region of I_2 to the lower margin of the jaw body in the level of the second premolar.

The left fragment comprises the frontal part of the lower jaw and the nearly complete left body. The line of the broken surface runs from the alveolus of the right lateral incisor in oblique direction to the lower margin in the region of the left lateral incisor.

Both fragments were of grayish white color and moderately fossilized. They apparently represent a single jaw specimen.

The roots of the medial incisors were retained in their sockets. The left first molar is preserved *in situ* and strongly worn. Its crown is damaged and the lingual half has broken off. The socket of the left lateral incisor has been completely fused and the tooth was apparently lost before death. All other teeth are missing but the alveoli are well preserved, with the exception of those of the last molars of both sides and the left lateral incisor and canine which are broken off.

Judging from the smaller general size of the specimen and the smaller height of the body just in front of the mental foramen which is 26.9 mm, it clearly belongs to the small type. Thus we attribute it to the female sex.

As the molar tooth retained was strongly worn and the alveolus of the left lateral incisor was completely fused, the individual was apparently of old age.

The greatest thickness of the specimen in the region of the first molar on the right side is 18.0 mm and on the left side is 18.8 mm, and in the region of the second molar on the right side is 18.2 mm and on the left side is 19.0 mm.

According to Weidenreich, the sexual difference in thickness of the mandibles is evident though not so great as the height. He reported that the greatest thickness in the region of M_1 in mandible of male sex is 17.3 mm, while that of female sex is 15.4 mm, 14.9 mm or 15.7 mm respectively. In the present specimen, the thickness of

the mandible even exceeds that of the male sex reported by Weidenreich. Thus this thickness does not seem to reveal sexual difference.

The relief of the lateral surface of the present specimen is much less differentiated than in the female mandible H1 of *Sinanthropus* described by Weidenreich in 1936. This may be due to the greater robustness of the jaw, especially its great thickness. The prominentia lateralis is fairly developed. It is more distinct on the left side. It extends downward and forward from the external wall of the third molar and divides into two branches. The upper branch, called by Weidenreich the torus lateralis superior, extends forward and ends on the jugum of the canine, and the lower branch, called by Weidenreich the torus marginalis, extends downward to the lower margin. Both branches do not rise to any extent above the general surface. There is a shallow depression, the sulcus intertoralis, between the two branches.

Weidenreich reported that the multiplicity of the foramen mentale is a rather striking characteristic feature of *Sinanthropus*.

In the present specimen the right side has four foramina arranged in two oblique lines with a thickened area between them at the anterior end of the torus lateralis superior in level with the interalveolar septum of C, P_1 and P_2 respectively. The two lines are sloping downward and backward. The lower foramen situated on the front line is the largest. It is interesting to note that the apertures of both foramina on the front line face forward, while those on the hind line face backward. The distance between the foremost and the last is 12.3 mm, that between the uppermost and the lowest is 7.4 mm. The lowest foramen is at a distance of 13.5 mm from the lower margin, the uppermost is 19.0 mm away from this margin.

On the left side there is one large foramen situated in line with the septum between P_1 and P_2. Its center is 15 mm above the lower margin and 12 mm from the upper alveolar border. The aperture of the foramen faces backward. Directly below the large foramen is a very small one. It is 9 mm from the lower margin and its aperture faces downward. The multiple occurrence of the foramen seems to be a pithecoid character.

The mental foramina of the present specimen on both sides are lying in line with P_1 or the septum between P_1 and P_2 and are slightly anterior in position than those reported by Weidenreich. Besides, all foramina except the smallest one of the left side are situated above the mid-line between the upper alveolar margin and the lower margin of the jaw. This is a hominid character.

On the internal surface of the lateral part of the specimen, the alveolar prominence is well developed and projects considerably inward. The fossa subalveolaris is very distinct, but the transition from the prominence to the fossa occurs gradually.

The internal surface of the alveolar process of the left half of the mandible has a moderate oval swelling or torus mandibularis located on the inner side of P_2. The same formation exists on the right half. This apparently belongs to the "tubercle type" of Weidenreich.

The significance of the torus is still disputable. It is probably a kind of strengthening structure of the jaw and is correlated with its actual robustness.

The robustness of the body of the mandible can be expressed by the index or proportion between the height and thickness of the mandible in the level of the foramen mentale. The indices for the present specimen are given in table 1. Thus *Sinanthropus* has a much higher index of robustness than the Neanderthal group (average index 49.7) and recent man (average index 41.3).

Table 1

The robustness index of *Sinanthropus* mandible

Side	Height (mm)	Thickness (mm)	Index
Right	26.2	16.7	63.7
Left	27.1	16.5	60.9

Another striking character of the *Sinanthropus* mandible is the parallelism between the alveolar and basal planes. This phenomenon is also found in gorilla and orang but not in recent man.

The lower margin of the body gradually becomes thicker from the posterior end forward and attains the greatest diameter in the level of P_1. The decrease beyond this mark is very slight. In recent man it attains the greatest diameter in the level of M_2 and then decreases gradually up to the level of P_2 and reverses to a slight increase in the frontal part. In anthropoids, the first thickening is kept without any limitation and continues to the far projecting frontal part.

The anterior (labial) surface of the frontal part between the alveolar juga of both canines of the specimen show very faint indication of the trigonum mentale. The lower margin and the inner surface of this part are largely broken off and no fundamental difference can be observed between *Sinanthropus* and modern man.

The angle of inclination of the frontal part was determined by the alveolar line and the incision-gnathion line. The alveolar line is traced from the incision to the most salient point of the alveolar border between the second and third molars. The angle of the present specimen is 63°.

This angle is very acute in anthropoids and approaches right angle in modern man. It indicates the gradual transition from prognathism to orthognathism in the frontal part.

The alveolar arch of *Sinanthropus* mandible differs from that of anthropoid on the one hand and from that of modern man on the other. Its frontal part forms an evenly rounded off curve. In recent man the frontal part of the alveolar curve is more or less flattened so that it runs in almost a straight line from the canine of one side to that of the other. In anthropoids it is still more pronounced, with the canine angle pro-

jecting sharply in consequence of the tusk-like canines and forms a rather rectangular figure.

The anterior alveolar arch has a length 32.5 mm, breadth 55.0 and an index 59.1. It is evident that the anterior alveolar arch of *Sinanthropus* is comparatively narrower than that of recent man.

The basal arch of the mandible in *Sinanthropus* falls considerably behind the outer contour of the alveolar arch. In anthropoids, it lies even much more behind the outer contour than that of *Sinanthropus,* whereas in modern man it is located before this contour.

As a whole the *Sinanthropus* mandible presents many primitive features, such as the bulkier mandibular body, the strong backward inclination of the frontal part, the relatively longer and narrower alveolar arch with well rounded anterior part, and the parallelism between the alveolar and basal planes. It is more primitive than all Neanderthals including the Heidelberg jaw. Hence it is one of the most primitive hominid type hitherto known.

As the world-famous *Sinanthropus* remains uncovered before the liberation in 1949 were all disappeared during World War II in American hands in Peking, the new discovery of *Sinanthropus* mandible has especial significance in anthropology and is of great value for researchers.

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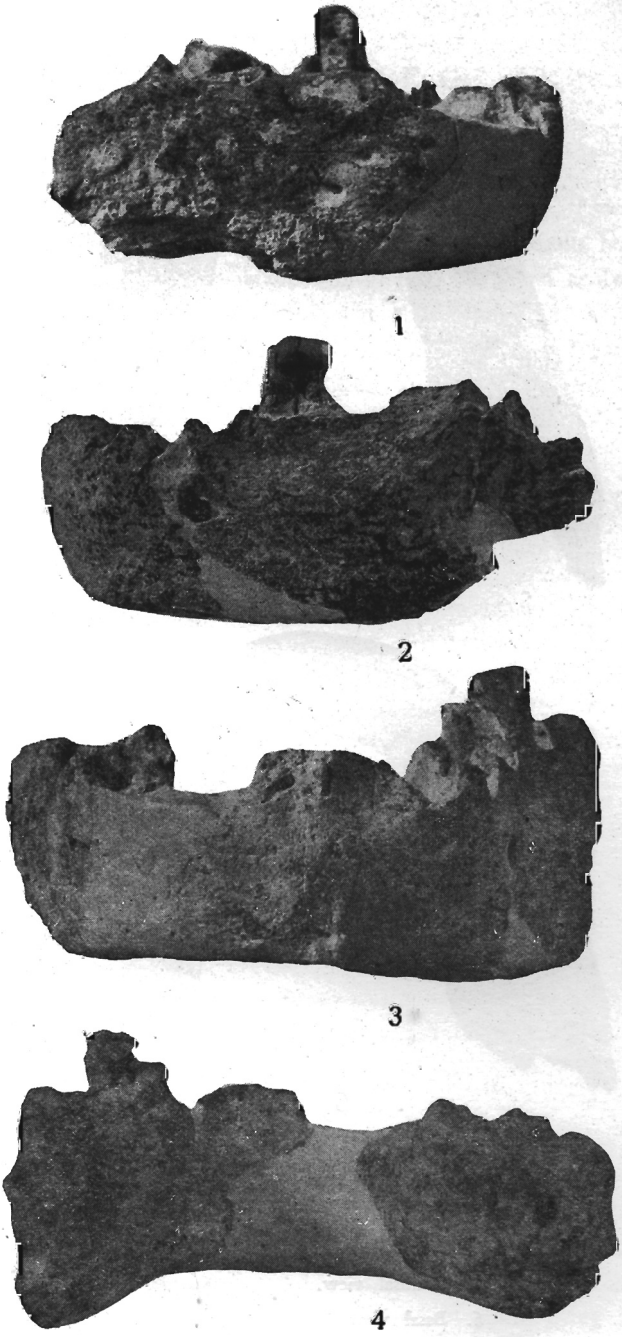

Sinanthropus mandible × 1/1

1. Right side view.
2. Left side view.
3. Viewed from front.
4. Viewed from behind.

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Sinanthropus mandible × 1/1

5. Occlusal view.
6. Basal view.