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A NOTE ON THE TEETH OF MEGANTHROPUS AFRICANUS WEINERT FROM TANGANYIKA TERRITORY

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A fossil member of Hominidae from the Serengeti district of the Tanganyika territory, discovered by Kohl-Larsen in 1939, had been in 1948 referred to as *Praeanthropus* by Hennig,[1] but was subsequently labelled *Meganthropus africanus* by Weinert of Kiel University[2]. Weinert, in this study, in which he contrasted the remains from East Africa only briefly with the corresponding parts of recent man and the lower jaw of *Meganthropus*,[3] attributed the African form to the same genus with *Meganthropus palaeojavanicus* von Koenigswald, first described by the late Weidenreich,[4] from the Djetis beds of Java.[5] The teeth of this form from the Laetolil beds[6] of

[1] Hennig, 1948, p. 214.

[2] Weinert, 1950, p. 139.

[3] *Ibid.*, Pls. XII - XIV and Pl. XV, fig. 1.

[4] Weidenreich, 1945, p. 34.

[5] von Koenigswald, 1949, p. 97; von Koenigswald, 1950, pp. 59-60; Movius, 1949, pp. 21-22. von Koenigswald (1949, p. 97) attributes The *Djetis* fauna to the Lower Pleistocene, while Hooijer places *Kali Glagah* and *Tjidjoelang* faunas, in descending order, below the Djetis fauna as representing still earlier phases of Pleistocene in Java, since these faunas include *Archidiskodon* (see Hooijer, 1951, pp. 272 and 274; 1952, p. 441).

[6] Oakley, 1954, p. 15.

Tanganyika territory, were afterwards described and compared in detail by Remane,[7] who also kept the name coined by Weinert, viz., *Meganthropus africanus* Weinert.

Subsequently, in 1953, Robinson, the able successor of the late R. Broom at the Transvaal Museum in South Africa compared P^3 and P^4 of *Meganthropus africanus* Weinert with the corresponding teeth of Australopithecinae.[8] In this study Robinson stated in conclusion: "*In my opinion* 'Meganthropus' africanus *is an australopithecine, which is almost certainly more closely related to the South African forms than to* M. palaeojavanicus. *There seems to be no justification for referring it to the genus* Meganthropus. *If it is to be referred to an already existing genus then* Plesianthropus *is the obvious choice. However the available material is too scanty to allow of certainty in referring it to any known genus. There seem to be no important features about the specimen differentiating it from* Plesianthropus *but this does not mean that additional material would not bring such differences to light. It is quite probable that additional specimens would show that the species should be placed in a new genus, but coining a new generic name at this stage seems to me unwise and, in fact, unjustifiable as the known specimen cannot be satisfactorily distinguished from* plesianthropus. *It seems wiser to leave the baptism of this type until more specimens are available. The chief importance of the specimen lies in the fact that it proves that the australopithecines were not confined to southern Africa. This is additional support for the proposition that the australopithecines were at one time a widely distributed group.*"[9] In a note published in 1954, Remane

[7] Remane, 1951, p. 311.

[8] Robinson, 1953, pp. 1-9.

[9] Ibid., p. 9. von Koenigswald (1954, p. 85) also agrees with this conclusion of Robinson. In his recent study von Koenigswald (1954, p. 85) states: "*We agree with ROBINSON that Meganthropus africanus, collected by KOHL-LARSEN in East Africa has nothing to do with our javanese form and rather belongs to the Australopithecinae. Of this species only the fragment of an upper jaw containing the two premolars is known (a molar of normal size referred to the same species had better be excluded); because of the large size WEINERT attached the name Meganthropus to this find, but of the type species no upper premolars are known. The view that the specimen in question might belong to an Australopithecinae, has already been expressed earlier: first by W. ABEL (vide: L. KOHL-LARSEN, 1943), later by TEILHARD DE CHARDIN (1952, p. 347) and the present author (von KOENIGSWALD, 1953, p. 132). In this case a decision might be possible, as all Australopithecinae have only two roots on the first upper premolar, while in Pithecanthropus modjokertensis the same tooth still has its original three roots and we might expect the same condi-*

replied, although he does not specifically state so, to Robinson.[10] In this newer study Remane insists on his earlier conclusion and states: "Meganthropus africanus *is a very primitive hominid, who in structure of the premolars is nearer to the pongids than is any other hominid known till now. The determination of the relationship to the other Hominidae of the Pleistocene is difficult. The resemblances with the South African hominids* Plesianthropus, Australopithecus and Paranthropus *are not very distinct.*"[11] Further on he adds: "*Robinson's newly published paper* ('53) *gives a detailed description of the* P^3 *of* Plesianthropus *and comes to the conclusion that this tooth is very near to that of* Meganthropus africanus (*fig. 3*). *But there is no antero-exterior extension of the buccal surface in* Plesianthropus; *the main cusp is lower. I doubt whether the more pongid premolars of* Meganthropus africanus *are the same species as* Plesianthropus."[12]

In a more recent study on the classification of the known forms of Australopithecinae, Robinson has eliminated the genus *Plesianthropus* Broom and has placed it in genus *Australopithecus* Dart, which he considers includes only one species, viz., *Australopithecus africanus* Dart.[13] In this new study Robinson includes *Meganthropus africanus* Weinert in *Australopithecus africanus* Dart, placing it together with *Australopithecus prometheus* Dart and *Plesianthropus transvaalensis* Broom in the subspecies *Australopithecus africanus transvaalensis*, while putting the original find from Taungs, described by Dart in 1925,[14] in the

tion in Meganthropus s. str." Unfortunately W. Abel's (1943) and Teilhard de Chardin's (1952) studies are unavailable to me. However, regarding W. Abel's (1941) ideas, von Koenigswald (1953a, p. 132) states: "*W. ABEL* [*25*] *hat in diesem Funde seinerzeit einen* Australopithecus *vermutet, und in der Tat lässt die Grösse der Kronen, die Kürze der Wurzeln und die beim zweiten Prämolaren noch deutlich zu erkennende angedeutete Dreiwurzlichkeit sehr an solche Formen denken.*"

[10] Remane, 1954, p. 123.

[11] *Ibid.*, pp. 124-125.

[12] *Ibid.*, pp. 125-126.

[13] Robinson, 1954b, pp. 196 and 199. Regarding *Australopithecus*, Robinson (1954b, p. 199) states: "Australopithecus *contains a single species with two subspecies, containing the specimens from Taungs, Sterkfontein, Makapan and East Africa.*" In this connection it is also of interest to recall that the late Broom had originally named the Sterkfontein form *Australopithecus transvaalensis* and then changed its name to *Plesianthropus transvaalensis* in 1938 (see Broom, 1938, p. 377).

[14] Dart, 1925.

subspecies *Australopithecus africanus africanus.* [15] Regarding *Meganthropus africanus* Weinert, however, Robinson makes the following reserved statement: "*The so-called* Meganthropus africanus *of Weinert, known only from a fragment of maxilla containing* P^3 *and* P^4*, cannot be distinguished from the Sterkfontein apeman (see Robinson, '53) and therefore falls into the same subspecies as the latter on present evidence. As it comes from central Africa it may well be representative of another subspecies or even species. Until further material is available it cannot legitimately be given separate status.*"[16]

As my interest in the fossil members of Hominidae from Africa goes back to 1940 and 1941 [17] I have felt a keen interest in the remains found by Kohl-Larsen, the discoverer of the remains of *Africanthropus njarasensis* Weinert, [18] in the region of Lake Eyasi (Njarassa-See) in 1939. I have compared the drawings and measurements published by Remane, [19] with the teeth of anthropoids, Australopithecinae and fossil hominids. This study has led me to the conclusion that the teeth attributed to *Meganthropus africanus* Weinert, as already has been concluded by Robinson[20] and von Koenigswald,[21] do not at all belong to *Meganthropus* represented by *Meganthropus palaeojavanicus* von Koenigswald from the Djetis beds of Java,[22] but comes nearer to Australopithecinae of South Africa, representing, however, in contrast to the conclusion of Robinson,[23] a genus distinct from *Australopithecus* and *Paranthropus.*

[15] Robinson, 1954b, p. 196. In this new study Robinson (1954b, p. 196) also includes *Paranthropus crassidens* in the species *Paranthropus robustus* Broom, regarding it as a separate subspecies of this species and considers *Meganthropus palaeojavanicus* von Koenigswald as the second species of genus *Paranthropus* Broom. The two subspecies of *Paranthropus robustus* Broom are named by Robinson (1954 b, p. 196) *Paranthropus robustus robustus* and *Paranthropus robustus crassidens.*

[16] Robinson, 1954b, p. 195.

[17] See Şenyürek, 1940 and 1941.

[18] See Weinert, 1939, p. 253.

[19] Remane, 1951, figs. 1-3 and Remane, 1954, figs. 1-3.

[20] Robinson, 1953, pp. 8-9.

[21] von Koenigswald, 1954, p. 85.

[22] On this occasion I wish to express my gratitude to my good friend Dr. von Koenigswald of Utrecht University, The Netherlands, for allowing me to study the remains of *Meganthropus* and *Pithecanthropus* from Java and *Gigantopithecus* from China, while he was working in the American Museum of Natural History of New York in 1947.

[23] Robinson, 1954b, p. 196.

The results of this comparative study are given below. As the photographs and drawings of the teeth attributed to *Meganthropus africanus* Weinert have been published by Weinert [24] and Remane [25] no pictures of this form are reproduced here. Furthermore, in this paper, although I consider the classification of South African Australopithecinae given by Robinson to be basically sound, in order to prevent confusion, instead of the new names utilized by Robinson, [26] the earlier names of the fossil forms are employed.

THE TEETH THAT HAVE BEEN ATTRIBUTED TO MEGANTHROPUS AFRICANUS WEINERT

Weinert [27] and Remane [28] have attributed to *Meganthropus africanus* Weinert, represented by a fragment of right maxilla including P^3-P^4 and the alveolus of C^1, an isolated left M^3 discovered either 6 or 3 kilometers away from the maxilla fragment.[29] Regarding this isolated M^3 Remane states: "*Dass die beiden Fundstücke zur gleichen Form (Spezies) gehören, dürfte sicher sein; ob sie zum gleichen Individuum gehören, lässt sich nicht entscheiden und ist von geringer Bedeutung.*" [30] However, as this isolated M^3 was found 3 or 6 kms. away, the question as to whether it belongs to the same individual or not is really out of consideration, as it cannot be attributed to the same individual with the maxillary fragment. [31] Robinson, who eliminates this tooth from consideration, states regarding it: "*This tooth is therefore not considered in this discussion (a) because it is too worn to be of much diagnostic value, and (b) because it is by no means certain, color and specific gravity notwithstanding, that it does belong to* M. africanus." [32] However, it is evident that we are dealing here with a geologically ancient M^3 which, as is attested by the flat attrition plane on its

[24] Weinert, 1950, pls. XII, XIII, XIV and pl. XV, fig. 1.

[25] Remane, 1951, figs. 1-4 and 1954, figs. 1-3.

[26] Robinson, 1954b.

[27] Weinert, 1950.

[28] Remane, 1951 and 1954.

[29] As is correctly noted by Robinson (1953, p. 7), Weinert gives this distance in the same paper as both 6 and 3 kilometers (see Weinert, 1950, p. 139 and p. 141).

[30] Remane, 1951, p. 311.

[31] See also Robinson, 1953, p. 7.

[32] *Ibid.*, p. 7.

chewing surface, [33] belongs to an early member of Hominidae. Thus, this tooth and the question of its affinities deserve some attention.

Regarding the geological age of *Meganthropus africanus* Weinert, Remane stated: "*Geologisch gehören sie an die Grenze Tertiär-Diluvium. E. Hennig setzt sie in seiner 1948 veröffentlichten Tabelle in das obere Pliocän.*"[34] In a recent study Oakley, the famous British geologist, makes the following statement on the age of the Laetolil beds: "*The Laetolil Beds have been correlated with Olduvai Bed I (Hopwood, in Leakey, '50, 23), but since their fauna indicates a drier biotope, and since they contain pebble-tools of a more primitive type (Kent, '41, 178), it is possible that they are slightly older and really of about the same age as the Sterkfontein breccia.*" [35] If Oakley's equation of the Laetolil beds with Sterkfontein breccia is correct, then the remains attributed to *Meganthropus africanus* Weinert would belong, according to Oakley's table, [36] to the later part of the Kageran stage in Africa, corresponding roughly to the upper part of Villafranchian stage of Europe. [37] If this attribution by Oakley is correct, then the remains attributed to *Meganthropus africanus* Weinert would belong to the upper part of the Lower Pleistocene, as now Villafranchian is generally included in the Lower Pleistocene, and would correspond in a general way to the Djetis beds of Java, [38] containing the remains of *Meganthropus palaeojavanicus* v. Koenigswald and *Pithecanthropus modjokertensis* (v. Koenigswald). [39]

[33] See Remane, 1951, fig. 4.

[34] *Ibid.*, p. 311, See also Hennig, 1948, p. 215.

[35] Oakley, 1954, p. 16. Unfortunately Leakey's (1950) and Kent's (1941) reports, cited by Oakley (1954), were inaccessible to me.

[36] Oakley, 1954, Table 1.

[37] See *ibid.*, p. 17.

[38] See Oakley, 1954, p. 19. Regarding the time relations of *Pithecanthropus* and *Australopithecinae* von Koenigswald (1953b, p. 405) states: "*We have reason to suppose that the oldest Pithecanthropus-types and the Australopithecinae are of about the same age.*" Regarding the time relation of Djetis beds of Java with the Kageran beds of Africa, Oakley (1954, p. 19) states: "*The Djetis Beds are of Upper Villafranchian age, and therefore broadly contemporary with the Kageran beds of Africa.*"

[39] See von Koenigswald, 1949, p. 97 and 1950, p. 59; Oakley, 1954, p. 19.

The Maxillary Fragment:

Remane states regarding this maxillary fragment: "*The premolars of* Meganthropus africanus *now are obviously intermediate between those of the Pongidae and those of the other Hominidae. The* P^3 *has three roots, as have the Pongidae in the most cases, but this is very exceptional in the Hominidae. The roots of* P^4 *are, as far as may be recognized, intermediate between two roots and three roots. The antero-interior extension of the buccal surface is more evident than in the premolar of any known other hominid, and the differences between* P^3 *and* P^4 *are also more evident than in the other Hominidae. The placing of* Meganthropus africanus *in the Hominidae is demonstrated by the crests and ridges of the enamel, the lowered point of the principal cusp and the alveolus of the canine, which demonstrates the existence of a smaller canine than in the Pongidae.*"[40] Regarding the estimated length measurement of the upper canine of which only the alveolus is retained, Remane states: "*Für seinen mesiodistalen Durchmesser gibt die Schlifffläche am P3 einen Ausgangspunkt. Unter Berücksichtigung der Alveolenlage kommt man auf ein Mindestmass von 10 mm (wahrscheinlich 11)*".[41] The mesio-distal measurements of the upper canines of the living great anthropoids and some members of the Hominidae are listed in Table I.

The figures listed show that the length (mesio-distal diameter) of C^1 of *Meganthropus africanus* Weinert is smaller than the minima of male *Pongo*, *Gorilla* and *Pan*. It is also below the minimum length of female *Gorilla* given by Remane.[42] The absolute length of the upper canine of *Meganthropus africanus* Weinert is smaller than the minimum of female *Pongo* in my series, but is near the minimum for female *Pongo* measured by Remane[43] and Hooijer.[44] The absolute length of C^1 of *Meganthropus africanus* Weinert is also in the range of female *Pan* measured by me.[45] However, in this connection I would like to point out that my series of female chimpanzees in-

[40] Remane, 1954, p. 124.

[41] Remane, 1951, p. 315.

[42] See Remane, 1921, Table IV.

[43] *Ibid.*

[44] Hooijer, 1948, Table IIB.

[45] The minimum given for female *Pan* by Remane (1921, Table IV) is 10.1 mm., which is slightly higher than the smallest value in my series.

cludes a specimen of *Pan schweinfurthi* (C^1 length=10.0 mm.), which is a small species, and a specimen of *Pan paniscus* (C^1 length=9.7 mm.) which is a still smaller, dwarf species.[46] In the relatively larger species, *Pan satyrus* in my series the minimum length of the upper canines in the females is 11.2 mm., which is near but slightly larger than that of *Meganthropus africanus* Weinert.

The mesio-distal diameter of the upper canine of *Meganthropus africanus* Weinert is considerably smaller than that of the canine attributed to *Gigantopithecus blacki* v. Koenigswald, whose precise systematic position is still unsettled. In length the upper canine of *Meganthropus africanus* Weinert comes near to that of male *Plesianthropus transvaalensis* Broom, but exceeds those of *Pithecanthropus modjokertensis* (v. Koenigswald), *Africanthropus njarasensis* Weinert and the average of *Sinanthropus pekinensis* Black, although the maximum of the latter comes near to it. Furthermore, it exceeds in absolute length, the maxima of all the recent races listed.

From the account given above it is clear that in absolute length of the upper canine the ranges of the hominids and some anthropoids, particularly the female anthropoids, overlap to some extent. In view of this, for the determination of the systematic position of a fossil form, such as *Meganthropus africanus* Weinert, the size of the canine relative to those of the other teeth is of greater taxonomic value, as the anthropoids, irrespective of the differences in the body sizes of the various genera and species, have relatively larger canines and the hominids comparatively smaller canines.

The length of C′ relative to those of P^3 and P^4 are listed in Table 2. From this table it is seen that the relative length of C′ of *Meganthropus africanus* Weinert is far below the minima of the male and female anthropoids, and is clearly on the hominid side. In these indices *Meganthropus africanus* Weinert also falls far below those of female *Pan schweinfurthi* and *Pan paniscus*.[47] In short it can be stated

[46] See Coolidge, 1933, p. 55.

[47] These indices in one specimen of female *Pan schweinfurthi*, one female *Pan paniscus* and the minima of female and male *Pan satyrus* are as follows:

	$\frac{C^1 \text{ length} \times 100}{P^3 \text{ length}}$	$\frac{C^1 \text{ length} \times 100}{P^4 \text{ length}}$
Pan schweinfurthi (♀)	136.98	161.29

that in the relative size of its upper canine *Meganthropus africanus* Weinert is definitely on the hominid side, as has already been concluded by Remane.[48]

When the first upper premolar of *Meganthropus africanus* Weinert is viewed from the distal side,[49] it is seen that the difference between the heights of the tips of buccal and lingual cusps, on the occlusal surface, is about the same as that of P^3 of *Plesianthropus transvaalensis* Broom (specimen Sts. 1), depicted by Robinson.[50] The difference between the tips of buccal and lingual cusps of *Meganthropus africanus* Weinert and *Plesianthropus transvaalensis* Broom (specimen Sts. 1) appear to be more than those of the first upper premolars of *Paranthropus crassidens*, depicted by Broom and Robinson[51] and *Sinanthropus pekinensis* (specimen 19), figured by Weidenreich.[52] In other words, it is seen that the lingual cusp of P^3 in *Meganthropus africanus* Weinert and *Plesianthropus transvaalensis* Broom is, relatively speaking, lower in height than those of *Paranthropus crassidens* and *Sinanthropus pekinensis*, that is, they are more primitive than the latter forms.

When the P^3 of *Meganthropus africanus* Weinert is viewed from the distal surface,[53] it is seen that the buccal surface inclines strongly lingualward and downward from the base toward the tip of the buccal cusp. The degree of inclination of the buccal surface of P^3 in *Meganthropus africanus* Weinert is more than that of the cast of the corresponding tooth of the type specimen of *Plesianthropus transvaalensis* Brrom[54] and the specimen Sts. 1 depicted by Robinson.[55] The degree of incli-

Pan paniscus (♀)	124.36	136.61
Pan satyrus (minimum for females)	138.82	146.42
Pan satyrus (minimum for males)	167.81	189.61

[48] Remane, 1954, p. 124.

[49] Remane, 1951, fig. 3a.

[50] Robinson, 1953, fig. 2B (The P^3 of *Plesianthropus* in this figure is shown from the mesial side).

[51] Broom and Robinson, 1952, fig. 34.

[52] Weidenreich, 1937, pl. VIII, fig. 64 m and d.

[53] Remane, 1951, fig. 3a.

[54] The late Dr. R. Broom had kindly sent me in 1940 casts of the then available teeth of *Plesianthropus transvaalensis* and *Paranthropus robustus* (for these see Şenyürek, 1941). On this occasion I wish to recall the memory of this great South African palaeontologist.

[55] Robinson, 1953, fig. 2B.

nation of the buccal surface in P^3 of *Meganthropus africanus* Weinert is considerably more than that of the specimen of *Paranthropus crassidens* depicted by Broom and Robinson,[56] but comes near to that of *Sinanthropus pekinensis* (specimen 19), figured by Weidenreich.[57]

The inclination of the lingual surface of P^3 of *Meganthropus africanus* Weinert, in distal view[58] is also more than that of the cast of the corresponding tooth of the type specimen of *Plesianthropus transvaalensis* Broom and than that of specimen Sts. 1 illustrated by Robinson.[59] In the degree of inclination of its lingual surface, P^3 of *Meganthropus africanus* Weinert comes near to those of *Paranthropus crassidens* figured by Broom and Robinson [60] and *Sinanthropus pekinensis* specimen 19, depicted by Weidenreich.[61] As for *Australopithecus prometheus* Dart, in the cast of the first specimen of the upper jaw (see Dart, 1949b) the buccal half of the crown of P^3 is broken and unrestored.[62] However, in P^3 of this specimen the inclination of the lingual surface is less than that of *Meganthropus africanus* Weinert. The degree of inclination of both the buccal and lingual surfaces of P^3 of *Meganthropus africanus* Weinert is conspicuously more than those of recent man.

It appears that in the degree of inclination of its buccal and lingual surfaces P^3 of *Meganthropus africanus* Weinert is more primitive than P^3 of *Plesianthropus transvaalensis* Broom, but is still not beyond

[56] Broom and Robinson, 1952, fig. 34.

[57] Weidenreich, 1937, pl. VIII, fig. 64 m and d.

[58] Remane, 1951, fig. 3a.

[59] Robinson, 1953, fig. 2B.

[60] Broom and Robinson, 1952, fig. 34.

[61] Weidenreich, 1937, pl. VIII, fig. 64 m and d.

[62] See Dart, 1949b, p. 197. On this occasion I wish to express my gratitude to Prof. Dr. R. Dart of the Witwatersrand University, in Johannesburg, who has generously supplied me with casts of the available teeth of *Australopithesus prometheus* Dart and of the juvenile specimen of *Australopithecus africanus* Dart.

Dart gives a drawing of the complete appearance of P^3 of the first specimen of palate of *Australopithecus prometheus* Dart (see Dart, 1949b, fig. 1), which he has restored from the mould of the missing part in the breccia (see Dart, 1949b, p. 197), but this restoration has not been transferred to the cast.

In the second specimen of the upper jaw of *Australopithecus prometheus* Dart (see Dart, 1949c), which belongs to an older individual, as the crown of P^3 is almost worn down to the base, it is not possible to compare the inclinations of the buccal and lingual surfaces of P^3 with those of *Meganthropus africanus* Weinert.

the range of *Sinanthropus pekinensis* Black, which is a primitive hominid. The degree of inclination of the lingual surface of P^3 of *Meganthropus africanus* Weinert, is about the same as that of *Paranthropus crassidens*, but that of the buccal surface is more primitive than that of the latter.

When P^3 of Meganthropus africanus Weinert is viewed from the distal surface, [63] it is seen that the basal part of the base of the buccal surface of the crown bulges more over the buccal surface of the roots than in the cast of P^3 of the type specimen of *Plesianthropus transvaalensis* Broom and more than in the specimen Sts. 1 figured by Robinson, [64] which is indicative of a greater development of a basal cingulum in the former. The bulge of the basal part of the buccal surface of P^3 in *Meganthropus africanus* Weinert also appears to be greater than in *Paranthropus crassidens* and *Sinanthropus pekinensis*, depicted respectively by Broom and Robinson [65] and Weidenreich.[66] On the other hand, there does not appear to be much difference in the bulge of the base of the lingual surface, over the root, between *Meganthropus africanus* Weinert, [67] *Plesianthropus transvaalensis* Broom [68] and *Paranthropus crassidens*. [69] The bulge of the base of the lingual surface in P^3 of these forms appears to be more than in specimen 19 of *Sinanthropus* depicted by Weidenreich [70] and much more than in recent man, that is they are more primitive.

The accessory ridges on the chewing surface of P^3 of *Meganthropus africanus* Weinert is described by Remane as follows: "*Die Modellierung der Kaufläche ist schwach, das gilt besonders von den Leisten, doch lassen sich am Aussenhöcker zwei nach innen ziehende Wülste erkennen, die mit gemeinsamer Basis entspringen.*" [71] Regarding these ridges on the chewing surface of P^3 of *Plesianthropus transvaalensis* Broom, Robinson states : "*P^3 from the left side is illustrated here in figure 2. From this it is manifest that the occlusal surface of this tooth is very similar to that*

[63] Remane, 1951, fig. 3a.
[64] Robinson, 1953, fig. 2B.
[65] Broom and Robinson, 1952, fig. 34.
[66] Weidenreich, 1937, pl. VIII, fig. 64 m and d.
[67] Remane, 1951, fig. 3a.
[68] Robinson, 1953, fig. 2B.
[69] Broom and Robinson, 1952, fig. 34.
[70] Weidenreich, 1937, pl. VIII, fig. 64 m and d.
[71] Remane, 1951, p. 313.

of the M. africanus *tooth, but the former has a more complicated crenulation of the surface. P³ of Sts. 12, on the other hand, has a similarly shaped occlusal surface which is absolutely smooth except for the simple hominid-type fissure system.*"[72] From this it is clear that in the degree of the development of accessory transverse ridges on its chewing surface, P³ of *Meganthropus africanus* Weinert falls within the range of variation of *Plesianthropus transvaalensis* Broom.

In the type specimen of *Paranthropus robustus* Broom figured by Broom, [73] the masticating surface of left P³ is also slightly worn, but still a short transverse fissure is present on the buccal side of the antero-posterior furrow and just behind thre transverse axis of the tooth. This fissure indicates that there were two accessory ridges on the buccal half of the chewing surface of this tooth, as in P⁴ of this specimen shown here in fig. 4. Indeed, in the right P³, figured by Broom [74] and attributed by him to the type specimen, two ridges on the buccal side are clearly seen. Thus the configuration of the accessory ridges on the occlusal surface of P³ of *Paranthropus robustus* Broom also comes near to that of *Meganthropus africanus* Weinert. In the presence of two accessory ridges on the buccal half of the masticating surface of P³, *Meganthropus africanus* Weinert also does not differ much from the upper first premolars of *Paranthropus crassidens* figured by Broom and Robinson. [75] As has been described by the late Weidenreich, P³ of *Sinanthropus pekinensis* Black also possesses two accessory ridges on the buccal side and several weaker ones on the lingual side. [76]

It is evident that in the presence of two accessory transverse ridges on the buccal side of the chewing surface of P³, *Meganthropus*

[72] Robinson, 1953, p. 5. In the type specimen of *Plesianthropus transvaalensis* Broom pictured in this report (fig. 2), the chewing surface is worn, so it is not possible to detect the accessory ridges that may have been present (for the picture of this tooth see also Broom, 1946, pl. VI, fig. 33 and Gregory and Hellman, 1939, fig. 6B).

[73] Broom, 1946, pl. IX, fig. 86.

[74] *Ibid.*, pl. IX, fig. 86.

[75] Broom and Robinson, 1952, fig. 34, pl. 1, fig. 7 and pl. 5, fig. 20.

[76] Weidenreich, 1937, p. 37.

africanus Weinert is not more primitive than the australopithecines in general and *Sinanthropus pekinensis* Black. [77]

Regarding the crown of P^3 of *Meganthropus africanus* Weinert, Remane states: "*Der P3 fällt besonders durch die Vorwölbung der vorderen Buccalfläche auf* (*Abb. 2.*) *In Seitenansicht fällt die mesiale Seite der Buccalfläche vorn zunächst fast senkrecht ab, ihre tiefste Vorbuchtung erreicht sie auf der Vorderwurzel* (*wie bei den Anthropoiden*)." [78] When the crown of P^3 of *Meganthropus africanus* Weinert, depicted by Remane, [79] is viewed from the occlusal surface, it is seen that the most pronounced part of the basal swelling of the buccal surface is found in the mesial part of this surface, thus giving the tooth, in this view an assymetrical appearance.

In this feature P^3 of *Meganthropus africanus* Weinert reminds one of P^3 of the great anthropoids, in which the buccal surface of this tooth is usually assymetrical in occlusal view. [80] In the assymetry of its buccal surface, in occlusal view, P^3 of *Meganthropus africanus* Weinert also approaches P^3 of *Sinanthropus pekinensis* Black (specimen 19), depicted by Weidenreich. [81] Thus, although primitive, in this feature *Meganthropus africanus* Weinert is still within the range of variation of Hominidae.

In the type specimen of *Plesianthropus transvaalensis* Broom there is a median swelling on the buccal surface of the crown which courses from the tip of buccal cusp toward the mesial part of the base

[77] P^3 of *Africanthropus njarasensis* Weinert (Remane, in Weinert, 1939, fig. 3) is too worn for an assessment of the accessory ridges and the photographs of P^3 of *Pithecanthropus modjokertensis* v. Koenigswald (*Pithecanthropus robustus* Weidenreich) published by Weidenreich (1945, pl. 3, fig. 3) and von Koenigswald (1942, pl. 6, fig. 2) are not too clear for this purpose. Regarding the accessory ridges in the upper premolars and molars of *Pithecanthropus modjokertensis* v. Koenigswald (*Pithecanthropus robustus* Weidenreich), however, Weidenreich (1945, p. 30) makes the following general statements: "*The canine pattern shows the same arrangement and development of the crests and of the lingual surface as that I described in* Sinanthropus *and the same is true of the wrinkle system of the premolars and molars. At first glance the wrinkles seem less pronounced, but when the individual teeth are compared with those of* Sinanthropus *having a corresponding degree of wear, the difference is practically nil.*"

[78] Remane, 1951, p. 312.

[79] *Ibid.*, fig. 2.

[80] Şenyürek, 1940, p. 15.

[81] Weidenreich, 1937, pl. VIII, fig. 64 (o).

of buccal surface, but still as can be seen from fig. 2, the buccal surface of this tooth, in occlusal view, is much more symmetrical than that of *Meganthropus africanus* Weinert. [82] In P^3 of specimen Sts. 1 of this form, figured by Broom and Robinson, and Robinson, the buccal surface in occlusal view is symmetrical. [83] This surface is also symmetrical in P^3 of the female *Plesianthropus transvaalensis* Broom, [84] found in 1936, and in that of another female specimen (Skull 6), figured by Broom and Robinson.[85] In the first upper premolars of *Paranthropus robustus*, pictured by Broom [86] and *Paranthropus crassidens*, figured by Broom and Robinson, [87] the buccal surface is more symmetrical than that of *Meganthropus africanus* Weinert. [88] Thus it is clear that in the assymetry of its buccal surface, in occlusal view, P^3 of *Meganthropus africanus* Weinert differs from the known, at least the pictured, specimens of australopithecines.

When the P^3 of *Meganthropus africanus* Weinert is viewed from the buccal surface, it is seen that the highest point of enamel margin, instead of being in the middle, is, as already pointed out by Remane, [89] found in the mesial part of the buccal surface. This assymetrical form of enamel margin in P^3 of *Meganthropus africanus* Weinert recalls the condition found in the corresponding tooth of the typical anthropoids (see fig. 1). [90]

Remane states regarding the height measurements of the upper premolars of *Meganthropus africanus* Weinert: "*Die Kronenhöhe, gemessen*

[82] The more symmetrical nature of the buccal surface of P^3 of the type specimen of *Plesianthropus transvaalensis* Broom is also clearly seen in the figures published by Broom (1939, fig. IA and B; 1946, pl. VI, figs. 33-34) and Gregory and Hellman (1939, fig. 6B).

[83] Broom and Robinson, 1950, pl. 4, fig. 17 and Robinson, 1953, fig. 2A.

[84] See Broom, 1939, fig. IB; Broom, 1946, pl. VI, fig. 34; Gregory and Hellman, 1939, fig. 4; Le Gros Clark, 1950, fig. 2A.

[85] Broom and Robinson, 1950, pl. 1, fig. 4.

[86] Broom, 1946, pl. IX, fig. 86.

[87] Broom and Robinson, 1952, fig. 34, pl. 1, fig. 7, pl. 4, fig. 17 and pl. 5, fig. 20.

[88] In the drawing of the restored P^3 of the first specimen of upper jaw of *Australopithecus prometheus* Dart, also, the buccal face, in occlusal view, is shown as nearly symmetrical (see Dart, 1949b, fig. 1).

[89] Remane, 1951, p. 312 and p. 322.

[90] *Ibid.*, p. 312. For anthropoids see also Şenyürek, 1940, p. 15.

von der Spitze des Aussenhöckers bis zur tiefsten Stelle des Schmelzrandes der Buccalfläche beträgt am P³ 10.9, bei senkrechter Messung zum Mittelteil des buccalen Schmelzrandes 10.4, am P⁴ 8.4." [91] However, a scrutiny of the drawing published by Remane[92] shows that the first measurement given by him as representing the height of the highest point of the enamel margin, is very probably an oblique measurement, thus augmenting the difference in height of enamel margin at the middle and anterior part of buccal surface. I have measured the middle and anterior heights of the crown of P³ of *Meganthropus africanus* Weinert from Remane's drawing [93] according to the technique shown in fig. 1 and obtained the following values: Middle height (A-B) 10.5 mm., and anterior height (C-D) 10.75 mm. Although the measurements taken from the drawings of teeth cannot always be considered to be precise, still, as the two measurements are taken in parallel they perhaps give a better idea about the difference in height of the enamel margin at the anterior and middle parts of the buccal surface of P³, than the figures given by Remane. The index expressing the anterior height of P³ as a percentage of its middle height, in some anthropoids I had measured and in *Meganthropus africanus* Weinert is as follows : [94]

		$\frac{\text{Anterior Height of } P^3 \times 100}{\text{Middle Height of } P^3}$	
Pongo. 5 individuals	(♂ + ♀)	103.16	[100.00-106.36]
Gorilla. 3 individuals	♂	113.10	[104.76-119.29]
Pan. 4 individuals	(♂ + ♀)	106.29	[100.00-117.14]
Meganthropus africanus Weinert		102.38	

It is clear from this list that in this index, P³ of *Meganthropus africanus* Weinert is still within the range of the living anthropoids, that is, primitive. On the other hand, in the specimen Sts. 1 of *Plesianthropus transvaalensis* Broom, figured by Robinson for comparison, the

[91] Remane, 1951, p. 312.
[92] *Ibid.*, fig. 2.
[93] *Ibid.*, fig. 2.
[94] Figures in parentheses show the range.

opposite condition from that observed in P^3 of *Meganthropus africanus* Weinert is seen; viz., the highest point of enamel margin on the buccal surface is found behind the mid-line of the crown.[95] However, regarding the configuration of the enamel margin in P^4 and P^3 of *Plesianthropus transvaalensis* Broom, Robinson states: "*In* M. africanus P^4 *differs considerably from* P^3. *The crown is more symmetrical and the occlusal surface is simpler. The fissure system is essentially hominid and the enamel surface is almost smooth. The buccal face is also less complicated. The buccal grooves are lightly marked and the ridges poorly developed and are only visible for a short distance mesially and distally; not almost continuous as in* P^3. *The upward extension of the cervical line is centrally placed; the corresponding extension in* P^3 *is situated mesialward of the center. These features may also be found among the* Plesianthropus *teeth.*"[96] With due regard to this statement however, in my opinion it still remains to be demonstrated whether the same degree of assymetry in the enamel margin of the buccal surface of P^3 of *Meganthropus africanus* Weinert also exists in the corresponding teeth of *Plesianthropus transvaalensis* Broom.

The form of the enamel margin of the buccal surface of P^3 of *Meganthropus africanus* Weinert is distinguished from that of the specimen of *Paranthropus crassidens*, figured by Broom and Robinson,[97] in which the enamel margin is seen to be symmetrical, with the highest point being in the center. In this feature P^3 of *Meganthropus africanus* Weinert is also more primitive than those of the specimens of *Sinanthropus pekinensis* figured by Weidenreich.[98]

In referring to P^3 of *Meganthropus africanus* Weinert and that of *Plesianthropus transvaalensis* Broom, Remane states that in the latter "*...the main cusp is lower.*"[99] Indeed, a comparison of the tip portion of the buccal cusp of P^3 of *Meganthropus africanus* Weinert with

[95] Robinson, 1953, fig. 2C. Regarding the buccal face of P^3 of the earlier found specimens of *Plesianthropus transvaalensis* Broom, Gregory and Hellman (1939, p. 349) stated : "*In* Plesianthropus *the buccal face of the crown of* P^1 *(Fig. 6A) is more symmetrical (with reference to a vertical axis through the paracone) than in gorilla, orang or chimpanzee.*"

[96] Robinson, 1953, pp. 6-7.

[97] Broom and Robinson, 1952, fig. 34.

[98] Weidenreich, 1937, pl. VIII, figs. 64b, 65b and 68b.

[99] Remane, 1954, p. 126.

that of *Plesianthropus transvaalensis* Broom, specimen Sts. 1, figured by Robinson,[100] which is nearly fresh,[101] shows that the tip portion of the buccal cusp of the former is absolutely as well as relatively higher than that of the latter. The tip portion of the buccal cusp of P^3 of *Meganthropus africanus* Weinert is also relatively higher than that of the specimen of *Paranthropus crassidens*, figured by Broom and Robinson[102] and higher than that of specimen 19 of *Sinanthropus pekinensis* depicted by Weidenreich.[103] On the other hand, the tip portion of the buccal cusp of P^3 of *Meganthropus africanus* Weinert is relatively lower in height than those of *Limnopithecus macinnesi* Le Gros Clark and Leakey, [104] *Proconsul africanus* Hopwood, [105] *Proconsul nyanzae* Le Gros Clark and Leakey, [106] *Sivapithecus africanus* LeGros Clark and Leakey, [107] *Dryopithecus punjabicus* Pilgrim, [108] *Sivapithecus orientalis* Pilgrim, [109] *Sivapithecus sivalensis* (Lydekker), [110] and those of the recent great apes (see fig. 1). [111] Thus, in addition to the relatively small size of the upper canine, this feature of P^3 also, as has already been stated by Remane, [112] clearly shows that *Meganthropus africanus* Weinert is a member of Hominidae, although it represents a primitive member of this family.

[100] Robinson, 1953, fig. 2C.

[101] *Ibid.*, p. 5. Regarding this tooth of *Plesianthropus*, Robinson (1953, p. 5) states: "*In the small collection of* Plesianthropus *specimens there is only one (Sts. 1) in which* P^3 *is almost unworn.*"

[102] Broom and Robinson, 1952, fig. 34. The buccal surface of P^3 of *Paranthropus robustus* Broom is shown by Broom (1946) rather sketchily together with the skull in pl. VIII, fig. 83 and together with other teeth in fig. 19. If these sketches are accurate, it would appear that the tip portion of the buccal cusp of P^3 of *Paranthropus robustus* also is lower than that of *Meganthropus africanus* Weinert (see also Remane, 1951, fig. 10, b and c). However, this still has to be verified.

[103] Weidenreich, 1937, pl. VIII, fig. 64b.

[104] Le Gros Clark and Leakey, 1951, pl. VII, fig. 59.

[105] Hopwood, 1933, pl. 6, fig. 6; MacInnes, 1943, pl. 25, fig. 1.

[106] Le Gros Clark and Leakey, 1951, pl. IV, fig. 20.

[107] *Ibid.*, pl. VI, fig. 42.

[108] Pilgrim, 1915, pl. 3, fig. 2.

[109] Pilgrim, 1927, fig. 1.

[110] Gregory, Hellman and Lewis, 1938, pl. 5, fig. A.

[111] See also Gregory, 1920, figs. 246, 251, 258 and 260; Hooijer, 1948, pl. IV, figs. 5-6.

[112] Remane, 1951, p. 322; Remane, 1954, p. 124. See also Vallois, 1953, p. 132.

The buccal cingulum of P^3 of *Meganthropus africanus* Weinert is described by Remane as follows: "*Durch einen breiten Aussenwulst ist die Buccalfläche deutlich modelliert. Er beginnt an dem fast höckerartig ausgebildeten Ursprung der vorderen Paraconusrandleiste und begleitet, sich verbreiternd, den unteren Kronenrand, um am Ende der hinteren Paraconusleiste zu enden. Dieser Aussenwulst ist vorn und hinten deutlich abgesetzt, in der Mitte jedoch kaum gegen die sonstige Buccalfläche abgegrenzt. Im Vorderteil ist die abgrenzende Furche napfartig vertieft.*" [113] The form of the buccal cingulum of P^3 of *Meganthropus africanus* Weinert is not much different from that of *Plesianthropus transvaalensis* Broom, specimen Sts. 1, described and illustrated by Robinson [114] and is also approached by that of P^3 of *Sinanthropus pekinensis* Black, described and figured by Weidenreich. [115]

Regarding the roots of P^3 of *Meganthropus africanus* Weinert, Remane states: "*Der P3 besitzt 3 Wurzeln, deren spezieller Verlauf nicht angegeben werden kann, da sie im Kiefer stecken.*"[116] From the configuration of the visible parts of the buccal roots, [117] it would appear that the two buccal roots were separate, but it is not known whether the lingual root also is completely separate. [118] Robinson has recently stated regarding the number of roots in P^3 of australopithecines: "*In one specimen from Sterkfontein a single root is present but in all other known australopithecine specimens there are at least two roots. Of 13 Sterkfontein specimens only one has a double buccal root, i.e., three roots altogether, while of 19 Swartkrans specimens 14 have double buccal roots. This difference takes on even greater significance when it is remembered that the geologically older form is the more advanced in this respect.*" [119] Regarding the roots of P^3 of *Paranthropus robustus* Broom, from Kromdrai, Broom stated: "*The tooth has three roots but the two outer ones are close together at the alveolus, but possibly they may diverge considerably in the bone. This is in*

[113] Remane, 1951, p. 312.

[114] Robinson, 1953, p. 5 and fig. 2A and C.

[115] Weidenreich, 1937, pp. 36-37 and pl. VIII, fig. 64b.

[116] Remane, 1951, p. 314.

[117] *Ibid.*, fig. 2.

[118] Regarding the lingual root, Remane (1951, p. 314) states: "*Die Innenwurzel ist nur an ihrer Basis sichtbar.*"

[119] Robinson, 1954b, p. 187. See also Robinson, 1954a, pp. 270-271.

marked contrast to the condition in Plesianthropus where there are only two roots though the tip of the outer is partly bifid." [120]

P^3 of the first specimen of the upper jaw of *Australopithecus prometheus* Dart, is described by Dart as possessing two roots. [121] In this feature P^3 of the Makapan form agrees with the majority of *Plesianthropus transvaalensis* Broom and resembles the specimens of *Paranthropus crassidens* having only two roots, while the majority of this form possesses three roots which may be free or two of which may be united. [122] Thus it is clear that in root number P^3 of *Meganthropus africanus* Weinert is within the range of variation of genus *Paranthropus* and is also approached by one specimen of *Plesianthropus transvaalensis* Broom, which in most cases have only two roots. In root number P^3 of *Meganthropus africanus* Weinert appears to agree also with that of *Pithecanthropus modjokertensis* v. Koenigswald (*Pithecanthropus robustus* Weidenreich), which is described as being three-rooted by von Koenigswald,[123] but is distinguished from that of *Sinanthropus pekinensis* Black which has two, separate or largely fused roots[124] and also from that of *Africanthropus njarasensis* Weinert.[125]

As can be seen from Table 3, in size, as expressed by the robustness value, P^3 of *Meganthropus africanus* Weinert is smaller than that of *Gorilla* of both sexes measured and is in the range of that of *Pongo*. This tooth of *Meganthropus africanus* Weinert exceeds the maximum of *Pan* measured. P^3 of *Meganthropus africanus* Weinert is smaller than that of *Paranthropus robustus* and also smaller than that of *Paranthropus*

[123] Broom, 1946, p. 95.

[121] Dart, 1949b, p. 198.

[122] For the condition of roots in P^3 of *Paranthropus crassidens* see Broom and Robinson, 1952, p. 38; Robinson, 1953, p. 6; Robinson, 1954b, p. 187.

[123] von Koenigswald, 1954, p. 85.

[124] Weidenreich, 1937, p. 37 and pl. VIII, figs. 64, 65 and 68.

[125] Regarding the roots of P^3 and alveolus of P^4 of *Africanthropus njarasensis* Weinert, Remane (in Weinert, 1939, p. 270) states: "*Da der Zahn fest im Kiefer steckt, is von den Wurzeln wenig zu erkennen. Die Aussenwurzel ist sicher einheitlich, nicht geteilt; inwieweit sie mit der Innenwurzel zu einem einheitlichen Gebilde verschmolzen war, ist am P^3 nicht zu erkennen, wohl aber am P^4. Von diesem Zahn ist nämlich die Vorderwand der Alveole erhalten, sie lässt auf eine breite einheitliche Wurzel mit einer Längsfurche an der Mesialfläche schliessen.*"

crassidens.[126] This tooth of *Meganthropus africanus* Weinert, in size, falls fully within the range of variation of *Plesianthropus transvaalensis* Broom and exceeds that of female *Australopithecus prometheus*. It exceeds in size the specimens of *Pithecanthropus modjokertensis* v. Koenigswald and *Africanthropus njarasensis* Weinert. It also surpasses in size the average of *Sinanthropus pekinensis* Black, but falls in the upper limit of its range of variation. P^3 of *Meganthropus africanus* Weinert far exceeds in size those of recent man listed.

The crown index of P^3 of *Meganthropus africanus* Weinert does not distinguish it from those of some great anthropoids and hominids, the ranges of which overlap.[127] However, it is of interest to note that in crown index it falls below those of *Plesianthropus transvaalensis*, *Australopithecus prometheus*, *Paranthropus robustus* and probably also *Paranthropus crassidens*. It is also noteworthy that, although still within the range of recent man and some anthropoids, the australopithecines, *Pithecanthropus* and *Sinanthropus* have relatively high crown indices, higher on the average than those of recent man and of the anthropoids. This would indicate that in the process of reduction in size of the first upper premolar of recent man, the breadth has been diminished more than the length.

In height indices (Table 4), P^3 of *Meganthropus africanus* is within the range of *Pongo*, *Gorilla* and recent man, that is, the height indices

[126] It may be noted that even the minimum length (9.3 mm.) and minimum breadth (13.4 mm.) measurements given by Broom and Robinson (1952) yield a higher robustness value than that of *Meganthropus africanus* Weinert.

[127] Very high crown indices are also found in P^3 of some specimens of fossil Tertiary anthropoids. For instance according to the measurements of Pilgrim(1927), in P^3 of the type specimen of *Sivapithecus sivalensis* (Lydekker) this index is 167.64 (length 6.8 and breadth 11.4 mm.) and in *Ramapithecus brevirostris* Lewis (according to Lewis, 1934, length is 6.9 and breadth 10.3 mm.) it is 149.27. As calculated from the measurements given by Le Gros Clark and Leakey (1951) this index varies between 131.25 and 148.57 in P^3 of *Proconsul nyanzae* Le Gros Clark and Leakey and from 128.76 (according to the measurements of Hopwood, 1933 and Le Gros Clark & Leakey, 1951) to 175.00 (Le Gros Clark and Leakey, 1951) in that of *Proconsul africanus* Hopwood. According to Le Gros Clark and Leakey (1951), this index amounts to 150.00 in P^3 of specimen C.M.H. 6 of *Sivapithecus africanus* Le Gros Clark and Leakey. This peculiarity of some anthropoids had unfortunately been overlooked in my earlier study on the teeth of australopithecines (see Şenyürek 1941, p. 296).

do not distinguish it from those of some anthropoids and recent man. On the other hand, in height indices it exceeds the maxima of *Pan* and one specimen of *Sinanthropus pekinensis*.

As can clearly be seen from the drawing published by Remane,[128] the chewing surface of P^4 of *Meganthropus africanus* Weinert is much smoother than that of the first upper molar.[129] In this feature P^4 of *Meganthropus africanus* Weinert differs conspicuously from the slightly worn corresponding teeth of the type specimen of *Plesianthropus transvaalensis* Broom (fig 2), the type specimen of *Paranthropus robustus* Broom (fig. 4) and that of the first specimen of the upper jaw of *Australopithecus prometheus* Dart (fig. 3), all of which, in spite of attrition, show more relief on the chewing surface than *Meganthropus africanus* Weinert. There appears to be more relief on the chewing surface of P^4 of *Paranthropus crassidens* Broom and Robinson[130] than that of *Meganthropus africanus* Weinert. In the smoothness of its chewing surface, P^4 of *Meganthropus africanus* Weinert also conspicuously diverges from that of *Sinanthropus pekinensis* Black, the chewing surface of which is wrinkled. [131] Regarding the chewing surface of P^4 of *Plesianthropus transvaalensis* Broom, Robinson states: "*The fissure system is simpler than that of* P^3 *but is not always as simple as that in* M. africanus." [132] Thus in this feature the maxillary fragment of *Meganthropus africanus* Weinert appears to be distinguished from *Plesianthropus transvaalensis* Broom and also the other australopithecines.

Remane states regarding the difference in the length of buccal and lingual cusps of P^4 of *Meganthropus africanus* Weinert: "*Die Kaufläche zeigt die stärksten Unterschiede gegenüber dem* P_3. *War dort das Aussenhöcker- (Paraconus-) Gebiet mit seiner vorderen und hinteren Kante länger als der mittlere Längsdurchmesser der Zähne (9,6: 8,6 mm), so ist am* P_4 *das Umgekehrte der Fall (7,4: 9,1 mm); was beim* P_3 *die Buccalhälfte viel länger als die Lingualhälfte, so ist am* P_4 *die Lingualhälfte länger, besonders ihr hinterer Innenteil (distal-labial) schiebt sich bogenartig vor.*

[128] Remane, 1951, fig. 2.
[129] Robinson, 1953, p. 6.
[130] Broom and Robinson, 1952, pl. I, fig. 7 and pl. 5, fig. 20.
[131] Weidenreich, 1937, p. 40 and pl. IX, figs. 77 (o) and 78 (o).
[132] Robinson, 1953, p. 7.

Dadurch erscheint der Innenhöcker (Protoconus) noch stärker in den Vorderteil des Zahnes verschoben, als es am P3 der Fall war." [133] In this feature P^4 of *Meganthropus africanus* Weinert differs from that of the type specimen of *Paranthropus robustus* Broom, in which the buccal length exceeds the middle length (see fig. 4), [134] and approaches that of the type specimen of *Plesianthropus transvaalensis* Broom (see fig. 2) [135] and also that of the first specimen of the upper jaw of *Australopithecus prometheus* Dart (fig. 3). It is of interest to note that in P^4 of *Plesianthropus transvaalensis* Broom (fig. 2) and *Australopithecus prometheus* Dart (fig. 3) also the disto-lingual section of the crown, in occlusal view, slants forward and inward, as in *Meganthropus africanus* Weinert. [136]

The buccal cingulum of P^4 of *Meganthropus africanus* Weinert, is described by Remane as follows: "*Der Aussenwulst ist nur an seiner vorderen und hinteren Ansatzstelle Kenntlich, vorn nur an der fast höckerartigen Kante, die am Zusammentreffen von vorderer (mesialer) Randleiste und der vorderen Paraconuskante entsteht, hinten als etwas breiterer und tiefer reichender Wulst, der von der gleichfalls schwach höckerartig markierten Stelle am Zusammentreffen der hinteren Paraconuskante mit der hinteren Randleiste ausgeht. Da auch von der Paraconusspitze ein Vertikalwulst zu der tiefsten Kronengrenze in schwachem, nach vorn gerichtetem Bogen verläuft, erscheint die Buccalfläche in drei Wülste (Vorder-und Hinterteil des Aussenwulstes und Mittelwulst) und zwei dazwischenliegende Täler zerlegt. Die Täler erstrecken sich nur auf den oberen Teil, d.h. den der Kaufläche benachbarten Teil des Zahnes.*" [137] In other words, the manifestation of cingulum in P^4 is weaker than that of the first upper premolar. [138] As far as can be judged from the drawing published by Remane, [139] the buccal cingulum in P^4 of *Meganthropus africanus* Weinert appears to be of about the same form and degree of development as that of *Sinanthropus pekinensis* specimen 25, depicted by Weidenreich. [140]

[133] Remane, 1951, p. 314.
[134] See also Gregory and Hellman, 1939, fig. 9.
[135] See *ibid.*, fig. 6B. See also Robinson, 1953, p. 7.
[136] See Remane, 1951, fig. 2.
[137] *Ibid.*, p. 314.
[138] See also Robinson, 1953, pp. 6-7.
[139] Remane, 1953, fig. 2.
[140] Weidenreich, 1937, pl. IX, fig. 77.

When the drawing [141] of the buccal surface of P^4 of *Meganthropus africanus* Weinert is examined it is seen that the highest part of the enamel margin forms a nearly triangular projection, the tip of which, as has been noted by Remane [142] and Robinson, [143] is almost in the middle of this surface. The enamel margin of the buccal surface of P^4 of *Meganthropus africanus* Weinert corresponds to Pedersen and Thyssen's[144] type 5, that is there is a rather strong degree of enamel extension. The degree of enamel extension is about the same in P^4 of *Paranthropus crassidens*, depicted by Broom and Robinson [145] and, as far as can be judged from the cast, somewhat less in P^4 of the type specimen of *Plesianthropus robustus* Broom which corresponds to Pedersen and Thyssen's type 4. [146]

As can be seen from the drawing published by Remane, in P^4 of *Meganthropus africanus* Weinert the visible parts of the two buccal roots are fused.[147] For the condition of the apical parts of the buccal roots, Remane states: "*Ob sich diese beiden Pfeiler am Wurzelende völlig trennen, Kann nicht entschieden werden, da dieser Bezirk des Vorderpfeilers im Knochen eingebettet ist.*" [148] Remane does not state whether the lingual root is completely free from the buccal roots and whether it is divergent. [149] In the condition of its buccal roots, P^4 of *Meganthropus africanus* Weinert seems to differ from that of *Paranthropus robustus* Broom in which there appear to be two separate buccal roots.[150] In the specimen of P^4 of *Paranthropus crassidens*, figured by Broom

[141] Remane, 1951, fig. 2.

[142] *Ibid.*, p. 314.

[143] Robinson, 1953, p. 7.

[144] Pedersen and Thyssen, 1942 (cited by Pedersen, 1949). The classification of Pedersen and Thyssen, (1942) is described and illustrated by Pedersen (1949, p. 74 and pl. 18, figs. 96-107).

[145] Broom and Robinson, 1952, fig. 35.

[146] In the cast of the type specimen of *Paranthropus robustus* Broom in my possession the basal part of the crown is not reproduced. In P^4 of the cast of *Australopithecus prometheus* Dart at my disposal, the enamel margin of the buccal surface is not too clear, but still from this cast it appears that this margin is strongly convex toward the roots (see also Dart, 1949b, fig. 1).

[147] Remane, 1951, fig. 2 and p. 314.

[148] *Ibid.*, p. 314.

[149] See *ibid.*, p. 314.

[150] Broom, 1946, p. 96 and fig. 19 B.

and Robinson, [151] the two buccal roots are fused in their lower two-thirds and free in the apical third. Although the condition of the apical parts of the two buccal roots of P^4 of *Meganthropus africanus* Weinert is not known, it is nevertheless clear that this tooth of *Paranthropus crassidens* referred to comes closer to that of *Meganthropus africanus* Weinert than that of *Paranthropus robustus*. [152] Regarding the condition of the roots in P^4 of the type and female specimens of *Plesianthropus transvaalensis*, Broom stated: "*The roots of the right second premolar are seen in section. As in the first premolar there are only two roots, but probably as in the first premolar the outer root is bifurcated near its tip. The roots are widely divergent.*

The second premolar is lost from the female maxilla, but from the ridge seen on the outer side of the bone the outer root appears to have been single even to its tip." [153] In his study published in 1953, Robinson makes the following statement regarding the roots of P^4 in a specimen of *Plesianthropus transvaalensis*: "*In only one case a little can be seen of the buccal roots of* P^3 *and* P^4 *and here there is also a marked similarity to* M. africanus. *That is, two buccal roots are present in both teeth but they are either partly fused or closely approximated in* P^4 *but not in* P^3."[154] Although in his recent studies Robinson [155] does not describe the condition of the roots in P^4 of *Plesianthropus transvaalensis*, still from the information available it would appear that in the condition of its roots P^4 of *Meganthropus africanus* Weinert is in the range of variation of *Plesianthropus*.

In the condition of its roots, P^4 of *Meganthropus africanus* Weinert differs from that of *Sinanthropus pekinensis* in which there is only one main buccal root which is fused with the lingual root. [156]

[151] Broom and Robinson, 1952, fig. 35.

[152] Broom and Robinson (1952, p. 40) state regarding the roots in P^4 of *Paranthropus crassidens*: "*Roots are preserved in three specimens. Two have the root arrangement illustrated, which is exactly the same as that of the first premolar illustrated, i.e. three roots with the mesiobuccal and the lingual ones fused for all, or most, of their length. The other has three separate roots; a mesiobuccal, a distobuccal and a lingual.*"

[153] Broom, 1946, p. 59.

[154] Robinson, 1953, p. 7.

[155] Robinson, 1954a and b. As for *Australopithecus prometheus*, Dart (1949b) does not describe the condition of the roots in P^1.

[156] Weidenreich, 1937, p. 40, pl. IX, fig. 75 and pl. XXII, fig. 214.

The size of P^4 of *Meganthropus africanus* Weinert, as can be seen from Table 5, is smaller than that of *Gorilla*, in the range of *Pongo* and larger than the maximum of *Pan* listed. It is considerably smaller than those of *Paranthropus robustus* and *Paranthropus crassidens*[157] and is in the range of that of *Plesianthropus transvaalensis*. This tooth of *Meganthropus africanus* Weinert is only slightly smaller than that of *Australopithecus prometheus* Dart which is also within the range of variation of *Plesianthropus* in size. On the other hand, in size, P^4 of *Meganthropus africanus* Weinert exceeds that of *Pithecanthropus modjokertensis* v. Koenigswald (*Pithecanthropus robustus* Weidenreich) and the maxima of *Sinanthropus pekinensis* and of the recent men listed.

The crown index does not distinguish P^4 of *Meganthropus africanus* Weinert from those of some anthropoids and hominids, the ranges of which overlap to a great extent. The crown index of P^4 of *Meganthropus africanus* Weinert is within the range of variation of *Plesianthropus transvaalensis* Broom but is lower than that of *Paranthropus robustus* and *Paranthropus crassidens*, at least lower than that of some specimens of the latter. It is also of interest to note that P^4 of the australopithecines, *Pithecanthropus* and *Sinanthropus* tend to have, on the average, higher crown indices than the averages of recent men listed, although their ranges overlap to a great extent.

An examination of Table 6 reveals that in height indices, P^4 of *Meganthropus africanus* Weinert falls within the range of the great anthropoids. In height-length index it falls below the minima of all the hominids, fossil and recent listed.[158] The same is true also for the height-breadth index, with the only exception of the somewhat worn P^4 of *Pithecanthropus modjokertensis* v. Koenigswald. It would appear that in height indices P^4 of *Meganthropus africanus* Weinert comes nearer to those of some anthropoids than to those of the hominids, although the differences separating it from the minima of hominids are not great.

[157] Even the robustness value calculated from the minimum length (9.2 mm.) and breadth (14.7 mm.) given for P^4 of *Paranthropus crassidens* by Broom and Robinson (1952) is higher than that of *Meganthropus africanus* Weinert.

[158] It is to be noted that among the recent men listed the lowest average height indices are found in Bushman. As I stated before (Şenyürek, 1952, p. 169), this Bushman series, measured by Drennan (1929) probably includes some worn teeth.

As Remane[159] and Robinson[160] have referred to the differences existing between P^3 and P^4 of *Meganthropus africanus* Weinert, I will only draw attention here to the difference observed in the length of the buccal surfaces of these teeth, which is not brought out by the indices listed.[161] An examination of the drawing published by Remane[162] shows that in *Meganthropus africanus* Weinert the buccal surface proper of the crown of P^3 is considerably longer than that of P^4, which is an anthropoid character. In this feature *Meganthropus africanus* Weinert conspicuously differs from *Paranthropus robustus*,[163] *Paranthropus crassidens*[164] and *Australopithecus prometheus*.[165] In the preponderance of the length of the buccal surface proper of P^3 over that of P^4, *Meganthropus africanus* Weinert also differs from the type specimen (fig. 2)[166] and skull 7 [167] of *Plesianthropus transvaalensis*, although in this feature this form would seem to come nearer to *Meganthropus africanus* than the other australopithecines.

The measurements of P^3 relative to those of P^4 are listed in Table 7. In the index expressing the length of P^3 as a percentage of that of P^4, *Meganthropus africanus* Weinert[168] does not differ from some anthropoids and hominids. In this index *Meganthropus africanus* Weinert differs from *Australopithecus prometheus* and *Paranthropus crassidens* in which P^3 is shorter than P^4. In this index it is approached by some specimens of *Plesianthropus transvaalensis* which also shows a

[159] Remane, 1951, p. 312 and p. 314; 1954, pp. 123-124.

[160] Robinson, 1953, pp. 6-7.

[161] The length indices $\frac{P^3 \text{ length} \times 100}{P^4 \text{ length}}$ listed in Table 7, do not clearly bring out this difference as the maximum length of P^3 and P^4 do not necessarily occur on the buccal surface proper but may be found further lingualward or in the middle of the tooth.

[162] Remane, 1951, fig. 2.

[163] Broom, 1946, pl. IX, fig. 86.

[164] Broom and Robinson, 1952, pl. 1, fig. 7 and pl. 5, fig. 20; Robinson, 1952, fig. 3.

[165] See Dart, 1949b, fig. 1.

[166] Gregory and Hellman, 1939, fig. 6A-B; Broom, 1946, pl. VI, fig. 33.

[167] Broom and Robinson, 1950, pl. I, fig. 4.

[168] In comparing the measurements of the upper premolars of *Meganthropus africanus* Weinert, Robinson (1953, p. 2) lists the median length of P^3 which is shorter than that of P^4 and also yields a smaller module for P^3 than that of P^4.

tendency to have a shorter P^3 than P^4. It is difficult to state anything definite regarding *Paranthropus robustus*, as the length measurements given by Broom [169] and Robinson [170] yield two different indices.

In the index expressing the buccal height [171] of P^3 as a percentage of that of P^4, according to the information available, *Meganthropus africanus* Weinert, would appear to be nearer to the anthropoids than to the hominids listed.

In the index expressing the robustness value of P^3 as a percentage of that of P^4, *Meganthropus africanus* Weinert is in the range of anthropoids and hominids. It is interesting to note that in this index, the australopithecines, with the only exception of the type specimen of *Plesianthropus transvaalensis* calculated from the measurements given by Gregory and Hellman, [172] fall below the averages of the hominids, fossil and recent, listed; this tendency being most pronounced in the case of *Paranthropus crassidens*, followed by *Australopithecus prometheus*. In this index *Meganthropus africanus* Weinert is conspicuously distinguished from *Paranthropus robustus*, *Paranthropus crassidens* and *Australopithecus prometheus*, in all of which P^3 is smaller than P^4. In this index it also differs from the available specimens of *Plesianthropus transvaalensis* Broom, with the only exception of the measurements of the type specimen given by Gregory and Hellman. [173] According to the measurements of Gregory and Hellman, [174] both the length and breadth measurements of P^3 exceed those of P^4. I have a cast of the type specimen of *Plesianthropus transvaalensis* (fig. 2), which had been generously sent to me by the late Dr. Broom in 1940. In this cast the length of P^3 is greater than that of P^4, but the breadth of the latter far exceeds that of the former, yielding a higher robustness value. In the measurements of this type specimen given by

[169] Broom, 1946, pp. 95-96.

[170] Robinson, 1953, p. 2.

[171] The height used is the middle height.

[172] Gregory and Hellman, 1939, p. 347.

[173] *Ibid.*

[174] According to Gregory and Hellman (1939, p. 347) the length and breadth measurements of P^3 are respectively 9.50 and 12.60 mm. and the corresponding dimensions of P^4 are 8.70 and 12.50 mm.

Broom [175] and Robinson [176] the breadth of P^4 also exceeds that of P^3, yielding again a greater robustness value than in the latter. In view of these, it seems possible that there may have been a recording error in the measurements of the type specimen of *Plesianthropus transvaalensis* given by Gregory and Hellman. [177] Thus in possessing a larger P^3 than P^4, *Meganthropus africanus* Weinert appears to differ from all the known australopithecines.

The Third Upper Molar:

The left M^3 from the Serengeti district attributed to *Meganthropus africanus* Weinert by Weinert [178] and Remane [179] is a four-cusped tooth, which is worn in the human fashion.[180] Regarding this tooth Remane states: "*In seiner Form entspricht er etwa den* Sinanthropus-*Molaren. Der Metaconus ist-wie es gelegentlich bei Mensch und Anthropoiden vorkommt-klein, der Hypoconus weit vorragend.*" [181] As can be seen from the drawings published by Remane, [182] this third upper molar differs from those of *Plesianthropus transvaalensis*, [183] the type specimen of *Paranthropus robustus* Broom and *Paranthropus crassidens* [184] in having, in mesial or distal views, a less inclined lingual surface. The inclinations of both the lingual and buccal surfaces of this tooth, in mesial or distal views, are, on the other hand, near those of the third upper molar of *Sinanthropus pekinensis*, figured by Weidenreich.[185]

As has been described and illustrated by Remane, [186] in this third upper molar from the Serengeti district the mesio-buccal and the lingual roots are fused to a large extent and the two buccal roots are relatively short. In having its mesio-buccal and lingual roots

[175] Broom, 1939, pp. 305-306; Broom, 1946, pp. 58-59.
[176] Robinson, 1953, p. 2.
[177] Gregory and Hellman, 1939, p. 347.
[178] Weinert, 1950.
[179] Remane, 1951 and 1954.
[180] See Remane, 1951, fig. 4.
[181] *Ibid.*, p. 315.
[182] *Ibid.*, fig. 4b-c.
[183] See Broom, 1946, pl. VI, figs. 45, 48 and 49.
[184] See Broom and Robinson, 1952, fig. 38.
[185] Weidenreich, 1937, pl. XVI, fig. 135.
[186] Remane, 1951, pp. 315-316 and fig. 4.

fused to a large extent, this tooth differs from the third upper molars of *Plesianthropus transvaalensis* and *Paranthropus crassidens*, figured respectively by Broom [187] and Broom and Robinson, [188] in which these roots are not united, and approach some specimens of *Sinanthropus pekinensis* depicted by Weidenreich. [189]

Regarding the pulp cavity of this third upper molar, Remane states: "*Die Pulpa war also offenbar grösser als beim rezenten Menschen, aber nur etwa so gross wie bei* Sinanthropus, *nicht vom voll 'taurodonten' Typus.*" [190] From this description it would appear that this third upper molar presents a moderate degree of taurodontism, which is characteristic of *Sinanthropus* [191] and also appears to be the case in M^2 of *Africanthropus njarasensis* Weinert.[192] The occurrence of tauro-

[187] Broom, 1946, pl. VI, figs. 45, 48 and 49. The tooth shown in pl. VI, fig. 5 by Broom (1946), is the one first described by Shaw (1940) which was subsequently attributed to *Plesianthropus transvaalensis* by Broom (1946, p. 63 and p. 101). As can be seen from fig. 5, in M^3 of the type specimen of *Plesianthropus transvaalensis*, behind the crista obliqua, there is a secondary ridge (see Shaw, 1940, p. 150), that connects the hypocone with the metacone, in which this tooth resembles the upper molars of some forms of *Dryopithecus* (see Schlosser, 1902, pl. I, fig. 2; Gregory and Hellman, 1926, fig. 5B; Pilgrim, 1915, pl. 3, fig. 1). This secondary ridge (see Gregory and Hellman, 1939, fig. 11 and Broom, 1946, pl. IX, fig. 86) is greatly reduced or lost in M^3 of the type specimen of *Paranthropus robustus*, which appears to be the case also in M^3 of *Paranthropus crassidens* (see Broom and Robinson, 1952, fig. 38). A glance at fig. 6 will show that in the left M^3 from Sterkfontein described by Shaw (1940), also there is a curved ridge extending from the hypocone toward the disto-buccal corner of the crown, toward a small wrinkle at this corner, the two being separated by a short furrow. This structure described no doubt represents a somewhat reduced secondary ridge, which is better developed in M^3 of the type specimen of *Plesianthropus transvaalensis*. The presence of this secondary ridge further confirms the late Broom's (1946) conclusion that this tooth described by Shaw (1940) belongs to *Plesianthropus*.

[188] Broom and Robinson, 1952, fig. 38. Regarding the buccal roots of a specimen of M^3 of *Paranthropus crassidens*, Broom and Robinson (1952, p. 50) state: "*In a third tooth only the buccal roots are preserved and these are appreciably smaller and shorter than are those of the other two third molars.*"

[189] Weidenreich, 1937, pl. XVI, fig. 135.

[190] Remane, 1951, p. 316.

[191] Weidenreich, 1937, pp. 103-109.

[192] Remane, in Weinert, 1939, p. 303. It is also of interest to note that according to Shaw (1940, p. 149) a third upper molar from Sterkfontein, described by him but subsequently attributed to *Plesianthropus transvaalensis* by Broom (1946), is also taurodont.

dontism in this third upper molar from the Serengeti district, in *Sinanthropus pekinensis* and *Africanthropus njarasensis* shows that a moderate degree of taurodontism is a characteristic of the primitive hominids, as has been concluded.[193]

The measurements of the third upper molars are listed in Table 8. As the tooth from the Serengeti district is worn, which especially affects the median length (10.1 mm.), [194] in this table the maximum length of the tooth, occurring on the inner side according to Remane,[195] is utilized. The robustness value of the Serengeti tooth is smaller than those of all available specimens of *Plesianthropus transvaalensis*, *Paranthropus robustus* and *Paranthropus crassidens*. The Serengeti tooth, in size, exceeds those of *Sinanthropus pekinensis* and the recent hominids listed. However, it is to be noted that the maximum robustness value of the East Greenland Eskimos is only slightly less than that of the Serengeti molar. So it appears that some exceptionally large teeth of recent man may come near to the Serengeti molar in size. In crown index the Serengeti tooth is in the range of variation of both anthropoids and hominids.

From the account given above it is clear that P^3 and P^4 of *Meganthropus africanus* Weinert are, in size, in the range of *Plesianthropus transvaalensis*, while the M^3 from the Serengeti district is much smaller than the minimum of *Plesianthropus transvaalensis*. Although, as is known, the third upper molar of the anthropoids and hominids is a variable tooth, still it is to be noted that relative to the upper premolars from the Serengeti district, M^3 from the same region is much smaller, comparatively speaking, than the third upper molars of *Plesianthropus transvaalensis*, *Paranthropus robustus* and even most individuals of *Sinanthropus pekinensis*. [196] Thus, the relatively small size of this M^3, would be against its inclusion in the same species with the maxillary fragment from the same region, designated as *Meganthropus africanus*. The relatively small size of this tooth, together with the fusion of its mesio-buccal and lingual roots and its general

[193] Şenyürek, 1939, p. 128.

[194] Remane, 1951, p. 315.

[195] *Ibid.*, p. 315.

[196] In the following list the robustness values of the third upper molars are expressed as percentages of those of P^3 and P^4:

resemblance to M^3 of *Sinanthropus pekinensis*, suggests that it may belong to a form more advanced from the phylogenetic standpoint than the maxillary fragment from the Serengeti district labelled as *Meganthropus africanus* by Weinert [197] and Remane [198] and *Plesianthropus transvaalensis*.

SYSTEMATIC POSITION OF THE REMAINS ATTRIBUTED TO MEGANTHROPUS AFRICANUS WEINERT

The comparisons that have been made clearly show that the maxillary fragment from the Serengeti District of Tanganyika Territory is a member Hominidae that comes nearer to the Australopithecinae than to the other hominids. The genera and species of Australopithecinae, which is a subfamily of the Family Hominidae, have so far been variously classified by various authors.[199] Among the classifications of South African Australopithecinae advanced, that

	Robustness value of $M^3 \times 100$ / Robustness value of P^3	Robustness value of $M^3 \times 100$ / Robustness value of P^4
Teeth from Serengeti District, attributed to *Meganthropus africanus* by Weinert & Remane. After the measurements of Remane, 1951.	120.00	124.57
Plesianthropus transvaalensis. Type. After the measurements of Şenyürek, 1941.	177.17	175.98
Paranthropus robustus. Type. After the measurements of Broom, 1946.	156.79	141.42
Sinanthropus pekinensis. Individual II. After the measurements of Weidenreich, 1937.	—	122.00
Sinanthropus pekinensis. Individual L II. Right side. After the measurements of Weidenreich, 1937.	162.47	160.13
Sinanthropus pekinensis. Individual OI. After the measurements of Weidenreich, 1937.	132.00	151.17

[197] Weinert, 1950.

[198] Remane, 1951.

[199] See Broom, 1950, p. 12; Mayr, 1950, pp. 113-114; Washburn and Patterson, 1951, p. 651; Robinson 1954b, p. 169,

proposed recently by Robinson[200] who recognizes two genera, viz., *Paranthropus* and *Australopithecus* appears to fit the situation quite satisfactorily, with the exception of Serengeti maxilla.

The premolars of the maxillary fragment from the Serengeti district differ conspicuously from those of the genus *Paranthropus* (including *Paranthropus robustus* and *Paranthropus crassidens*) in size and in a number of morphological features, as discussed, so there cannot be any doubt that it does not belong to this genus. In size and also in some morphological features the upper premolars of the Serengeti maxilla come nearer to those of *Australopithecus*[201] than to *Paranthropus*. But still a careful study reveals numerous important differences. For the sake of clearness in the comparisons made below the original names of the fossil forms now included in genus *Australopithecus* by Robinson[202] are utilized together with the new nomenclature proposed by this author.

As the skull of *Australopithecus africanus* Dart from Taungs, now called *Australopithecus africanus africanus* by Robinson[203] is that of a juvenile individual in whom the upper premolars had not yet replaced the milk molars, a comparison between the Serengeti maxilla and this Taungs find is not possible. The Serengeti maxilla differs from that of *Australopithecus prometheus* Dart, now designated *Australopithecus africanus transvaalensis* by Robinson,[204] in the stronger inclination of the buccal surface of P^3, in having 3 roots in this tooth, in the smoothness of the chewing surface of P^4, in the preponderance of the buccal surface of P^3 over that of P^4 and in having a P^3 that is larger than P^4. The Serengeti maxilla is distinguished from that of *Plesianthropus transvaalensis* Broom, now included in *Australopithecus africanus transvaalensis* by Robinson,[205] in the stronger inclination of the buccal and lingual surfaces of P^3, in the stronger bulge at the base of the buccal surface of this tooth, in the assymetry of the buccal surface of P^3 in occlusal view, in the higher tip of the buccal cusp

[200] Robinson, 1954a, pp. 269-270; Robinson, 1954b, p. 196.
[201] In the sense used by Robinson, 1954b.
[202] *Ibid.*, p. 196.
[203] *Ibid.*, p. 196.
[204] *Ibid.*, p. 196.
[205] *Ibid.*, p. 196.

of P^3, probably in the assymetry of the enamel margin of the buccal surface of this tooth, in the smoothness of the chewing surface of P^4, in the preponderance of the length of buccal surface proper of P^3 as compared with that of P^4, and in the larger size of P^3 than that of P^4. These differences which distinguish it from *Australopithecus prometheus* Dart and *Plesianthropus transvaalensis* Broom clearly show that the Serengeti maxilla cannot be placed in a subspecies of *Australopithecus africanus*, viz., *Australopithecus africanus transvaalensis*, as has been done by Robinson[206] and not even in genus *Australopithecus*.

In the greater inclination of the buccal surface of P^3 in the assymetry of the buccal surface of P^3 in occlusal view, probably in the assymetry of the enamel margin of the buccal surface of P^3, in the smoothness of the chewing surface of P^4, in the lower crown index of P^3, in the larger length of the buccal surface proper of P^3 than that of P^4 and in the larger size of P^3 as compared with P^4, the Serengeti maxilla falls beyond the ranges of variation of the genera *Paranthropus* and *Australopithecus*. In my opinion the conspicuous differences which distinguish the Serengeti maxilla, labelled as *Meganthropus africanus* by Weinert,[207] from *Paranthropus* and *Australopithecus* entitle it to a separate generic rank. Thus, taking the generic name used by Hennig[208] who did not add to it a specific name, and the specific name employed by Weinert,[209] I propose to rename this maxillary fragment from the Serengeti district as *Praeanthropus africanus*.

By analogy with the South African australopithecines, who had adopted a bipedal gait, it may be supposed that *Praeanthropus africanus* also had assumed the bipedal posture in his locomotion.

As the Kageran beds of East Africa, according to Oakley,[210] appear to correspond in age roughly to the Djetis beds of Java, which have yielded the remains of *Meganthropus palaeojavanicus* and *Pithecanthropus modjokertensis*, *Praeanthropus africanus* may not be considered to be the direct ancestor of the more advanced Pleistocene hominids.

[206] *Ibid.*, p. 196.
[207] Weinert, 1950, p. 139.
[208] Hennig, 1948, p. 214.
[209] Weinert, 1950, p. 139.
[210] Oakley, 1954, p. 19.

It would seem that *Praeanthropus africanus* probably represents a somewhat modified survivor of a Pliocene form that might have been related to the direct ancestors of the more advanced early Pleistocene hominids.

The isolated third upper molar from the Serengeti District also belongs to a member of Hominidae, but probably to a form more advanced from the phylogenetic standpoint than *Praeanthropus africanus* and also more advanced than *Australopithecus* and *Paranthropus*. It appears to me not improbable that this isolated molar might have belonged, strictly morphologically speaking, to a form intermediate in a general way between *Praeanthropus africanus*, *Australopithecus* and *Paranthropus* on the one hand and *Pithecanthropus*, *Sinanthropus* and *Africanthropus* level on the other. However, whether this is so or not can be settled only when more specimens from the Laetolil beds of East Africa are brought to light.

Broom[211] and Dart[212] have already expressed the opinion that *Australopithecus* had made use of some sort of weapons in obtaining his food. Broom has also deduced that he "*hunted in packs.*" [213] In a more recent article, Dart infers that *Australopithecus* had utilized the ungulate humeri found in the same breccia to kill his prey. [214] Bartholomew and Birdsell, in an interesting paper published in 1953, infer from the small size of the canines and the hominid features of their dentitions that australopithecines had made use of some weapons.[215]

We have already seen that *Praeanthropus africanus* possessed a relatively small canine. From this, following Bartholomew and Birdsell's line of reasoning, it may be assumed that in securing his food, he probably relied on the use of some weapons of bone, wood or stone.

It has been known for some time that the Kageran beds of East Africa contained "*Pebble tools*" of Kafuan culture.[216] Leakey states

[211] Broom, 1934, p. 140; Broom, 1946, p. 28.
[212] Dart, 1940, p. 178.
[213] Broom, 1946, p. 31; see also Broom, 1934, p. 140.
[214] Dart, 1949a, p. 12.
[215] Bartholomew and Birdsell, 1953, p. 490.
[216] See Leakey, 1953, p. 66.

regarding the Kafuan pebble tools: "*A proportion of the forms attributed to the earliest Kafuan culture (a term first used by E. J. Wayland in Uganda) are not unquestionably of human workmanship, but there is no doubt whatsoever about the later Kafuan forms, nor of the Oldowan (see fig. 5) culture types which are developed from them.*" [217] Thus the question arises as to whether these pebble tools might belong to *Praeanthropus africanus* and to the form represented by the isolated molar. However, while *Praeanthropus* and the form represented by the isolated third upper molars probably made use of some sort of weapon, it is difficult, at the present stage of our knowledge, to state anything definite in this regard, till they are found in association with these pebble tools. This question will be settled only when more extensive researches are carried out in the Kageran beds of East Africa. Till then I prefer to leave the question of ownership of these pebble tools as an open one.

CONCLUSION

1. The maxillary fragment from the Serengeti district of Tanganyika Territory, designated as *Meganthropus africanus* by Weinert[218] and Remane, [219] in the morphology of its teeth comes closer to the australopithecines of South Africa than to the other hominids. But still this form differs from *Australopithecus* and *Paranthropus* in a number of features which, in my opinion, entitle it to a separate generic rank. I propose to rename this form, which belongs to the family Hominidae, as *Praeanthropus africanus*. [220]

2. The isolated third upper molar from the Serengeti district, found 6 or 3 kilometers away from the maxillary fragment, also belongs to Hominidae, but probably to a form more advanced from the morphological standpoint than *Praeanthropus africanus*, *Australopithecus* and *Paranthropus*.

[217] *Ibid.*, p. 66.

[218] Weinert, 1950, p. 139.

[219] Remane, 1951, p. 311.

[220] The generic name is after Hennig (1948) and the specific name is after Weinert (1950).

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EXPLANATION OF THE FIGURES

Fig. 1. The buccal view of P^3 of a female *Gorilla.* Enlarged about twice. Drawn from original specimen.

Fig. 2. Occlusal view of P^3, P^4, M^1 and M^2 of *Plesianthropus transvaalensis* Broom *(Australopithecus africanus transvaalensis)*. Enlarged about twice. Drawn from cast.

Fig. 3. Occlusal view of P^3, P^4, M^1 and M^2 of *Australopithecus prometheus* Dart *(Australopithecus africanus transvvaalensis)*. Enlarged about twice. Drawn from cast.

Fig. 4. Occlusal view of P^4, M^1 and M^2 of *Paranthropus robustus* Broom *(Paranthropus robustus robustus)*. Enlarged about twice. Drawn from cast. [221]

Fig. 5. Occlusal view of M^3 of *Plesianthropus transvaalensis* Broom *(Australopithecus africanus transvaalensis)*. Enlarged about twice. Drawn from cast (Upper part of the lingual root also is shown).

Fig. 6. Occlusal view of M^3 of *Plesianthropus transvaalensis* Broom *(Australopithecus africanus transvaalensis)*. The tooth first described by Shaw [1940]. Enlarged about twice. Drawn from cast.

[221] In this drawing the contact surface beyween M^1 and M^2 appears narrower than it actually is.

TABLE 1

The Mesio - Distal Diameter of the Upper Permanent Canine[1]

	Average	Range
Pongo (♂). Şenyürek.	[5] 17.51	15.70-21.00
Pongo (♀). Şenyürek.	[8] 13.01	12.00-14.00
Gorilla (♂). Şenyürek.	[12] 22.47	19.00-25.80
Gorilla (♀). Şenyürek.	[1] 16.90[2]	—
Pan (♂). Şenyürek.	[3] 14.38	14.20-14.60
Pan (♀). Şenyürek.	[8] 11.56	9.70-13.70
Pan (♂ + ♀)[3]. Şenyürek.	[12] 12.40	9.70-14.60
Gigantopithecus blacki v. Koenigswald. von Koenigswald, 1952.	[1] 13.10	—
Meganthropus africanus Weinert. Remane, 1951.	10.00-11.00	—
Plesianthropus transvaalensis Broom (♂). Broom and Robinson, 1950.	10.90 (Prob. 11.30)	—
Plesianthropus transvaalensis Broom. S2 (♀). Broom, 1939.	8.80 (Est. 9.20)	—
Plesianthropus transvaalensis Broom. S2 (♀). Broom, 1946.	8.80 (Est. 9.10)	—

[1] The figures in brackets before the average values show the number of individuals in the series measured by me. The anthropoids listed were measured by me in 1938—1939 and 1946—1947 in the United States at the Museum of Comparative Zoology of Harvard University, American Museum of Natural History in New York and the United States National Museum in Washington, D.C.

On this occasion I wish to extend my thanks to the Ministry of Education of the Republic of Turkey and to the University of Ankara for having sent me in 1946 to the United States to continue my researches on the dentition of Primates and to the Wenner-Gren Foundation for Anthropological Research of New York City for having extended to me an additional grant.

[2] Average of the right and left sides (16.80-17.00).

[3] One chimpanzee of unknown sex is included.

TABLE 1 (Continued)

The Mesio - Distal Diameter of the Upper Permanent Canine

	Average	Range
Plesianthropus transvaalensis Broom. S2 (♀). Gregory and Hellman, 1939.	8.60	—
Plesianthropus transvaalensis Broom. Isolated tooth (♀). Broom, 1946.	10.00	—
Paranthropus crassidens. Atypical tooth. Broom and Robinson, 1952.	10.60	—
Paranthropus crassidens. Average calculated from range given by Broom and Robinson, 1952.	[6] 8.65	8.30-9.00
Pithecanthropus modjokertensis v. Koenigswald *(Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	9.50	—
Sinanthropus pekinensis Black. Average calculated from Weidenreich, 1937.	[6] 9.43	8.50-10.50
Africanthropus njarasensis Weinert. Remane, in Weinert, 1939.	9.00 (Prob. 9.10-9.20)	—
Australian aborigines. Campbell, 1925.	[116] 8.43	6.50-9.50
Pecos Indians. Nelson, 1938.	[86] 8.05	7.00-9.17
East Greenland Eskimos. Pedersen, 1949.	[16] 7.80	7.00-8.40
Bantu. Shaw, 1931.	[66] 7.60	7.00-8.50
Bushman tribe. Drennan, 1929.	[26] 7.50	7.00-8.30
Recent Whites.[4] Black, 1902.	7.60	—
Homo sapiens.[5] Şenyürek, 1940, 1941, 1946 and 1952.	[17] 7.89	6.70-8.70

[4] In the tables listed the figures for recent whites are after Black (1902), cited by Campbell (1925), Drennan (1929), Shaw (1931) and Nelson (1938).

[5] In the tables listed the group given as *Homo sapiens* is a mixed series consisting of whites, ancient Egyptians, American Indians, Negroes and Melanesians which I had measured at the Peabody Museum of Harvard University in 1938—1939.

TABLE 2 [1]
The Mesio - Distal Diameter of Upper Canine Relative to the Mesio - Distal Diameters of P^3 and P^4

	C^1 Length	P^3 Length	P^4 Length	Index I C^1 length × 100 / P^3 length	Index II C^1 length × 100 / P^4 length
Pongo (♂). Şenyürek.	(5) 17.51	(5) 10.16	(5) 9.50	172.86 [156.14-207.07]	184.39 [171.15-213.54]
Pongo (♀). Şenyürek.	(8) 13.01	(8) 9.80	(8) 9.15	132.89 [117.64-142.39]	142.57 [133.33-160.91]
Gorilla (♂). Şenyürek.	(12) 22.47	(12) 12.32	(12) 11.47	182.40 [163.33-198.24]	196.49 [166.10-228.57]
Gorilla (♀). Şenyürek.	(1) 16.90	(1) 11.80	(1) 11.20	143.22	150.89
Pan (♂). Şenyürek.	(3) 14.38	(3) 8.30	(3) 7.36	173.45 [167.81-179.37]	195.39 [189.61-199.99]
Pan (♀). Şenyürek.	(8) 11.56	(8) 8.01	(8) 6.91	144.10 [124.36-165.66]	165.76 [136.61-188.80]
Pan (♂ + ♀). Şenyürek.	(12) 12.40	(12) 8.06	(12) 7.05	153.72 [124.36-179.37]	174.63 [136.61-199.99]
Meganthropus africanus Weinert. Remane, 1951.	(max.) 11.00	9.60	9.10	114.58	120.87
Plesianthropus transvaalensis Broom. S2. Broom, 1939 and 1946.	8.80	8.70	—	101.14	—
Plesianthropus transvaalensis Broom. S2. Gregory and Hellman, 1939.	8.60	8.50	—	101.17	—
Plesianthropus transvaalensis Broom. Broom and Robinson, 1950 and Robinson, 1953.	10.90 [2]	9.50 [3]	9.30 [3]	114.71	117.20

[1] In this table in the series measured by me, the figures in parentheses above the averages show the number of individuals measured and the figures in brackets below the averages denote the range. In the series measured by me in this table the indices were calculated from the skulls having C^1, P^3 and P^4 *in situ*. The indices of the material taken from the literature have been calculated by me.

[2] The isolated male canine measured by Broom and Robinson, 1950, p. 40.

[3] The maximum mesio-distal diameters of P^3 and P^4 of *Plesianthropus transvaalensis* Broom, given by Robinson, 1953, p. 2.

TABLE 2 (Continued)
The Mesio - Distal Diameter of Upper Canine Relative to the Mesio - Distal Diameters of P^3 and P^4

	C^1 Length	P^3 Length	P^4 Length	Index I C^1 length × 100 / P^3 length	Index II C^1 Length × 100 / P^4 length
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	9.50	8.35[4]	8.35[4]	113.77	113.77
Sinanthropus pekinensis Black. Individual FIV (♂). Weidenreich, 1937.	10.50	9.20	—	114.13	—
Sinanthropus pekinensis Black. Individual LI (♀). Weidenreich, 1937.	8.50 (left)	8.70 (right)	—	97.70	—
Sinanthropus pekinensis Black. Averages calculated from Weidenreich, 1937.	(6) 9.43	(4) 8.32	(8) 7.93	113.34	118.91
Africanthropus njarasensis Weinert. Remane, in Weinert, 1939.	9.00	7.90	—	113.00	—
Australian aborigines. Campbell, 1925.	(116) 8.43	(124) 7.81	(89) 7.20	107.93	117.08
Pecos Indians. Nelson, 1938.	(86) 8.05	(82) 7.43	(88) 7.01	108.33	114.83
East Greenland Eskimos. Pedersen, 1949.	(16) 7.80	(15) 7.50	(17) 6.80	104.00	114.70
Bantu. Shaw, 1931.	(66) 7.60	(62) 7.20	(87) 7.00	105.55	108.57
Bushman tribe. Drennan, 1929.	(26) 7.50	(27) 6.80	(28) 6.50	110.29	115.38
Recent Whites. Black, 1902.	7.60	7.20	6.80	105.55	111.76
Homo sapiens. Şenyürek.	(15) 7.92	(15) 6.95	(15) 6.72	114.99 [106.34-126.86]	118.22 [104.68-130.15]

[4] Averages of right and left P^3 and P^4 of *Pithecanthropus modjokertensis* v. Koenigswald (*Pithecanthropus robustus*) given by Weidenreich, 1945, p. 28. According to Weidenreich (1945, p. 28) the mesio-distal diameter of both the right and left canine of *Pithecanthropus modjokertensis* is 9.5 mm.

TABLE 3[1]

Length and Breadth Measurements of P^3

	Length (Mesio-distal diameter)	Breadth (Bucco-lingual diameter)	Robustness Value[2]	Crown Index[3]
Pongo (♂). Şenyürek.	[5] 10.16 (9.70-11.40)	[5] 12.68 (11.80-13.70)	129.13 (118.00-156.18)	124.97 (118.00-131.31)
Pongo (♀). Şenyürek.	[9] 9.80 (9.20-10.40)	[9] 11.69 (11.00-13.00)	114.65 (103.40-130.00)	119.47 (111.88-141.30)
Gorilla (♂). Şenyürek.	[13] 12.35 (10.30-13.00)	[13] 16.16 (14.20-18.60)	200.20 (161.71-241.80)	131.10 (121.42-152.42)
Gorilla (♀). Şenyürek.	[1] 11.80[4]	[1] 15.10[4]	178.20	127.98
Pan (♂). Şenyürek.	[4] 8.40 (8.00-8.70)	[4] 10.88 (9.50-12.00)	91.49 (76.00-104.40)	129.54 (118.75-140.24)
Pan (♀). Şenyürek.	[8] 8.01 (7.30-8.60)	[8] 9.31 (8.90-9.80)	74.68 (64.97-79.80)	116.43 (104.65-124.00)
Pan (♂ + ♀).[5] Şenyürek.	[15] 8.03 (7.00-8.60)	[15] 9.98 (8.90-11.10)	80.23 (64.97-85.47)	124.72 (104.65-151.42)
Meganthropus africanus Weinert. Remane, 1951.	9.60	12.30	118.08	128.12

[1] In this table, with the exception of the crown indices of all groups of recent man and robustness values of the East Greenland Eskimos, the robustness values and crown indices of the material taken from the literature have been calculated by me. In the series measured by me, the figures in brackets before the averages denote the number of individuals and the figures in parentheses below the averages show the range.

[2] Robustness value=length × breadth.

[3] Crown index $= \frac{\text{Breadth} \times 100}{\text{Length}}$.

[4] Average of two sides.

[5] Three chimpanzees of unknown sex are included.

TABLE 3 (Continued)

Length and Breadth Measurements of P^3

	Length (Mesio-distal diameter)	Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
Plesianthropus transvaalensis Broom. Type. Broom, 1939.	9.20 (est. 8.90)	12.20 (est. 11.70)	112.24	132.60
Plesianthropus transvvaalensis Broom. Type. Broom, 1946.	9.20	12.30	113.16	133.69
Plesianthropus transvaalensis Broom. Type. Gregory and Hellman, 1939.	9.50	12.60	119.70	132.63
Plesianthropus transvaalensis Broom. Type. Şenyürek, 1941.	9.10	12.20	111.02	134.06
Plesianthropus transvaalensis Broom. S2. Broom, 1939 and 1946.	8.70 (est. 9.00)	12.00	104.40	137.93
Plesianthropus transvaalensis Broom. S2. Gregory and Hellman, 1939.	8.50	11.60	98.60	136.47
Averages of 6 specimens of *Plesianthropus transvaalensis* Broom, calculated from the measurements given by Robinson, 1953.	[6] 9.05 (8.60-9.50)	[6] 12.71 (12.00-13.60)	115.21 (104.40-129.20)	140.56 (133.69-151.16)
Australopithecus prometheus Dart. Dart, 1949b.	8.50	11.70	99.45	137.64
Paranthropus robustus Broom. Type. Broom, 1946.	10.50	13.80	144.90	131.42
Paranthropus robustus Broom. Type. Broom and Robinson, 1952.	10.30	13.80	142.14	133.98
Paranthropus robustus Broom. Type. Robinson, 1953.	10.30	13.80	142.14	133.98

TABLE 3 (Continued)

Length and Breadth Measurements of P^3

	Length (Mesio-distal diameter)	Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
Paranthropus crassidens. Robinson, 1953.	9.60	13.80	132.48	143.75
Paranthropus crassidens. Averages calculated from the ranges of measurements of 9 specimens given by Broom and Robinson, 1952.	[9] 9.90 (9.30-10.50)	[9] 14.35 (13.40-15.30)	142.06	144.94
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	8.35[6]	12.40[6]	103.54	148.68
Sinanthropus pekinensis Black. Averages and indices calculated from Weidenreich, 1937.	[4] 8.32 (7.40-9.20)	[4] 11.87 (10.50-12.80)	99.59 (77.70-118.26)	142.71 (139.13-145.00)
Africanthropus njarasensis Weinert. Remane, in Weinert, 1939.	7.90 (est.8.10-8.20)	10.40	82.16	131.64
Australian aborigines. Campbell, 1925.	[124] 7.81 (7.00-9.00)	[163] 10.30 (8.50-12.00)	80.44	132.10
Pecos Indians. Nelson, 1938.	[82] 7.43 (6.54-8.42)	[82] 9.89 (8.78-11.00)	73.48	133.10 (118.30-157.90)
East Greenland Eskimos. Pedersen, 1949.	[15] 7.50 (6.60-8.60)	[20] 9.20 (6.80-10.50)	[15] 68.70 (49.00-81.20)	[15] 122.90 (104.70-136.10)
Bantu. Shaw, 1931.	[62] 7.20 (6.50-8.50)	[62] 9.00 (7.00-10.00)	64.80	132.40 (105.80-150.00)
Bushman tribe. Drennan, 1929.	[27] 6.80 (6.00-7.80)	[25] 8.60 (7.80-9.50)	58.48	126.90
Recent Whites. Black, 1902.	7.20	9.10	65.52	126.40
Homo sapiens. Şenyürek, 1940, 1941, 1946 and 1952.	[19] 6.96 (6.20-7.70)	[19] 9.39 (8.20-10.70)	65.31 (50.84-82.39)	134.91 (123.28-146.15)

[6] Averages of two sides given by Weidenreich, 1945.

TABLE 4[1]

Height Measurements and Height Indices of P^3

	Buccal Height	Ht. × 100 / Length	Ht. × 100 / Breadth
Pongo (♂). Şenyürek.	[4]) 10.67 (10.00-11.30)	[4] 108.44 (101.01-115.46)	[4] 85.91 (76.92-91.05)
Pongo (♀). Şenyürek.	[6] 10.00 (8.60-11.10)	[6] 101.95 (87.75-113.26)	[6] 86.94 (74.13-100.00)
Gorilla (♂). Şenyürek.	[9] 12.70 (11.40-13.60)	[9] 101.48 (96.52-110.93)	[9] 78.36 (67.73-87.32)
Gorilla (♀). Şenyürek.	11.30[2]	95.80[2]	74.84[2]
Pan (♂). Şenyürek.	[4] 7.77 (7.00-8.30)	[4] 93.15 (87.50-101.21)	[4] 72.14 (65.00-78.30)
Pan (♀). Şenyürek.	[6] 7.00 (6.50-7.20)	[6] 86.57 (76.47-98.63)	[6] 76.00 (69.89-80.89)
Pan (♂+♀). Şenyürek.	[11] 7.40 (6.50-8.30)	[11] 90.53 (76.47-103.75)	[11] 75.17 (65.00-83.00)
Meganthropus africanus Weinert. Remane, 1951.	10.40	108.33	84.55
Meganthropus africanus Weinert. Height after Şenyürek; length and breadth after Remane, 1951.	10.50	109.37	85.36
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	8.55+[3]	102.39+	68.95+
Sinanthropus pekinensis Black. Individual F IV. Weidenreich, 1937.	[1] 9.70	[1] 105.43	[1] 75.78
Pecos Indians. Nelson, 1938.	[82] 7.95	106.99	80.38
Bantu. Shaw, 1931.	[62] 7.90 (7.00-8.50)	109.72	87.77
Bushman tribe. Drennan, 1929.	[17] 6.60	97.05	76.74
Homo sapiens. Şenyürek, 1940, 1946 and 1952.	[18] 8.06 (6.70-9.00)	[18] 115.61 (100.00-130.64)	[18] 85.60 (75.70-98.78)

[1] The indices of the material taken from the literature have been calculated by me. In the series measured by me the figures in brackets before the averages denote the number of individuals and the figures in parentheses below the averages show the range

[2] Averages of two sides.

[3] Averages of two sides given by Weidenreich, 1945.

TABLE 5 [1]
Length and Breadth Measurements of P^4

	Length (Mesio-distal diameter)	Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
Pongo (♂). Şenyürek.	[5] 9.50 (9.00-10.40)	[5] 13.00 (12.30-13.80)	123.72 (110.70-143.52)	136.98 (132.69-144.44)
Pongo (♀). Şenyürek.	[9] 9.07 (8.50-9.60)	[9] 12.07 (11.60-12.90)	109.72 (99.45-117.12)	133.21 (126.08-141.17)
Gorilla (♂). Şenyürek.	[12] 11.36 (10.10-12.70)	[12] 15.75 (14.60-17.80)	178.91 (151.98-210.04)	139.42 (125.98-150.84)
Gorilla (♀). Şenyürek.	11.20 [2]	14.15 [2]	158.48	126.33
Pan (♂). Şenyürek.	[4] 7.37 (7.10-7.70)	[14] 10.61 (10.00-11.30)	78.31 (73.00-87.01)	143.93 (136.98-153.52)
Pan (♀). Şenyürek.	[8] 6.91 (6.10-7.60)	[8] 9.47 (8.80-10.20)	65.57 (55.44-74.48)	138.01 (122.66-167.31)
Pan (♂+♀). Şenyürek.	[15] 7.06 (6.10-7.70)	[15] 9.91 (8.80-11.30)	70.16 (55.44-87.01)	140.92 (122.66-167.31)
Meganthropus africanus Weinert. Remane, 1951.	9.10	12.50	113.75	137.36
Plesianthropus transvaalensis Broom. Type. Broom, 1939.	9.00	12.80	115.20	142.22
Plesianthropus transvaalensis Broom. Type. Broom, 1946.	9.30	12.80	119.04	137.63
Plesianthropus transvaalensis Broom. Type. Gregory and Hellman, 1939.	8.70	12.50	108.75	143.67
Plesianthropus transvaalensis Broom. Type. Şenyürek, 1941.	8.80	12.70	111.76	144.31
Averages of 3 specimens of *Plesianthropus transvaalensis* Broom, calculated from the measurements given by Robinson, 1953.	9.03 (8.50-9.30)	12.76 (12.20-13.30)	115.18 (113.05-119.04)	141.76 (131.18-156.47)
Australopithecus prometheus Dart. Dart, 1949b.	9.40	12.60	118.44	134.04

[1] In this table with the exception of the crown indices of all groups of recent man and robustness values of East Greenland Eskimos, the robustness values and crown indices of the material taken from the literature have been calculated by me. In the series measured by me, the figures in brackets before the averages denote the number of individuals and the figures in parentheses below the averages show the range.

[2] Averages of two sides.

TABLE 5 (Continued)

Length and Breadth Measurements of P^4

	Length (Mesio-distal diameter)	Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
Paranthropus robustus Broom. Type. Broom, 1939.	10.20	15.30	156.06	150.00
Paranthropus robustus Broom. Type. Broom, 1946.	10.5 (max.)	15.30	160.65	145.52
Paranthropus robustus Broom. Type. Gregory and Hellman, 1939.	9.60	15.20	145.92	158.33
Paranthropus robustus Broom. Type. Şenyürek, 1941.	9.90	14.50?	143.55	146.46
Paranthropus robustus Broom. Robinson, 1952.	10.00	15.20	152.00	152.00
Paranthropus crassidens. Robinson, 1953.	10.50	15.80	165.90	150.47
Paranthropus crassidens. Averages calculated from the ranges of measurements of 10 specimens given by Broom and Robinson, 1952.	10.35 (9.20-11.50)	15.55 (14.70-16.40)	160.94	150.24
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	8.35 [3]	12.20[3]	101.87	146.10
Sinanthropus pekinensis Black. Averages and indices calculated from Weidenreich, 1937.	[9] 7.93 (7.20-8.90)	[9] 11.35 (10.30-12.10)	90.42 (74.16-102.96)	143.50 (132.95-152.05)
Australian aborigines. Campbell, 1925.	[89] 7.20 (6.50-8.25)	[168] 10.14 (8.50-12.00)	73.00	140.30
Pecos Indians. Nelson, 1938.	[88] 7.01 (6.32-7.96)	[88] 9.18 (8.12-9.95)	64.35	130.40 (114.00-147.80)
East Greenland Eskimos. Pedersen, 1949.	[17] 6.80 (5.60-7.40)	[21] 9.20 (7.70-10.00)	[17] 61.50 (43.10-74.00)	[17] 130.80 (104.30-147.70)
Bantu. Shaw, 1931.	[87] 7.00 (6.50-8.00)	[87] 9.10 (8.00-10.50)	63.70	135.80 (120.00-146.00)
Bushman tribe. Drennan, 1929.	[28] 6.50 (5.80-7.30)	[26] 8.50 (7.30-9.30)	55.26	131.10
Recent Whites. Black, 1902.	6.80	8.80	59.84	129.40
Homo sapiens. Şenyürek, 1941, 1946 and 1952.	[19] 6.73 (5.80-7.90)	[19] 9.37 (8.40-10.40)	63.27 (48.72-81.37)	139.43 (128.35-151.51)

[3] Averages of two sides given by Weidenreich, 1945.

TABLE 6[1]

Height Measurements and Height Indices of P^4

	Buccal Height	Ht. × 100 / Length	Ht. × 100 / Breadth
Pongo (♂). Şenyürek.	[2] 9.20 (9.00-9.40)	102.22 (100.00-104.44)	72.82 (69.23-76.42)
Pongo (♀). Şenyürek.	[7] 9.47 (8.50-10.50)	103.70 (93.75-114.35)	78.48 (71.37-85.24)
Gorilla (♂). Şenyürek.	[9] 11.66 (11.00-12.80)	100.99 (91.66-107.61)	73.59 (61.80-77.57)
Gorilla (♀). Şenyürek.	[1] 10.45[2]	93.30[2]	74.10[2]
Pan (♂) Şenyürek.	[4] 6.57 (6.30-6.80)	89.21 (85.13-94.36)	62.03 (59.29-65.00)
Pan (♀). Şenyürek.	[5] 6.31 (5.60-6.80)	90.28 (81.33-106.40)	67.43 (60.86-73.86)
Pan (♂ + ♀). Şenyürek.	[10] 6.52 (5.60-7.40)	91.10 (81.33.106-40)	66.08 (59.29-75-51)
Meganthropus africanus Weinert. Remane, 1951.	8.40	92.30	67.20
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	8.00+[3]	95.80+[3]	65.57+[3]
Sinanthropus pekinensis Black. Weidenreich, 1937.	[2] 8.25[4] (8.20-8.30)	96.59 (93.18-100.00)	69.33 (68.59-70.08)
Pecos Indians. Nelson, 1938.	[88] 7.60 (6.76-8.65)	108.41	82.78
Bantu. Shaw, 1931.	[87] 7.70 (6.50-9.00)	110.00	84.61
Bushman tribe. Drennan, 1929.	[15] 6.30	96.92	74.11
Homo sapiens. Şenyürek, 1946 and 1952.	[17] 7.47 (6.00-8.50)	111.22 (94.02-130.76)	79.33 (71.42-89.47)

[1] Indices of the material taken from the literature have been calculated by me. In the series measured by me figures in brackets before the averages denote the number of individuals and those in parentheses below the averages show the range.

[2] Averages of two sides.

[3] Averages of two sides, given by Weidenreich, 1945. The height given for right P^4 by Weidenreich (1945) is 7.5 mm., giving a height-length index of 91.46 and a height-breadth index of 61.98. On the left side height is 8.5 mm., height-length index is 100.00 and the height-breadth index 69.10.

[4] Sinanthropus specimens 27 (♀) and 133′ (♀).

TABLE 7[1]

Measurements of P^3 Relative to those of P^4

	Length of P^3 X100 / Length of P^4	Height of P^3X100 / Height of P^4	Robustness value of P^3X100 / Robustness value of P^4
Pongo (♂). Şenyürek.	[5] 106.96 (102.10-111.11)	[2] 116.77 (113.33-120.21)	[5] 104.34 (96.59-111.54)
Pongo (♀). Şenyürek.	[9] 108.26 (96.84-115.29)	[6] 107.39 (101.06-117.44)	[9] 104.76 (96.87-110.32)
Gorilla (♂). Şenyürek.	[13] 109.04 (98.34-125.74)	[9] 108.91 (101.78-114.54)	[13] 112.12 (99.60-129.34)
Gorilla (♀) Şenyürek.	105.35[2]	108.13[2]	112.44[2]
Pan (♂). Şenyürek.	[4] 113.89 (109.56-115.49)	[4] 119.06 (107.69-129.13)	[4] 116.56 (104.10-121.85)
Pan (♀). Şenyürek.	[8] 117.23 (109.85-136.00)	[5] 109.48 (100.00-128.57)	[8] 114.65 (105.35-137.54)
Pan (♂ + ♀). Şenyürek.	[15] 114.39 (104.47-136.00)	[10] 113.58 (100.00-129.13)	[15] 114.90 (104.10-137.54)
Meganthropus africanus Weinert. Remane, 1951.	105.49	123.80[3]	103.80
Plesianthropus transvaalensis Broom. Type. Broom, 1939.	102.22	—	97.43
Plesianthropus transvaalensis Broom. Type. Broom, 1946.	98.92	—	95.06
Plesianthropus transvaalensis Broom. Type. Gregory and Hellman, 1939.	109.19	—	110.06
Plesianthropus transvaalensis Broom. Type. Şenyürek, 1941.	103.40	—	99.33
Plesianthropus transvaalensis Broom. 3 specimens having both P^3 and P^4. Robinson, 1953.	[3] 98.59 (95.69-101.17)	—	[3] 96.28 (94.91-98.89)
Australopithecus prometheus Dart. Dart, 1949 [b].	90.42	—	83.96
Paranthropus robustus Broom. Type. Broom, 1946.	100.00	—	90.19
Paranthropus robustus Broom. Type. Robinson, 1953.	103.00	—	93.51
Paranthropus crassidens. Robinson, 1953.	91.42	—	79.85
Pithecanthropus modjokertensis v. Koenigswald (*Pithecanthropus robustus* Weidenreich). Weidenreich, 1945.	100.00[4]	106.87[4]	101.63[4]

TABLE 7 (Continued)

Measurements of P^3 Relative to thoşe of P^4

	Length of P^3X100 / Length of P^4	Height of P^3X100 / Height of P^4	Robustness value of P^3X100 / Robustness value of P^4
Sinanthropus pekinensis Black. 3 specimens (individuals LI, LII and OI) containing both P^3 and P^4. Weidenreich, 1937.	[3] 102.89 (97.75-109.58)	—	[3] 103.86 (98.53-114.52)
Sinanthropus pekinensis Black. Calculated from the averages given in Tables 3, 4, 5 and 6.	104.91	117.57	110.14
Australian aborigines. Campbell, 1925.	108.47	—	110.19
Pecos Indians. Nelson, 1938.	105.99	104.60	114.18
East Greenland Eskimos. Pedersen, 1949.	110.29	—	111.70
Bantu. Shaw, 1931.	102.85	102.59	101.72
Bushman tribe. Drennan, 1929.	104.61	104.76	105.82
Recent Whites. Black, 1902.	105.88	—	109.49
Homo sapiens. Şenyürek.	[19] 103.71 (96.87-112.12)	[17] 108.70 (98.52-117.91)	[19]103.22 (86.34-117.10)

[1] The indices of the material taken from the literature have been calculated by me.

In the series measured by me the figures in brackets before the averages show the number of individuals and those below the averages, in parentheses, denote the range. In the series measured by me only individuals having both P^3 and P^4 are utilized.

[2] Averages of two sides.

[3] P^3 height of *Meganthropus africanus* Weinert is the middle height given by Remane, 1951.

[4] Calculated from the averages of two sides given by Weidenreich, 1945.

TABLE 8
Measurements of the Third Upper Molar [1]

	Maximum Length (Mesio-distal diameter)	Maximum Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
Pongo (♂). Şenyürek.	[3] 12.10 (11.80-12.30)	[3] 13.60 (12.90-14.60)	164.97 (158.12-178.12)	112.69 (104.87-119.67)
Pongo (♀). Şenyürek.	[5] 10.76 (9.60-11.50)	[5] 12.79 (12.00-13.60)	137.66 (124.80-156.40)	119.41 (109.56-135.41)
Gorilla (♂). Şenyürek.	[12] 15.42 (14.00-17.50)	[12] 16.28 (15.40-17.80)	251.52 (220.22-306.16)	105.69 (98.25-111.76)
Pan (♂). Şenyürek.	[3] 9.56 (9.20--10.00)	[3] 11.50 (10.80-12.10)	110.18 (99.36-121.00)	120.16 (117.39-122.10)
Pan (♀). Şenyürek.	[7] 8.97 (7.70-10.00)	[7] 10.35 (9.00-11.30)	93.46 (69.30-103.40)	115.53 (109.47-120.00)
Pan (♂ + ♀). Şenyürek.	[12] 9.16 (7.70-10.00)	[12] 10.70 (9.00-12.10)	98.53 (69.30-121.00)	116.94 (108.51-125.55)
The tooth attributed to *Meganthropus africanus* Weinert, by Weinert and Remane. Remane, 1951.	10.90	13.00	141.70	119.26
Plesianthropus transvaalensis Broom. Type. Broom, 1939.	13.80	15.30	211.14	110.86
Plesianthropus transvaalensis Broom. Type. Gregory and Hellman, 1939.	13.20	15.20	200.64	115.15
Plesianthropus transvaalensis Broom. Type. Şenyürek, 1941.	13.20	14.90	196.68	112.87
Plesianthropus transvaalensis Broom. Second individual. Broom, 1939.	13.40	15.10	202.34	112.68
Plesianthropus transvaalensis Broom. Second individual. Broom, 1946.	13.60 (est. 14.30)	15.20	206.72	111.76
Plesianthropus transvaalensis Broom (Referred to *Plesianthropus* by Broom, 1946). Shaw, 1940.	13.00	14.70	191.10	113.07
Plesianthropus transvaalensis Broom (Shaw's tooth, referred to *Plesianthropus* by Broom, 1946). Broom, 1946.	13.10 (est. 13.50)	14.70	192.57	112.21
Plesianthropus transvaalensis Broom (Shaw's tooth, referred to *Plesianthropus* by Broom, 1946). Şenyürek [from cast].	13.10	14.40	188.64	109.92
Plesianthropus transvaalensis Broom. S3. Old male, worn. Broom, 1939.	(12.20)	(14.90)	(181.78)	(122.13)
Plesianthropus transvaalensis Broom. S3. Old male, worn. Broom, 1946.	(12.10) (est. 12.70)	(14.90)	(180.29)	(123.14)
Paranthropus robustus Broom. Type. Broom, 1939.	14.30	16.00	228.80	111.88
Paranthropus robustus Broom. Type. Broom, 1946.	14.20	16.00	227.20	112.67
Paranthropus robustus Broom. Type. Gregory and Hellman, 1939.	13.50	16.00	216.00	118.51
Paranthropus robustus Broom. Type (Right). Şenyürek (From cast).	13.60	15.50	210.80	113.97
Paranthropus robustus Broom. Left. Broom, 1946.	14.60	15.40	224.84	105.47
Paranthropus robustus Broom. Broom and Robinson, 1952.	13.70 14.10	15.80 16.20	216.46 228.42	115.32 114.89
Paranthropus crassidens. Averages of 18 specimens. Broom and Robinson, 1952.	[18] 14.60 (13.50-16.20)	[18] 16.90 (16.00-18.30)	246.74	115.75
Sinanthropus pekinensis Black.[2] Averages calculated from Weidenreich, 1937.	[8] 9.65 (8.70-10.40)	[8] 11.71 (10.90-12.50)	113.36 (90.48-126.25)	121.34 (116.34-127.55)
Australian aborigines. Campbell, 1925.	[142] 10.03 (8.00-13.00)	[193] 12.33 (10.00-15.00)	123.66	113.00
Pecos Indians. Nelson, 1938.	[84] 9.36 (7.89-10.70)	[84] 10.57 (9.24-12.49)	98.93	113.10 (101.20-143.40)
East Greenland Eskimos. Pedersen, 1949.	[35] 9.60 (8.00-11.10)	[35] 11.10 (8.30-13.00)	107.30 (73.90-139.10)	117.20 (93.30-131.30)
Bantu. Shaw, 1931.	[80] 9.50 (8.00-10.50)	[80] 11.00 (8.50-12.50)	104.50	119.60 (94.40-135.20)
Bushman tribe. Drennan, 1929.	[26] 8.20 (7.00-9.80)	[26] 10.30 (9.30-12.00)	84.46	125.70
Recent Whites. Black, 1902.	8.60	10.60	91.16	123.30
Homo sapiens. Şenyürek, 1941, 1946 and 1952.	[12] 8.63 (7.50-9.70)	[12] 10.96 (9.30-12.00)	95.12 (76.80-113.49)	127.08 (117.39-142.85)

[1] With the exception of the crown indices of all groups of recent man and robustness values of the East Greenland Eskimos, the robustness values and crown indices of the material taken from the literature have been calculated by me.

[2] Haberer's tooth has not been included in these averages.

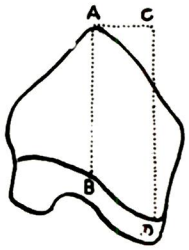

Fig. 1

Fig. 2

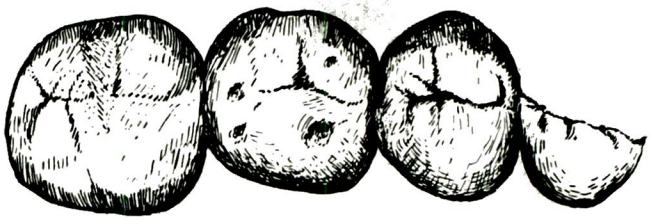

Fig. 3

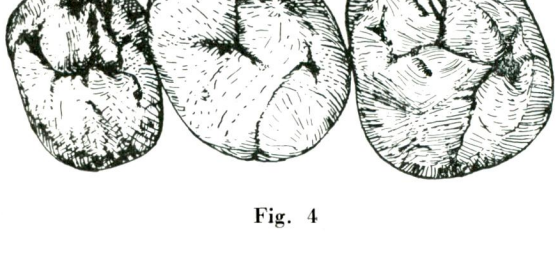

Fig. 4

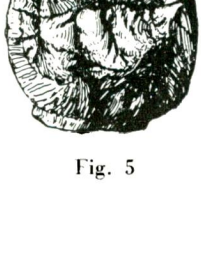

Fig. 5

Fig. 6