T Ü R K T A R İ H K U R U M U

BELLETEN

Cilt: XXI Ocak 1957 Sayı: 81

A NEW SPECIES OF EPIMACHAIRODUS FROM KÜÇÜKYOZGAT

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During the field season of 1956 at Küçükyozgat (Elmadağ) district,[1] I continued excavations at the new fossiliferous locus[2] I had located in 1951, which is just to the southeast of the first fossiliferous locus visited by Tschachtli[3] in 1941. During the course of this excavation I found a fragmentary skull, a mandible and upper and lower teeth, of one individual, belonging to genus *Epimachairodus* Kretzoi[4] and the isolated upper canine of another and larger individual. These remains were found in whitish calcareous marls of lacus-

[1] On this occasion I wish to express my thanks to the Office of the Dean, Professors' Council and the Central Anatolian Research Station of the Faculty on Language, History and Geography of the University of Ankara for a grant to continue my excavations at this place.

[2] For this locus (Küçükyozgat locus 2) see Şenyürek, 1953 a, fig. 3.

[3] See Tschachtli, 1942, pp. 322 and 325. For the locus (Küçükyozgat locus 1) first visited by Tschachtli in 1941 see Şenyürek, 1953 a, fig. 2. In his brief report Tschachtli (Tschachtli, 1942, pp. 324 and 326) notes only the presence of *Hipparion gracile* Kaup, *Sus erymanthius* Roth and Wagner, *Mastodon sp.*, *Tragocerus sp.* and *Gazella sp.* at this place (Küçükyozgat locus 1). As in Küçükyozgat locus 2, in locus 1 also the fossils are found in whitish calcareous marls of lacustrine origin. As has been shown by Erol, these two loci (Küçükyozgat loci 1 and 2) are located on opposite slopes of an anticline (Erol, 1954, p. 94).

[4] Kretzoi, 1929, p. 1310.

trine origin at this place, in the fauna of which (Küçükyozgat fauna), to date, the following genera and species have been determined:[5]

Mastodon (Choerolophodon) pentelici Gaudry and Lartet
Hipparion gracile Kaup
Sus erymanthius Roth and Wagner
Giraffa sp.
Tragocerus amaltheus Roth and Wagner
Palaeoryx pallasi (Wagner sp.)
Helicotragus rotundicornis Weithofer
Oioceros rothii Wagner
Gazella gaudryi Schlosser (*Gazella pilgrimi* Bohlin)
Gazella capricornis Rodler and Weithofer (*Gazella rodleri* Pilgrim)
Gazella eleanorae Şenyürek
Promephitis hootoni Şenyürek[6]

This fauna clearly shows that the beds of lacustrine origin at Küçükyozgat belong, as has already been concluded by Tschachtli[7] and me,[8] to the Pontian stage, that is to the lower Pliocene.[9]

[5] For the fauna of the whitish calcareous marls of lacustrine origin (Küçükyozgat fauna) see Şenyürek, 1953a, p. 2; Şenyürek, 1953b, p. 142; Şenyürek, 1953d, p. 460; Şenyürek, 1954b, p. 280; Şenyürek, 1955, p. 67.

[6] In addition to the above at Küçükyozgat locus 2 were found, in the season of 1955, remains of two additional individuals of *Promephitis*, one of which exhibits some interesting features, and in the seasons of 1955 and 1956 respectively, a skull and a palate belonging to genus *Parataxidea* Zdansky and some teeth belonging to the genus *Ictitherium*. These as well as the hyaenid teeth from Küçükyozgat locus 2 (see Şenyürek, 1954c, p. 29) and the additional remains of *Crocuta eximia* found in 1955 in the heterogeneous calcareous clays of running water origin at Kuyutarla locality (Kuyutarla locus 2), which represents a later horizon of Pontian than the whitish calcareous marls of lacustrine origin (Şenyürek, 1954c, p. 51) will soon be published. In addition to the above there are some remains of rhinoceroses and a large collection of still unstudied material from this region, which will be taken up in due course.

[7] Tschachtli, 1942, pp. 324 and 327.

[8] Şenyürek, 1953a, p. 2; Şenyürek, 1953b, p. 142; Şenyürek, 1953d, p. 460; Şenyürek, 1954b, p. 280; Şenyürek, 1954c, p. 51; Şenyürek, 1955, p. 68.

[9] Abel (in Weber, 1928; p. XVIII), Colbert (1935, fig. 14 and 1955, pp. pp. 427-428), Lewis (1937 p. 194), Papp and Thenius (1949, table VI), Romer (1946, table 4), Şenyürek (1951, 1952, 1953a, 1953b, 1953c, 1953d, 1954a, 1954b, 1954c and 1955), Simpson (1947, table 2), Thenius (1949) and Zittel (1925, p. 300) attribute the Pontian stage to the Lower Pliocene period, instead of the Upper Miocene period.

At the time Kretzoi published his widely quoted paper and coined the generic name, *Epimachairodus*, four species of this genus were known from Europe, three from upper Pliocene of the continent (*Epimachairodus crenatidens*, *Epimachairodus boulei* and *Epimachairodus hungaricus*) and one from the Pleistocene of England (*Epimachairodus latidens*).[10] Subsequently, in his excellent monograph published in 1931, Pilgrim transferred a form from Taraklia in Rumania, described originally as *Machairodus aphanistus* var. *taracliensis* by Riabinin,[11] to genus *Epimachairodus* Kretzoi which thus became *Epimachairodus taracliensis* (Riabinin) and further and rightly attributed to this species a mandible, described by Wagner as *Machaerodus lenoninus* W. and R.,[12] from the Pontian of Pikermi. [13] In 1945 the late Teilhard de Chardin correctly attributed to *Epimachairodus* Kretzoi two species from the Pontian of China described by Zdansky[14] in 1924 as *Machairodus palanderi* and *Machairodus tingii*.[15] Species of *Epimachairodus* have also been reported from the Villafranchian, that is lower Pleistocene (*Epimachairodus cf. crenatidens*) and Pleistocene (Choukoutien) deposits (*Epimachairodus ultimus*) of China.[16] Recently a new Pleistocene species of *Epimachairodus* has been described from Omo, in East Africa, by Arambourg as *Homotherium ethiopicum*. [17] The individual represented by the skull from Küçükyozgat has features which clearly distin-

[10] See Kretzoi, 1929, pp. 1310—1313. Kretzoi has grouped some isolated teeth from Doveholes and Forest Bed in England under the heading of *Epimachairodus Sp.* (Kretzoi, 1929, P. 1313). However, among the teeth from Doveholes, attributed by Dawkins (1903, p. 111) to what is now known as *Epimachairodus crenatidens*, at least one of the fragmentary upper canines, as shown by Dawkins, comes very close to that of *Epimachairodus crenatidens* (see Dawkins, 1903, p. 113 and pl. VIII, fig. 1).

[11] Riabinin, 1929, p. 100.

[12] Wagner, 1860, p. 121.

[13] See Pilgrim, 1931, pp. 126 and 132-134. Although the history of the classification of Machaerodonts lies outside the scope of the present paper, it may be mentioned here that Wagner's (Wagner, 1860, p. 121) mandible from Pikermi as well as what later became to be known as *Epimachairodus crenatidents* (Fabrini) were shown by Schaub in 1925 to be distinct from *Machairodus aphanistus* (see Schaub, 1925, pp. 264-265).

[14] See Zdansky, 1924, pp. 108 and 116.

[15] See Teilhard de Chardin, 1945, pp. 11 and 14.

[16] See ibid., p. 15.

[17] Arambourg, 1947, p. 438.

guish it from the Pontian and later species of *Epimachairodus* listed above, thus showing that a new species of this genus is being dealt with here.[18] I have dedicated this new species to my teacher, Prof. Dr. Alfred Sherwood Romer, the eminent vertebrate Palaeontologist of Harvard University.

In his monograph on the fossil vertebrates from Omo, in East Africa, Arambourg, apparently following Simpson,[19] has used *Homotherium* Fabrini (1890) as a synonym of *Epimachairodus* Kretzoi (1929) and has named a new Pleistocene species from this region as *Homotherium ethiopicum*[20] and has furthermore changed *Epimachairodus taracliensis* (Riabinin) and *Epimachairodus crenatidens* (Fabrini) respectively to *Homotherium tarakliense* and *Homotherium crenatidens.*[21]

In this work, however, Arambourg retains the specific name *Machairodus nestianus*,[22] for which Fabrini had suggested the name *Homotherium* as a section of genus *Machairodus.*[23] It is evident that *Homotherium* Fabrini can be used as a synonym for *Epimachairodus* Kretzoi, only if it can be proven that the form described by Fabrini as *Machairodus* (*Megantereon*) *nestianus*[24] is generically identical with *Epimachairodus* Kretzoi. Regarding "*Machairodus*" *nestianus* Fabrini, Schaub, who has examined the available material from Italy and France (Perrier), states: "*Les relations du* 'Machairodus' Nestianus *avec les deux autres types de Machairodontidés du pliocène supérieur ne sont pas faciles à discerner. Fabrini a proposé de le ranger, éventuellement, dans une nouvelle section et de l'appeler* Homotherium. *M. Kretzoi, en divisant le groupe des Félidés en autant de genres que d'espèces, l'a suivi. En réalité, nous ne sommes pas suffisamment documenté pour pouvoir trancher cette question. L'antagonisme des canines et la réduction très avancée du talon interne de la carnassière supérieure le rapporochent bien du genre* Epimachairodus, *mais nous ne connaissons pas son squelette. Peut-être les documents d'Olivola et de Perpignan que j'ai cité en* 1925 (*loc. cit., pag.* 266) *se rapportent*

[18] As will be described in the text, the position of the isolated upper canine from Küçükyozgat remains uncertain.

[19] See Simpson, 1945 (1950), p. 121,

[20] Arambourg, 1947, p. 438.

[21] Ibid., pp. 439-440.

[22] Ibid., pp. 439 and 554.

[23] See Fabrini, 1890, p. 176.

[24] Ibid., p. 172 and pl. VI, figs. 6-7.

au 'Machairodus' Nestianus *ou à son prédécesseur.*" [25] In his study of 1948, Piveteau made the following remarks about "*Machairodus*" *nestianus*: "*La position du* Machairodus nestianus *reste indéterminée et sera discutée dans un travail ultérieur. Nous utiliserons, pour nos comparaisons, un magnifique crâne de cette forme, provenant du lieudit Rocca-Neyra, près de Perrier.*" [26] In this connection the photograph of a skull from Perrier, labelled by Boule and Piveteau as *Machairodus crenatidens*, gives useful information. [27] The relatively wide diastema between the lower P_3 and P_4 and the reduced upper and lower P3, clearly show that this skull, in spite of the label, belongs to "*Machairodus*" *nestianus* Fabrini and is probably the Rocca-Neyra skull referred to by Piveteau. [28] From this photograph it is seen that the lower canine and incisors stand considerably above the lower cheek-teeth, in which this specimen differs from *Epimachairodus* and comes closer to *Megantereon* and *Machairodus*. [29] From this photograph it is further observed that in this skull the glenoid cavity (Fossa mandibularis) stands somewhat below the level of the external acoustic meatus, in which it comes nearer to *Megantereon* and differs from *Epimachairodus*.[30] It is seen that "*Machairodus*' *nestianus* Fabrini comes closer to *Epimachairodus* in some and to *Megantereon* in other features, that is, it seems to be intermediate between these genera.[31] Thus the likelihood that "*Machairodus*" *nestianus* may represent a distinct form, as was considered to be the case by Kretzoi, who elevated it to the rank of a separate genus (*Homotherium*)[32] is not precluded. Hence, as the generic identity of "*Machairodus*" *nestianus* Fabrini with genus *Epimachairodus* has not yet been

[25] Schaub, 1934, p. 406.

[26] Piveteau, 1948, p. 102

[27] See Boule and Piveteau, 1935, fig. 1284.

[28] Piveteau, 1948, p. 102.

[29] For this relation in Machaerodonts see Schaub, 1925, pp. 264-265; Pilgrim, 1931, pp. 126, 128 and 131; Pilgrim, 1932, pp. 173 and 194.

[30] For the relation of glenoid cavity to external acoustic meatus in *Megantereon* and *Epimachairodus* see Teilhard de Chardin 1945, p. 7.

[31] It is also of interest to note that, concerning a large upper canine from Perrier reproduced by Boule(1901,fig. 1), Schaub (1934, p. 405) made the following statements: "*Cette canine est plus grande que celle de* M. Crenatidens, *moins recourbée en arrière, à courbure antérieure évoquant plutôt* Megantereon. *Elle est donc en quelque sort intermédiaire entre les deux autres types et ne doit être confondue ni avec l'un ni avec l'autre.*"

[32] Kretzoi, 1929, p. 1313.

established, and indeed does not seem to be very likely, the validity of the generic name *Epimachairodus* Kretzoi continues to be unimpaired. For this reason in the present paper Arambourg's *Homotherium ethiopicum* is referred to as *Epimachairodus ethiopicum*.

Before taking up the description of the remains from Küçükyozgat I shall review briefly what is known about the lower Pliocene and later Machaerodonts of Turkey. In the literature on the lower Pliocene fauna of Turkey, [33] there are only a few references to Machaerodonts. Malik (Prof. Sayar) and Nafiz (Prof. Pamir) have attributed a fragmentary maxilla from Küçükçekmece, near İstanbul, to *Machaerodus orientalis* (Kittl).[34] Following Pilgrim's revision of Machaerodonts, this species together with what was described as *Machairodus schlosseri* by Weithofer, [35] now becomes *Paramachaerodus orientalis* (Kittl).[36] Regarding a tooth from the Pontian fossil bed of Karain near Ürgüp, in central Anatolia, Chaput stated: ... *une molaire de* Machairodus, *paraissant identique à* M. aphanistus *Kaup de Pikermi.*"[37] As unfortunately no photograph of this molar was published and no description or measurements were given, it cannot be determined whether this tooth belongs to the genus *Machairodus* proper, represented by *Machairodus aphanistus* (Kaup), or to another genus. However, as *Machairodus aphanistus* (Kaup) is known from Pikermi[38] and Salonika[39] it is not unlikely that its distribution may have extended to some parts of Turkey in the Pontian stage.[40]

[33] For the lower Pliocene fauna of Turkey see: Chaput, 1936; Egeran and Lahn, 1948; İzbırak and Yalçınlar, 1951; Furon, 1953; Malik and Nafiz, 1933; Ozansoy, 1951,1955 and 1957; Şenyürek, 1951, 1952, 1953a, 1953b, 1953c, 1953d, 1954a, 1954b, 1954c, and 1955; Thenius, 1949; Yalçınlar, 1950, 1952a, 1952b, 1953, 1953-1954 and 1954.

[34] Malik and Nafiz, 1933, pp. 69 and 109 and pl. XII, fig. 7.

[35] Weithofer, 1888, p. 233. It may be noted here that in 1924 Schlosser had already attributed this form from Pikermi (*M. schlosseri* Weithofer) to *Machairodus orientalis* Kittl (see Schlosser, 1921, p. 10).

[36] See Pilgrim, 1931, p. 137. Pilgrim (1931, p. 137) also attributes to this species a mandible from Hungary that had been described as *Machaerodus hungaricus* by Kormos (see Kormos 1911, p. 58 and fig. 17).

[37] Chaput, 1936, p. 257.

[38] Boule, 1901, p. 557 and Pilgrim, 1931, p. 129.

[39] Arambourg and Piveteau, 1929, p. 128.

[40] It may also be mentioned here that De Mecquenem (1924, p. 25) has referred a broken upper canine from the Pontian of Maragha, in Iran, to *Machairodus*

In 1947, while listing the fossils from the Pontian of the Upper Gediz, Yalçınlar had referred to a tooth as: "... *une grande canine rappellant* Machaerodus (?) ..."[41] However, as no photograph was published and as Yalçınlar made no reference to *Machairodus* in a subsequent study where, together with other localities, he also lists the fossils from the Upper Gediz Valley,[42] nothing can be said regarding the affinities of this canine. In his book, Furon, among the Pontian mammals of Turkey, lists one as *Machairodus pentelici*.[43] However, as, to my knowledge, no species of this designation were ever described in Turkey, this is apparently due to a mistake.

Recently Ozansoy briefly referred to a form from the Upper Pliocene of Sinap (Upper Sinap d in his paper of 1955 and Middle Sinap in his paper of 1957), near Ankara, as *Megantereon Piveteaui* n. sp.,[44] and to two forms from the Villafranchian, that is the Lower Pleistocene, of this place as *Machairodus erki* n.sp. and *Megantereon hoffstetteri* n. sp. [45] Regarding the form attributed to *Machairodus*, as Ozansoy does not specify whether he is using the term *Machairodus* in a strict sense, meaning *Machairodus* proper represented by *Machairodus aphanistus* (Kaup) or whether in a general sense covering also what is now known to be separate genera, such as for instance *Epimachairodus* and *Megantereon*, I will be content here with only mentioning this late occurrence until a detailed report with pictures is published.

Now we can take up the description of the remains from Küçükyozgat.

aphanistus (Kaup). Although this tooth, as pointed out by De Mecquenem (1925, p. 25), recalls that of *Machairodus aphanistus* from Eppelsheim in the absence of crenulations in the preserved basal part of the mesial edge of the crown, it is still too fragmentary for a certain determination.

[41] Yalçınlar, 1947, p. 175.

[42] See Yalçınlar, 1954, p. 143.

[43] Furon, 1953, p. 72.

[44] Ozansoy, 1957, p. 18. In his paper of 1955 Ozansoy had referred to this specimen as *Machairodus, n. sp.* (see Ozansoy, 1955, p. 993, p. 2 in reprint.)

[45] Ozansoy, 1957, p. 18. While in his study of 1955 Ozansoy had attributed the classical Pontian sites of Anatolia to Upper Miocene (see Ozansoy, 1955, p. 994, p. 3 in reprint), in his new paper, published while the present paper was in the press, he has abandoned his former viewpoint and has referred them to the Lower Pliocene; although he now places the classical Pontian in the later part of the Lower Pliocene period (see Ozansoy, 1957, p. 20).

FAMILY FELIDAE GRAY, 1821[46]

Subfamily Machairodontinae Gill, 1872 [47]
Genus Epimachairodus Kretzoi, 1929 [48]
Epimachairodus Romeri, New Species

The holotype of this new species, preserved in the Division of Palaeoanthropology of the University of Ankara (No. Ky. Ep.1), is represented by a damaged skull, a broken mandible and some isolated teeth. When found all parts belonging to this individual were in association, the mandible and the upper teeth occupying their normal positions. However, as the skull (fig.1) had been crushed and partly decomposed, only the largest part of the skull and most of the teeth, some still *in situ*, could be retrieved. In the skull the largest portion of the brain-case and facial skeleton are preserved (figs.2-4). The frontal region of the skull has been crushed and has slightly caved in. The zygomatic arches are not preserved. In the damaged premaxilla the three incisors of the right side and the first and second incisors of the left side are retained, the third incisor being isolated (figs. 8-9). Aside from those in the premaxilla, in the upper jaw only the upper parts of the alveoli of the right and left canines are preserved. The palate is decomposed and I have not tried to restore it nor to place the isolated teeth in their proper places. The right upper canine is nearly intact, missing only a few chips (figs. 10-11). The largest part of the crown of the left upper canine is retained, but the root is broken, a part of it being still stuck in the preserved part of the socket of this tooth. The right and left P^3 are isolated, the left one being preserved together with a fragment of the alveolar process still attached to it (figs. 12-15). The anterior and middle parts of the right and left P^4 are retained (figs. 16-17). The upper first molars of the right and left sides are missing, together with the distal portions of the upper carnassial teeth. No remains of the P^2 were found.

In the mandible the symphysis and the largest parts of the right and left corpus mandibulae are preserved (figs. 5-7). In this mandible

[46] Simpson, 1945 (1950), p. 118.
[47] Ibid., p. 120.
[48] Kretzoi, 1929, p. 1310.

all the incisors, the right and left canines, right P_3, left P_4 and the right M_1 are preserved *in situ*. The distal root and a portion of the distal part of the crown of left P_3, and the mesial and distal roots of right P_4 are retained in the alveoli, while the left M_1 is found isolated (figs. 18-20). The shiny smooth superior surfaces of the distal and mesial roots of the right P_4 indicate that this tooth was broken during the life of this individual. The appearance of the distal part of left P_3 suggests that this tooth also may have been fractured during life. The upper canines of this individual show some attrition, while the incisors and lower canines are strongly worn. The other remaining teeth exhibit considerable attrition. The degree of wear of the teeth indicates that an adult individual and perhaps one well-advanced in age is being dealt with here.

The isolated right upper canine was also found in the same locus (Küçükyozgat Locus 2), but some distance away from the skull. The largest portion of this tooth is preserved, only a small part of the tip and few chips here and there being missing (figs. 21-22). The systematic position of this isolated canine remains uncertain.

THE SKULL

When viewed in norma verticalis, the skull is seen to be relatively long, which is, as has been stated by Teilhard de Chardin, a characteristic of genus *Epimachairodus*.[49] In this feature the skull from Küçükyozgat differs from genus *Megantereon*.[50] The distance from the place of junction of crista sagittalis and crista lambdoidea to the anterior margin of the nasal bones, in mid-sagittal plane, is 232.00 mm. As the crista lambdoidea is damaged, this distance is actually slightly more than this figure. The crista sagittalis and crista lambdoidea are damaged, but both appear to have been of moderate development.

In norma lateralis the highest point of the skull, in mid-sagittal plane, occurs at the posterior end of the frontal bones. The infraorbital foramen, which is well preserved on the left side, is of moderate size and is located somewhat below the inferior margin of the orbit. Its greatest diameter, vertical, is 20.50 mm. and its maximum width (transverse

[49] Teilhard de Chardin, 1945, p. 7.
[50] For *Megantereon* see ibid., p. 7.

diameter) is 12.70 mm. In the posterior part of the right side of the skull are seen two notches, one representing the place where the external acoustic meatus is located and the one anterior to it is a part of mandibular fossa. These show that in this skull the external acoustic meatus and the mandibular fossa were located at about the same level, which is, as has been stated by Teilhard de Chardin, a characteristic of genus *Epimachairodus*, whereas in genus *Megantereon* the mandibular fossa is found at a lower level.[51] Both the external acoustic meatus and the mandibular fossa also occur at nearly the same level with the preserved part of the posterior region of the external base of the skull. The postglenoid process is stoutly built but not very long. It is shorter than that of *Megantereon*,[52] and stouter, but no longer, than that of *Epimachairodus palanderi* (Zdansky), depicted by Zdansky.[53] The foramen ovale is found directly internal to the mandibular fossa. Bulla tympanica of both sides, the foramen magnum and the occipital condyles are missing.

THE MANDIBLE

When viewed in norma lateralis, the lower canine and the incisors are seen to be slightly above the level of the cheek teeth in this mandible, the difference between the levels of these teeth being considerably less than that of *Machairodus aphanistus* (Kaup) from Pikermi, originally described as *Machaerodus leoninus* by Roth and Wagner.[54] Pilgrim states that in the genera *Machairodus* and *Megantereon* the lower incisors and canines are situated at a higher plane than the lower cheek teeth, whereas in *Epimachairodus* and *Paramachaerodus* the level of the front teeth is not raised.[55] However, the elevation of the front teeth in the Küçükyozgat mandible appears to be slightly

[51] Ibid., p. 7.

[52] See Piveteau, 1948, fig. 5.

[53] See Zdansky, 1924, pl. XXV, fig. 1.

[54] See Roth and Wagner, 1855, pl. 3, fig. 1.

[55] Pilgrim, 1931, pp. 128, 131 and 135; Pilgrim, 1932, pp. 173, 186 and 194. Schaub (1925, pp. 264-265) had also drawn attention to the elevation of the front teeth in *Megantereon (Machairodus cultridens)* and to the lack of elevation of these teeth in what is now known as *Epimachairodus crenatidens* (Fabrini) and in the mandible from Pikermi described and depicted by Wagner (Wagner, 1860, pl. III, fig. 11).

more than in *Epimachairodus taracliensis* (Riabinin) from Pikermi, originally described as *Machaerodus leoninus* by Wagner[56] and from Taraklia originally described by Riabinin as *Machairodus aphanistus* var. *taracliensis*[57] and is also somewhat higher than that of *Epimachairodus crenatidens* (Fabrini) depicted by Fabrini.[58] In this feature the mandible from Küçükyozgat comes near to *Epimachairodus palanderi* (Zdansky), [59] *Epimachairodus tingii* (Zdansky)[60] and *Epimachairodus ultimus* (Teilhard)[61] from China.

The front of the mandible is nearly flat and is four-sided,the upper side being slightly wider than the lower side and the lateral sides being slightly concave. The symphysis is slightly grooved for the greatest part of its course, with only a slight thickening, mental crest, occurring at the bottom. This mental crest is slightly prolonged downward and forms a small tubercle at gonion, the lower margin of the front surface of the mandible being slightly concave on either side of this median tubercle.The shape of the front surface of the mandible, in norma frontalis, recalls that of *Epimachairodus ultimus* (Teilhard) from Choukoutien in China.[63] A few accessory foramina are scattered on the front surface of the mandible.

When viewed in norma lateralis, it is seen that the front surface of the mandible forms a sharp, obtuse, angle with the lower margin of corpus mandibulae which is, as stated by Piveteau, a characteristic of Machaerodonts in contrast to the condition seen in Felinae.[63]

The mandible from Küçükyozgat does not possess a mental process and in this feature it differs from *Megantereon*,[64] *Sansanosmilus*[65]

[56] See Wagner, 1860, pl. III, fig. 11.
[57] See Riabinin, 1929, pl. VII, fig. 1.
[58] See Fabrini, 1890, pl. V, fig. 4 and pl. VI, fig. 5.
[59] See Zdansky, 1924, pl. XXVI, fig. 2.
[60] See ibid, pl. XXVII, fig. 3.
[61] See Teilhard de Chardin, 1939, fig. 4.
[62] Ibid., fig. 4.
[63] Piveteau, 1948, p. 115.
[64] See Matthew, 1930, fig. 31; Teilhard de Chardin and Piveteau, 1930, pl. XXIII, fig. 2; Pilgrim, 1932, p. 173; Boule and Piveteau, 1935, fig. 1283; Piveteau, 1948, p. 115.
[65] See Pilgrim, 1932, p. 180 and Matthew, 1910, fig. 14 (*Sansanosmilus palmidens*, formerly known as *Machairodus palmidens*).

and *Smilodon*.[66] In the absence of a mental process, the mandible of *Epimachairodus romeri* comes near to that of *Epimachairodus taracliensis* (Riabinin),[67] *Epimachairodus ultimus* (Teilhard),[68] "*Machairodus*" *nestianus* (Fabrini)[69] and *Paramachaerodus orientalis* (Kittl).[70] In this feature the mandible from Kçükyozgat differs from that of *Epimachairodus tingii* (Zdansky), in which there is some downward prolongment of the anterior part of the lower margin of corpus mandibulae.[71] It also differs from *Epimachairodus palanderi* (Zdansky), in which, although variable, there is usually a slight prolongment of this region.[72]

On either side of the mandible there are two foramina mentalia, of which the large anterior one is located below the distal half of the diastema between the lower canine and P_3 and the small posterior one is found below the middle of P_3, both foramina being nearer to the lower margin of the mandible than to the alveolar border. The lower margin of the corpus mandibulae is slightly concave below the diastema and P_3 and slightly convex behind this tooth. The fossa masseterica is rather deep and pointed in front, its anteriormost point extending to below the distal part of M_1. According to the description and the photograph given by Zdansky, the fossa masseterica of *Epimachairodus romeri* appears to extend slightly more forward than in *Epimachairodus palanderi* (Zdansky).[73]

The angle of symphysis of *Epimachairodus romeri* (119°) is slightly more than that of *Paramachaerodus orientalis* (Kittl) which is, according to Pilgrim,[74] one hundred and fifteen degrees. As far as can be judged from the pictures, the angle of symphysis in the Küçükyozgat mandible appears to be greater than those of *Machairodus aphanistus* (Kaup),[75] *Megantereon*[76] and "*Machairodus*" *nestianus* (Fabrini).[77]

[66] Piveteau, 1948, p. 115 and Matthew, 1910, fig. 15.

[67] See Wagner, 1860, pl. III, fig. 11 and Riabinin, 1929, pl. VII, fig. 1.

[68] See Teilhard de Chardin, 1939, fig. 4.

[69] See Fabrini, 1890, pl. VI, fig. 7; Boule and Piveteau, 1935, fig. 1284.

[70] Weithofer, 1888, pl. XI, fig. 3.

[71] See Zdansky, 1924, pl. XXVII, fig. 3.

[72] See ibid, pl. XXVI, fig. 2; and Teilhard de Chardin, 1945, fig. 6.

[73] See Zdansky, 1924, p. 111 and pl. XXVI, fig. 2.

[74] Pilgrim, 1931, p. 137.

[75] See Roth and Wagner, 1855, pl. 3, fig. 1.

[76] See Teilhard de Chardin and Piveteau, 1930, pl. XXIII, fig. 2, and Boule and Piveteau, 1935, fig. 1283.

[77] See Fabrini, 1890, pl. VI, fig. 7 and Boule and Piveteau, 1935, fig. 1284.

On the other hand this angle of the Küçükyozgat mandible, as far as can be discerned from the pictures, comes near to those of *Epimachairodus taracliensis* (Riabinin)[78] and *Epimachairodus crenatidens* (Fabrini).[79] Again as far as can be judged from the pictures, the symphyseal angle of *Epimachairodus romeri* appears to be slightly more than those of *Epimachairodus palanderi* (Zdansky),[80] *Epimachairodus tingii* (Zdansky)[81] and *Epimachairodus ultimus* (Teilhard). [82] An examination of the pictures published by various authors, indicates that the symphyseal angle of genus *Epimachairodus*, on the whole, is greater than those of the genera *Machairodus* and *Megantereon*. In this feature "*Machairodus*" *nestianus* (Fabrini) seems to come nearer to *Machairodus* and *Megantereon* than to *Epimachairodus*.

The height of symphysis in *Epimachairodus romeri* is greater than that of *Epimachairodus taracliensis* (Riabinin) from Pikermi and is in the range of *Machairodus aphanistus* (see Table 5).

In his study on *Therailurus* from Roussillon, Piveteau has expressed the relative height of corpus mandibulae by dividing the distance from the most posterior point of the lower canine to the most distal point of the crown of M_1, by the height of corpus measured at the region of the posterior one of foramina mentalia.[83] This index in Küçükyozgat mandible and in various forms measured by Piveteau[84] are listed below:

Epimachairodus romeri	2.98
'*Machairodus*' *nestianus* (Piveteau, 1948)	2.09
Megantereon (Piveteau, 1948)	2.05
Therailurus diastemata (Piveteau, 1948)	3.08
Metailurus (Piveteau, 1948)	2.82
Felis diardi (Piveteau, 1948)	2.50
Felis nebulosa (Piveteau, 1948)	2.60
Felis leo (Piveteau, 1948)	2.30

This list shows that corpus mandibulae of *Epimachairodus romeri*

[78] See Wagner, 1860, pl. III, fig. 11 and Riabinin, 1929, pl. VII, fig. 1.
[79] See Fabrini, 1890, pl. V, fig. 4 and pl. VI, fig. 5.
[80] See Zdansky, 1924, pl. XXVI, fig. 2 and Teilhard de Chardin, 1945, fig. 6.
[81] See Zdansky, 1924, pl. XXVII, fig. 3.
[82] See Teilhard de Chardin, 1939, fig. 4.
[83] Piveteau, 1948, p. 114.
[84] Ibid., pp. 114-115.

is relatively shallower than that of "*Machairodus*" *nestianus* and *Megantereon* and indeed even lower than those of the forms of *Felis* given. In this feature, "*Machairodus*" *nestianus* from Rocca-Neyra (Perrier) agrees more with *Megantereon* than with *Epimachairodus romeri* which comes nearer to *Therailurus* and *Metailurus* in this regard.

The diastema between C_1 and P_3 in *Epimachairodus romeri* is longer than that of *Epimachairodus taracliensis* (Riabinin) from Pikermi but, judging from the photograph published by Riabinin, it may perhaps be still within the range of variation of this species.[85] In the length of diastema the mandible from Küçükyozgat falls in the range of *Machairodus aphanistus* (Kaup) which appears to be quite variable in this feature, agreeing with the minimum for this species (see Table 5). The diastema in the mandible of *Epimachairodus romeri* is longer than those of various species of *Paramachaerodus* listed, and appears to be slightly less than that of *Megantereon* (?) *palaeindicus* (Bose).

Between P_3 and P_4 of *Epimachairodus romeri* there exists a small space of approximately 1.6 mm. of length. In this feature *Epimachairodus romeri* differs from *Epimachairodus crenatidens* (Fabrini) in which there is a wider diastema,[86] *Epimachairodus tingii* (Zdansky), in which, according to Zdansky, there is a diastema of 6.70 mm.[87] and "*Machairodus*" *nestianus* (Fabrini) in which the diastema according to Schaub amounts to 12.50-14.00 mm.[88] In this regard the mandible of the specimen from Küçükyozgat comes closer to *Epimachairodus palanderi* (Zdansky) in which as can be seen from the pictures published by Zdansky[89] and Teilhard de Chardin[90] there is a small gap between P_3 and P_4.

THE TEETH

The Upper Teeth:

The upper incisors of *Epimachairodus romeri* clearly increase in

[85] See Riabinin, 1929, pl. VII, fig. 1.

[86] See Fabrini, 1890, pl. VI, fig. 4.

[87] Zdansky, 1924, p. 119.

[88] Schaub, 1934, p. 406. See also Fabrini, 1890, pl. VI, fig. 7 and Boule and Piveteau, 1935, fig. 1284.

[89] Zdansky, 1924, pl. XXVI, fig. 2.

size from the first toward the third incisor, which is almost twice the size of I^2. At the base of the lingual surface of I^3 a slight thickening is observed which represents the cingulum

The flat upper canine of *Epimachairodus romeri* is, in side view, conspicuously curved, with a crown height measured at the middle of the buccal surface (65.20+ mm.) slightly exceeding the root height again taken on the buccal side (64.80 mm.). The distal edge of the crown is finely crenulated, from the slightly worn tip to the base of the crown. The mesial edge, in both the right and left tooth, is worn, but clearly divides into two branches toward the base of the crown enclosing a flat and smooth triangular area. The buccal and lingual edges of this triangular area are clearly crenulated. Although the anterior edge is worn, some traces of worn crenulations can still be discerned under a magnifying glass some distance below the tip in both the right and left tooth. These traces and some transverse striations indicate that in this tooth the mesial edge also was crenulated and that these have been worn off by rubbing against the distal part of the lower canine. Indeed, on the distal part of the buccal surface of the crown of the left lower canine a wide worn area is seen and a trace of it is also observed in the broken right lower canine, which are caused by rubbing against the mesial edge of the upper canine. This normal antagonism of upper and lower canines seen in *Epimachairodus romeri* was first noted by Schaub in what is now known as *Epimachairodus crenatidens*[91] and is, as stated by Pilgrim, a characteristic of genus *Epimachairodus* Kretzoi.[92]

The upper canine of *Epimachairodus romeri* approaches that of *Machairodus aphanistus* (Kaup) in having a crown higher than the root, [93] but differs from this species in being more curved.[94] The upper canine of *Epimachairodus romeri*, in its curvature, comes close to

[90] Teilhard de Chardin, 1945, fig. 6 (No. 25. 588).

[91] Schaub, 1925, p. 264.

[92] See Pilgrim, 1931, p. 131 and 1932, p. 194. Regarding this relation Pilgrim (1931, p. 126) states: "*Schaub also showed that the slender limbs of* M. crenatidens *were associated with a smaller upper canine, worn in such a way as to indicate that the upper and lower canines bit in opposition to one another, a structure which is in entire disagreement with* 'M. cultridens,' Smilodon neogaeus *and the Pikermi and Eppelsheim species known as* M. aphanistus.;"

[93] See Boule, 1901, p. 562.

[94] See Roth and Wagner, 1855, pl. 3, fig. 4 and Boule, 1901, figs. 6 and 7.

those of *Epimachairodus crenatidens* (Fabrini),[95] *Epimachairodus hungaricus* Kretzoi[96] and *Epimachairodus latidens* (Owen).[97] On the other hand, the upper canine of *Epimachairodus romeri* differs from those of *Epimachairodus crenatidens*,[98] *Epimachairodus taracliensis* (Riabinin),[99] *Epimachairodus ultimus* (Teilhard)[100] and *Epimachairodus latidens* in having a crown that is higher than the root.[101] It appears that a strongly curved upper canine is characteristic of genus *Epimachairodus* in contrast to genus *Machairodus*. The upper canine of *Epimachairodus romeri* differs from that of *Epimachairodus tingii* (Zdansky) in having the anterior edge crenulated, which is lacking in this species from China,[102] and from that of *Megantereon megantereon* Croizet and Jobert in having both the anterior and posterior edges crenulated, whereas in European species these edges are smooth.[103] The upper canine of *Epimachairodus romeri* differs from that of *Paramachaerodus orientalis* (Kittl) in being larger and in having a more curved crown.[104] As far as can be judged from the photograph, the form of the upper canine of *Epimachairodus romeri*, in lateral view, appears to approach that of specimen 1 of *Epimachairodus palanderi* (Zdansky).[105]

The measurements of the upper canine of *Epimachairodus romeri* are contrasted with those of other Machaerodonts in Table 6. In *Epimachairodus romeri* the height of the crown is measured from the middle point of enamel margin on the buccal surface, viz., the point where the enamel margin of the buccal surface is bisected by the median axis of the crown, and the length and breadth measurements are taken

[95] See Fabrini, 1890, pl. VI, fig. 3 and Boule, 1901, fig. 10.

[96] See Kretzoi, 1929, pl. XLIII, fig. 4.

[97] See Boule, 1901, figs. 8 and 9.

[98] See ibid, p. 562.

[99] See Riabinin, 1929, pp. 103 and 128.

[100] See Teilhard de Chardin, 1939, fig. 3.

[101] Dawkins gives the crown and root heights of *Epimachairodus latidens* (Owen) respectively as 69.00 (?) and 84.00 mm. (Dawkins, 1903, p. 113). As the tip of the root in *Epimachairodus hungaricus* Kretzoi (see Kretzoi, 1929, pl. XLIII, fig. 4) is broken, the relation of crown and root heights cannot be determined from the photograph.

[102] See Zdansky, 1924, p. 117.

[103] See Boule, 1901, pp. 555 and 571.

[104] See Kittl, 1887, pl. XIV, fig. 2 and Pilgrim, 1931, p. 137.

[105] See Zdansky, 1924, pl. XXIV, fig. 4.

at the level of the point used in the height measurement. In Machaerodonts the distal edge of the crown often ascends higher than the mesial border. Hence, if the length and breadth are measured at the distal limit of the crown, usually different and, in my specimens, larger measurements are obtained. As the authors listed in Table 6 do not explain how they measured the canines, in comparing these figures it will be safer to take into consideration only the large differences.

The comparison of robustness values shows that the upper canine of *Epimachairodus romeri* is clearly smaller than those of *Epimachairodus tingii* (Zdansky), *Machairodus aphanistus* (Kaup), "*Machairodus*" *nestianus* (Fabrini) and perhaps only slightly smaller than that of *Epimachairodus taracliensis* (Riabinin).

From Table 6 it is seen that there is considerable difference between the figures given by Zdansky[106] and those by Teilhard de Chardin[107] for *Epimachairodus palanderi* (Zdansky). If the figures given by Teilhard de Chardin are correct, then it may be said that in the size of its crown the upper canine of *Epimachairodus romeri* falls in the range of *Epimachairodus palanderi* (Zdansky). However, the total length of the right upper of canine of *Epimachairodus romeri* measured from the tip of crown to the mid-point of the base of the root (121.00 + mm.) is slightly smaller than that of *Epimachairodus palanderi* (Zdansky) which is, according to Teilhard de Chardin, 141.00 mm. [108] The size of the crown of upper canine of *Epimachairodus romeri* is larger than those of *Paramachaerodus orientalis* (Kittl), *Sansanosmilus* (?) *rhomboidalis* Pilgrim, *Megantereon megantereon* Croizet and Jobert and *Megantereon maximiliani* (Zdansky), but seems to approach that of *Megantereon nihowanensis*.

Taking into consideration the wear on the tip, the height of the crown of upper canine of *Epimachairodus romeri* seems to approach those of *Epimachairodus taracliensis* from Taraklia and those of *Epimachairodus palanderi* and *Epimachairodus cf. crenatidens* from China. In the height of the crown of upper canine, *Epimachairodus romeri* falls far short of *Machairodus aphanistus* and "*Machairodus*" *nestianus*. The height of the crown of C^1 of *Epimachairodus romeri* appears to be somewhat

[106] Ibid., p. 110.
[107] Teilhard de Chardin, 1945, p. 14.
[108] Ibid.

lower than that of *Megantereon megantereon*. It seems to come near to one specimen of *Megantereon nihowanensis* but falls short of the other specimen of this species listed. In the crown height of the upper canine, *Machairodus aphanistus* (Kaup) exceeds the species of *Epimachairodus* and *Megantereon* listed. In this measurement the upper canine of "*Machairodus*" *nestianus* Fabrini comes closer to *Machairodus aphanistus* than to *Megantereon* and *Epimachairodus*.

From Table 6 it is seen that the crown indices of the upper canines of *Machairodus aphanistus* and of the species of *Epimachairodus* are lower than those of *Sansanosmilus* (?) *rhomboidalis*, *Paramachaerodus orientalis* and the various species of *Megantereon* listed. In this index "*Machairodus*" *nestianus* Fabrini occupies an intermediate position between *Megantereon* on the one hand and *Epimachairodus* and *Machairodus* on the other.

As for the isolated canine from Küçükyozgat, its distal edge is finely crenulated. Although the crenulations on its mesial edge are mostly worn, traces of a number of them are still discernible. A part of the tip is broken, which probably took place during life. The height of the existing part of the crown (80.20+mm.) is near the root height (81.40 mm.). However, as part of the tip is broken, it is apparent that in its fresh state the crown height must have somewhat exceeded the root height. In these features this isolated upper canine comes close to that of *Epimachairodus romeri*. It differs from that of *Epimachairodus romeri* in being larger [109] and in having a more generally curved anterior border, which is slightly less bent backward than that of the latter. However, it is still strongly curved, the curvature being more than that of *Machairodus aphanistus* [110] and coming close to that of the large canine from Perrier, a drawing of which is reproduced by Boule. [111] In other words, while this isolated upper canine resembles that of *Epimachairodus romeri* in some features, it differs from it in some other respects. Thus the systematic position of this isolated upper canine, although it was found at the same locus with *Epimachairodus romeri*,

[109] The total length of the tooth from the broken tip to the middle of the base of the root is 147.00 mm. and in the fresh state of the tooth must have been about 155.00 mm.

[110] See Roth and Wagner, 1855, pl. 3, fig. 4 and Boule, 1901, figs. 6-7.

[111] Ibid., fig. 1.

remains uncertain for the time being. Its status can be determined only if more material from this site comes to light.

When the skull was found, the remains of this individual and the ground was carefully searched for the traces of a second upper premolar, but none was found.

Of the two upper third premolars, the right one is slightly larger than the left one. P^3 has a main cusp, a moderately developed anterior accessory cusp and two posterior accessory cusps, of which the distal one is smaller. In front of the anterior accessory cusp there is a conspicuous bulge, representing the cingulum. In this two-rooted tooth, the cusps imperceptibly slant backward and the inner surface of the tooth, in occlusal view, is concave owing to a bulge at its disto-lingual corner, which is now chipped.

P^3 of *Epimachairodus romeri* differs conspicuously from that of *Paramachaerodus* in possessing a moderately developed anterior accessory cusp, which is missing in *Paramachaeodus*.[112] In this feature the specimen from Küçükyozgat does not differ much *Machairodus aphanistus* from Pikermi,[113] *Epimachairodus*[114] and *Megantereon megantereon*.[115]

The robustness values listed in Table 8 show that P^3 of *Epimachairodus romeri* is smaller than that of *Epimachairodus tingii*, somewhat smaller than that of *Epimachairodus taracliensis* and near the minimum for *Epimachairodus palanderi*. On the other hand, this tooth of the Küçükyozgat specimen far exceeds in size those of *Paramachaerodus orientalis*, *Sansanosmilus* (?) *rhomboidalis*, *Megantereon maximiliani*, *Megantereon* (?) *falconeri*. "*Machairodus*" *nestianus* and *Epimachairodus ultimus*.

In the crown index P^3 of *Epimachairodus romeri* comes close to *Epimachairodus taracliensis*, *Epimachairodus palanderi* and *Epimachairodus tingii*. It is observed that in the Pontian species of *Epimachairodus* the crown index is relatively low and that in the Villafranchian species *Epimachairodus ultimus* it is increased, owing to the greater reduction of length than breadth, during the course of evolution of the genus *Epimachairodus*. The crown indices of *Paramachaerodus orientalis*, *Sansa-*

[112] See Kittl, 1887, pl. XIV, fig. 2; Schlosser, 1921, pl. 1, fig. 3; Pilgrim, 1931, p. 135; Pilgrim, 1932, p. 186.

[113] See Roth and Wagner, 1855, pl. 3, fig. 1 and Pilgrim, 1931, p. 129.

[114] See Zdansky, 1924, pl. XXIV, fig. 4, pl. XXVI, fig. 4, pl. XXVII, fig. 1 and Riabinin, 1929, pl. IX, fig. 2.

[115] See Fabrini, 1890, pl. V, figs. 1, 2 and 3.

nosmilus (?) rhomboidalis and *Megantereon* (?) *falconeri* tend to be higher than those of the Pontian species of *Epimachairodus*. In this index *Megantereon maximiliani (Machairodus maximiliani* Zdansky) from the Pontian of China comes near to the maximum for the Pontian species of *Epimachairodus*. In this index "*Machairodus*" *nestianus* parallels *Epimachairodus ultimus*.

The measurements of P^4 and the size of P^3 relative to that of P^4 in the Machaerodonts are listed in Table 9. From the last column in this table it is seen that in the Pontian Machaerodonts *(Epimachairodus taracliensis, Epimachairodus palanderi, Machairodus aphanistus,* "*Machairodus*" *copei, Paramachaerodus orientalis,* and *Megantereon maximiliani*) the size of P^3 relative to that of P^4 is rather large, while in later forms of *Epimachairodus (Epimachairodus cf. crenatidens* and *Epimaachairodus ultimus*) and *Megantereon (Megantereon megantereon, Megantereon (?) falconeri, Megantereon nihowanensis* and *Megantereon inexpectatus)* it is reduced to varying degrees. In other words, during the course of evolution of the genera *Epimachairodus* and *Megantereon* P^3 has been reduced, this process of reduction, which has proceeded parallelly in the two genera, having been carried further in the later forms of *Epimachairodus* than those of *Megantereon*. In this process of reduction "*Machairodus*" *nestianus* has paralleled later forms of *Epimachairodus (Epimachairodus ultimus)* and to a lesser extent *Megantereon*. Together with this reduction in size of P^3, which has effected the length more than the breadth, in the later forms of *Megantereon* and *Epimachairodus* and also in "*Machairodus*" *nestianus* the crown index of this tooth has been increased.

In the upper fourth premolar (P^4), there is a moderately developed parastyle and in front of it a tiny ectoparastyle (pré-parastyle), which is represented by the cingulum descending downward on the mesial border of the buccal surface of the crown. The paracone is observed to be slanting faintly backward. The inner surface of the crown is considerably worn. On the inner and anterior part of the paracone a sharp ridge descends from the worn tip of this cusp obliquely toward the base of the crown. This ridge is broken about 1.5 mm. below the base of the crown in the left P^4 and further down in the right tooth. This ridge and the shape of the crown in occlusal view closely resemble that of P^4 of specimen 4 of *Epimachairodus palanderi* (Zdansky), in which, according to Zdansky, the protocone is

represented by this ridge.[116] The fact that this ridge comes to the vicinity of the base of the crown suggests that in *Epimachairodus romeri* the protocone is represented by this ridge as in the above-mentioned specimen of *Epimachairodus palanderi*, that is the protocone appears to have been reduced as is the case in genus *Epimachairodus*. [117]

The upper fourth premolar of *Epimachairodus romeri*, in having a small ectoparastyle,differs from that of *Machairodus aphanistus* (Kaup), in which the ectoparastyle and parastyle are rather large.[118] The small size of its ectoparastyle also distinguishes P^4 of the Anatolian species from that of a form from China described as *Machairodus horribilis* by Schlosser.[119] The ectoparastyle of P^4 of *Epimachairodus romeri* is smaller than that of *Epimachairodus palanderi* (Zdansky) from China[120] and somewhat smaller than that of *Epimachairodus taracliensis* (Riabinin) from Taraklia.[121] P^4 of the Anatolian species differs from those of *Epimachairodus crenatidens* (Fabrini) from Europe [122] and *Epimachairodus cf. crenatidens* (Fabrini) from China,[123] in the presence of a small ectoparastyle, which is lacking in the other species, as also seems to be the case in the specimen of "*Machairodus*" *nestianus* depicted by Fabrini. [124] The presence of a small ectoparastyle also distinguishes P^4 of *Epimachairodus romeri* from those of *Megantereon megan-*

[116] See Zdansky, 1924, p. 115 and pl. XXVII, fig. 2.

[117] See Kretzoi, 1929, p. 1310; Pilgrim, 1931, p. 132; Pilgrim, 1932, p. 194; Schaub, 1934, p. 406; Teilhard de Chardin, 1945, p. 7.

[118] See Boule, 1901, p. 562 and fig. 11; Arambourg and Piveteau, 1929, p. 128 and pl. XI, fig. 2; Pilgrim, 1931, p. 129. Regarding this feature of *Machairodus aphanistus*, Pilgrim (1931, p. 129) states: "*P^4 with two well marked anterior accessory cusps.*"

[119] See Schlosser, 1903, pl. I, fig. 10. Regarding *Machairodus horribilis* Schlosser, Teilhard de Chardin and Piveteau, (1930, p. 116) stated: "*... forme probablement composite...*" On this form Pei (1934, p. 128) remarked:"*... a practically useless form from its uncertain origin...*"

[120] See Zdansky, 1924, p. 109 and pl. XXIV, figs, 4 and 6, pl. XXV, fig. 1, pl. XXVI, fig. 4 and pl. XXVII, fig. 1.

[121] See Riabinin, 1929, p. 128 and pl. IX, fig. 2.

[122] See Fabrini, 1890, pl. V, fig. 6 and Boule, 1901, fig. 11.

[123] See Teilhard de Chardin and Piveteau, 1930, pl. XXII, fig. 2 and Teilhard de Chardin, 1945, p. 15.

[124] See Fabrini, 1890, pl. VI, fig. 6.

tereon from Europe[125] and *Megantereon nihowanensis* from China,[126] which are devoid of an anterior cusp. On the other hand, as far as can be judged from the pictures, in the size of the ectoparastyle in P^4, *Epimachairodus hungaricus* Kretzoi[127] and *Epimachairodus ultimus* (Teilhard)[128] appear to come near to *Epimachairodus romeri*.

P^4 of *Epimachairodus romeri* differs from that of *Paramachaerodus orientalis* in its larger size[129] and apparently also in the reduced size of its protocone which is large in this genus.[130] This tooth of the Anatolian species is distinguished from a P^4 referred by Pilgrim to *Sansanosmilus* (*?*) *rhomboidalis* in being larger and in having the cingulum at the base of the buccal surface of the crown reduced, save at the anterior border of this surface.[131]

The Lower Teeth:

As is the case in the upper jaw, the incisors increase in size in the mandible, also, from the first toward the third incisor. The third lower incisor is separated from the lower canine by a short diastema which, on the left side, has a width of 3.00 mm. at the base. The lower canine has an oval cross-section and is strongly worn, as a result of friction with the upper third incisor and the anterior border of the upper canine. Below the right lower canine an impression of the upper canine, in occlusion, is preserved in a strip of marl still stuck to the bone, further demonstrating that in this species there was a normal antagonism between the upper and lower canines. The lower canine of *Epimachairodus romeri* is smaller than that of *Epimachairodus tingii*,

[125] See ibid., pl. IV, fig. 1 and pl. V, figs. 1,2 and 3 and Boule, 1901, fig. 11.

[126] See Teilhard de Chardin and Piveteau, 1930, pl. XXIII, fig. 1a and Teilhard de Chardin, 1945, p. 9. However, Teilhard de Chardin (1939, p. 248) describes p^4 of *Megantereon inexpectatus* from Choukoutien as having: "*A small preparastyle.*"

[127] See Kretzoi, 1929, pl. XLIII, fig. 5.

[128] Teilhard de Chardin, 1939, p, 241 and fig. 2.

[129] The length of the fragment of left p^4 of *Epimachairodus romeri*, in which the largest part of metacone is missing, is 28.00 mm. The combined length of the anterior portion and a large fragment of the metacone of right p^4, preserved separately together with the posterior part of the paracone, amounts to approximately 32. 5 mm. Thus it is clear that p^4 of *Epimachairodus romeri* is larger than those of *Paramachaerodus orientalis* and *Sansanosmilus* (?) *rhomboidalis*.

[130] See Kittl, 1887, pl. XIV, fig. 3 and Pilgrim, 1931, pp. 135 and 138.

[131] See Pilgrim, 1932, p. 185 and pl. VIII, fig. 5.

near to that of *Epimachairodus palanderi* and larger than those of *Paramachaerodus orientalis*, *Paramachaerodus pilgrimi*, *Propontosmilus sivalensis* and *Sivasmilus copei*. The length measurement of the lower canine is in the range of *Epimachairodus taracliensis*, near to *Megantereon nihowanensis* and *Machairodus aphanistus* but larger than that of *Paramachaerodus indicus*.

In the mandible of *Epimachairodus romeri* P_2 is absent. In this, the Anatolian species differs from *Propontosmilus* [132] and *Sivasmilus*, [133] which possess a P_2.

In the two-rooted P_3 there is a distinct anterior accessory cusp, a worn main cusp and a worn trough behind it. Judging by the shape of the external side of this trough, it would appear that there was a low cusp here, recalling that of *Epimachairodus palanderi*,[134] that has been worn away. In front of the anterior accessory cusp there is a bulge representing the cingulum. P_3 is seen to be slightly inclined buccalward, as in *Epimachairodus palanderi*.[135]

The lower third premolar of *Epimachairodus romeri* is distinguished from those of the genera *Paramachaerodus*[136] and *Megantereon*[137] in the possession of a distinct anterior accessory cusp. In this feature the Anatolian species also differs from *Epimachairodus palanderi*[138] and "*Machairodus*" *nestianus*,[139] the third lower premolars of which are devoid of an anterior accessory cusp. The size of the anterior accessory cusp in P_3 of *Epimachairodus romeri* comes near to that of *Machairodus aphanistus* from Pikermi, [140] *Epimachairodus tingii* from China[141] and *Epimachairodus taracliensis* from Taraklia.[142] P_3 of *Epimachairodus crenatidens* from Europe also possesses a distinct anterior accessory cusp

[132] See Pilgrim, 1932, p. 191.

[133] See ibid., p. 192.

[134] See Zdansky, 1924, pl. XXVI, fig. 2.

[135] Ibid., p. 112 and pl. XXVI, fig. 1.

[136] See Pilgrim, 1931, p. 135; Pilgrim, 1932, p. 186; Weithofer, 1888, pl. XI, figs. 3 and 5.

[137] See Pilgrim, 1932, p. 173; Fabrini, 1890, pl. IV, fig. 2; Teilhard de Chardin and Piveteau, 1930, pl. XXIII, fig. 2;; Boule and Piveteau, 1935, fig. 1283.

[138] See Zdansky, 1924, pl. XXVI, fig. 2 and Teilhard de Chardin, 1945, fig.6.

[139] See Fabrini, 1890, pl. VI, fig. 7.

[140] See Roth and Wagner, 1855, pl. 3, fig. 1.

[141] See Zdansky, 1924, pl. XXVII, fig. 3.

[142] See Riabinin, 1929, pl. IX, figs. 1 and 3.

but differs from that of the Anatolian species in that the part behind the main cusp is short, that is, reduced, whereas in *Epimachairodus romeri* this section amounts to nearly one-third of the crown length.[143] In *Machairodus aphanistus*,[144] *Epimachairodus taracliensis*,[145] *Epimachairodus palanderi*[146] and *Epimachairodus tingii*[147] also this part of P_3 is longer than that of *Epimachairodus crenatidens*.

The length of P_3 of *Epimachairodus romeri* is smaller than those of *Machairodus aphanistus* and *Epimachairodus tingii*, in the range of *Epimachairodus taracliensis* and appears to be slightly larger than that of *Epimachairodus palanderi* (see Table 12). The length of this tooth of the Anatolian species exceeds those of the species of *Paramachaerodus*, *Propontosmilus*, *Sivasmilus* and *Megantereon* listed. The length of this tooth of *Epimachairodus romeri* is far in excess of that of "*Machairodus*" *nestianus* which has the smallest P_3 among the forms listed.

The length of P_3 relative to that of M_1 is listed in Table 14. From this table it is seen that in *Machairodus aphanistus*, *Paramachaerodus* and *Propontosmilus sivalensis* the length of P_3 relative to that of M_1 is longer than that of the species of *Epimachairodus* listed. That is, as compared with *Machairodus aphanistus*, *Paramachaerodus* and *Propontosmilus sivalensis*, the P_3 of *Epimachairodus* is, relatively speaking, somewhat reduced. In this index *Epimachairodus romeri* falls in the range of *Epimachairodus taracliensis*. From Table 14 it is further seen that in *Megantereon nihowanensis* and *Megantereon (?) falconeri* the length of P_3 relative to that of M_1 is distinctly reduced and is smaller than that of *Megantereon megantereon* which is more primitive in this respect, coming close to *Epimachairodus palanderi*. Among the Machaerodont species listed in this table, "*Machairodus*" *nestianus* possesses the smallest P_3 relative to M_1.[148]

[143] See Fabrini, 1890, pl. V, fig. 5.

[144] See Roth and Wagner, 1855, pl. 3, fig. 1.

[145] See Riabinin, 1929, pl. IX, figs. 1 and 3.

[146] See Zdansky, 1924, pl. XXVI, fig. 2. The relative length of the part of the crown behind the main cusp in *Epimachairodus palanderi* and *Epimachairodus taracliensis* comes near to that of *Epimachairodus romeri*.

[147] See Zdansky, 1924, pl. XXVII, fig. 3.

[148] In this connection it would be of interest to know the relative length of P_3 in *Epimachairodus ultimus* which, as will be discussed later, possesses a relatively small P_4. Unfortunately the late Teilhard de Chardin, who described this species, did not give any measurements for this tooth which he (Teilhard de Chardin, 1939, p. 242) described as: "*p3 very small, styliform, one-rooted.*"

P_4 of *Epimachairodus romeri*, on the left side, possesses a large anterior accessory cusp, a high main cusp that slightly slants backward and a well developed posterior accessory cusp behind it. The disto-buccal corner of the posterior accessory cusp is worn flat and the region behind this cusp, that is the talonid, is broken. In front of the anterior accessory cusp is seen a slight bulge at the base, representing the cingulum. On the upper part of the distal edge of the main cusp traces of a few worn crenulations are observed. Crenulations on P_4 exist in *Sansanosmilus (?) serratus* from India [149] and Pilgrim describes the back teeth of genus *Epimachairodus* as follows: "*...back teeth highly specialized with crenulated crests.*"[150]

As the hind portion of P_4 of the Anatolian species is defective, it is evident that the measured length is inferior to the actual one. However, from the measurements listed in Table 13, it is evident that P_4 of *Epimachairodus romeri* is larger than those of *Epimachairodus crenatidens*, *Epimachairodus ultimus*, *Epimachairodus ethiopicum*, "*Machairodus*" *nestianus*, *Paramachaerodus orientalis*, *Paramachaerodus indicus*, *Paramachaerodus pilgrimi*, *Sansanosmilus palmidens*, *Sansanosmilus (?) serratus*, *Propontosmilus sivalensis*, *Sivasmilus copei*, *Megantereon megantereon*, *Megantereon (?) palaeindicus*, *Megantereon (?) falconeri* and *Megantereon nihowanensis*. This tooth of *Epimachairodus romeri* is smaller than that of *Epimachairodus tingii* and appears to have come near to some specimens of *Epimachairodus palanderi* and perhaps also to some specimens of *Epimachairodus taracliensis* and *Machairodus aphanistus*.

The length of P_4 relative to that of M_1 is listed in Table 14. It is seen from this table that in the Pontian species of *Epimachairodus* this index is relatively high, as is the case in *Machairodus aphanistus* and *Paramachaerodus orientalis* and that some of the later forms of *Epimachairodus* (in *Epimachairodus crenatidens* and *Epimachairodus ultimus* but not so much in *Epimachairodus ethiopicum*) it is reduced. That is, during the course of the evolution of genus *Epimachairodus* P_4 has been, relatively speaking, reduced, this process of reduction having been carried further in *Epimachairodus ultimus* than in other species. In the degree of relative reduction of P_4, "*Machairodus*" *nestianus* comes very close to *Epimachairodus ultimus*, that is it has paralleled the latter

[149] See Pilgrim, 1932, p. 192.
[150] Pilgrim, 1931, p. 131.

species in the reduction of this tooth. It is also seen in this table that the reduction of P_4 is not as advanced in *Megantereon* as in the later species of *Epimachairodus*.

In both the right and left M_1 of *Epimachairodus romeri*, the paraconid and the protoconid show considerable attrition. This tooth possesses, on both sides, a well developed talonid behind the protoconid, but no trace whatsoever of a metaconid. On the buccal and lingual surfaces of the crown the basal cingulum is reduced.

In lacking a metaconid the first lower molar of *Epimachairodus romeri* differs from those of *Machairodus aphanistus*, [151] *Paramachaerodus* [152] and *Sansanosmilus (?) serratus*, [153] which possess a small metaconid [154] and agrees with *Epimachairodus*, the first lower molar of which is described by Pilgrim as "*M_1 with or without a vestigial metaconid.*"[155] and also with *Megantereon*[156]

In having a well developed talonid in M_1, *Epimachairodus romeri* has retained a primitive feature that was present in the Oligocene and Miocene representatives of Felidae, [157] which was lost in most of the later Machaerodonts, being lost even in *Sansanosmilus palmidens* of Miocene Age.[158]

In having a well developed talonid, M_1 of *Epimachairodus romeri* differs from those of the following Machaerodonts which are devoid of a talonid: *Machairodus aphanistus* from Pikermi,[159] *Epimachairodus taracliensis* from Taraklia,[160] *Epimachairodus crenatidens*,[161] *Epimachairodus hungaricus* Kretzoi,[162] *Epimachairodus boulei*,[163] *Epimachairodus*

[151] See Pilgrim, 1931, pp. 128 and 130.

[152] See ibid., p. 135.

[153] See Pilgrim, 1932, p. 181.

[154] See Pilgrim, 1931, pp. 128, 130 and 135; Pilgrim, 1932, p. 181; Viret and Mazenot, 1948, p. 25.

[155] See Pilgrim, 1931, p. 132.

[156] Regarding [the metaconid] in M_1 of genus *Megantereon*, Pilgrim (1932, p. 174) states: "*metaconid absent or vestigial.*"

[157] See Matthew, 1910, figs. 7A, B, C and D and fig. 8A and Piveteau, 1931, pl. II, figs, 1, 3, 4, 5, 7, 8 and 9, pl. III, figs. 1, 2, 3 and 6 and pl. IV, figs. 2 and 3.

[158] See Matthew, 1910, fig. 8B and fig. 14.

[159] See Boule, 1901, fig. 17.

[160] See Riabinin, 1929, pl. IX, figs. 1 and 3.

[161] See Fabrini, 1890, pl. V, fig. 4 and pl. VI, fig. 5 and Boule, 1901, fig. 17.

[162] See Kretzoi, 1929, pl. XLIII, fig. 6.

[163] See Boule, 1901, fig. 14B. These remains from Sainzelles reproduced by Boule (1901, fig. 14B) have been referred to *Epimachairodus boulei* by Kretzoi (1929, p. 1312).

palanderi,[164] *Epimachairodus ultimus*,[165] "*Machairodus*" *nestianus*,[166] *Megantereon megantereon*,[167] *Megantereon maximiliani*,[168] *Megantereon nihowanensis*,[169] "*Machairodus*" from Choukoutien (Loci 1 and 9),[170] and *Paramachaerodus cf. pilgrimi*.[171]

In the mandible from Pikermi, first described by Wagner as *Machaerodus leoninus*,[172] but which was subsequently referred to *Epimachairodus taracliensis* by Pilgrim,[173] the buccal cingulum, which appears to be distinct, forms a projection at the base of the distal edge of protoconid.[174] This projecting part of the cingulum in the mandible from Pikermi corresponds only to the faint thickening at the basal part of the back of talonid in M_1 of *Epimachairodus romeri*, better seen in the left tooth, but still there is no distinct talonid as in the Anatolian species. In M_1 of *Paramachaerodus orientalis* from Pikermi, depicted by Weithofer,[175] also there is a slight distal prolongation of cingulum, but still no distinct talonid. Thus in the morphology of the talonid of M_1, *Epimachairodus romeri* differs from *Epimachairodus taracliensis* and *Paramachaerodus orientalis* from Pikermi.

In *Megantereon (?) falconeri* from India, depicted by Matthew,[176] there is seen a small talonid, much smaller and more closely pressed to the distal edge of protoconid than in *Epimachairodus romeri*.

The first lower molar of a form from China described as *Machairodus horribilis* by Schlosser[177] has a talonid approaching that of *Epimachairodus romeri*. M_1 of *Machairodus horribilis*, however, differs from

[164] See Zdansky, 1924, pl. XXVI, fig. 2 and Teilhard de Chardin, 1945, fig. 6.

[165] See Teilhard de Chardin, 1939, figs. 4 and 5A.

[166] See Boule and Piveteau, 1935, fig. 1284.

[167] See Fabrini, 1890, pl. IV, fig. 2; Boule, 1901, fig. 17; Boule and Piveteau, 1935, fig. 1283.

[168] See Zdansky, 1924, pl. XXVII, fig. 7. This species had been referred to genus *Paramachaerodus* by Pilgrim (Pilgrim, 1931, p. 135).

[169] See Teilhard Chardin and Piveteau, 1930, pl. XXIII, fig. 2.

[170] See Pei, 1934, fig. 39, A and B.

[171] See Pilgrim, 1932, pl. VIII, fig. 6a.

[172] See Wagner, 1860, p. 121.

[173] Pilgrim, 1931, pp. 132, 133 and 134.

[174] For this feature of the Pikermi mandible depicted by Wagner (1860, pl. III, fig. 11) see Viret and Mazenot, 1948, p. 25.

[175] See Weithofer, 1888, pl. XI, fig. 5.

[176] See Matthew, 1930, fig. 31.

[177] See Schlosser, 1903, pl. 1, fig. 16.

that of *Epimachairodus romeri* in being larger and also in having anterior border of paraconid and the posterior border of the protoconid converge more than in the Anatolian species. Furthermore, the P^4 attributed to this species, as was stated before, also differs from that of *Epimachairodus romeri* in having a larger ectoparastyle.

The first lower molar of a Machaerodont of Pontian Age from Soblay, described, only provisionally, as *Machairodus cf. aphanistus* by Viret and Mazenot[178] also possesses a distinct talonid,[179] as in the Anatolian species. This tooth from Soblay approaches also that of *Epimachairodus romeri* in lacking a metaconid and in having a reduced buccal cingulum,[180] but appears to differ from that of the Anatolian species in having the anterior border of paraconid and the posterior edge of protoconid converge slightly more. However, regarding the lower canine of Soblay form, Viret and Mazenot state: "*La couronne de la canine (fig. 3-3a, pl.1) est d'une fraîcheur parfaite, à l'exception d'un léger sillon d'usure sur la face antéro-interne, qui provient du frottement avec la troisième incisive supérieure correspondante. Mais la face externe est intact; elle est assez fortement convexe vers l'avant, plus plate du côté postérieur, cette dernière partie s'ornant de légers plis transverses. Il n'y avait donc pas frottement entre cette dent et son antagoniste, ce qui exclut le genre* Epimachairodus *Kretzoi.*"[181] In other words, in spite of some resemblance between their first lower molars, the Küçükyozgat and Soblay forms are not at all closely related.

From the account given above it is clear that the talonid of the first lower molar, which is a primitive trait, has been retained independently and to various degrees in some forms of the genera *Machairodus*, *Epimachairodus* and *Megantereon*, while it has been lost in other species of these genera.

The length of M_1 of *Epimachairodus romeri* is close to that of *Epimachairodus crenatidens* and *Epimachairodus palanderi*, approaches that of *Epimachairodus taracliensis* and also some specimens of *Machairodus aphanistus*. It is shorter than that of *Machairodus horribilis*, and appears to be slightly smaller than those of *Epimachairodus ultimus* and "*Machairodus*" *nestianus*. The length of M_1 of the Anatolian species is in excess

[178] Viret and Mazenot, 1948, pp. 24 and 26.
[179] See ibid., pl. I, fig. 1.
[180] See ibid., p. 24.
[181] Ibid., pp. 24-25.

of those of the following Machaerodonts: *Epimachairodus ethiopicum*, *Paramachaerodus orientalis*, *Paramachaerodus indicus*, *Paramachaerodus pilgrimi*, *Sansanosmilus palmidens*, *Sansanosmilus (?) serratus*, *Propontosmilus sivalensis*, *Megantereon megantereon*, *Megantereon (?) falconeri*, *Megantereon maximiliani* and *Megantereon nihowanensis*.

From the account given above it is clear that the skull found at Küçükyozgat belongs to genus *Epimachairodus* Kretzoi, but to a form distinct from all the Pontian and later species of this genus. The features which distinguish the Anatolian form from the known species of genus *Epimachairodus* are listed below.

Epimachairodus romeri differs from *Epimachairodus taracliensis* (Riabinin) in having somewhat more elevated lower incisors and lower canines, in possessing an upper canine with a crown higher than the root, in having a smaller ectoparastyle in the upper fourth premolar and a distinct talonid in the first lower molar.

Epimachairodus romeri differs from *Epimachairodus palanderi* (Zdansky) in having a smaller ectoparastyle in the upper fourth premolar, a distinct anterior accessory cusp in the third lower premolar and a distinct talonid in the first lower molar. Furthermore, in the Anatolian species the symphyseal angle is larger and there is no trace of a mental process.

Epimachairodus romeri differs from *Epimachairodus tingii* (Zdansky), in possessing smaller teeth, crenulations on the anterior border of the upper canine and a shorter diastema between the third and fourth lower premolars.[182] Again in *Epimachairodus romeri* the symphyseal angle is larger and there is no trace of a mental process.

Epimachairodus romeri is distinguished from *Epimachairodus crenatidens* (Fabrini) in having somewhat more elevated lower incisors and lower canines, an upper canine in which the height of the crown exceeds that of the root, a lower third premolar in which the

[182] In *Epimachairodus palanderi* and *Epimachairodus tingii* of China (see Zdansky 1924, pp. 110 and 118) there is a small second upper premolar, which was probably missing in *Epimachairodus romeri*.

Regarding two fragments Zdansky (1924, p. 120) states: "*Ein Schnauzenfragment sowie der hintere Teil eines Unterkiefers von Lok.* 30_8 *können ebenso wohl zu* M. Palanderi *als zu* M. tingii *gehören.*" Unlike the first lower molar of the Anatolian species, this first lower molar from China, does not possess a distinct talonid (Zdansky, 1924, pl. XXIV, fig. 8).

part behind the main cusp is longer, a lower first molar with a distinct talonid and in possessing a shorter diastema between the third and fourth lower premolars. Furthermore, in the fourth upper premolar of the Anatolian species there is a small ectoparastyle which is lacking in *Epimachairodus crenatidens.*

Epimachairodus romeri differs from *Epimachairodus boulei* Kretzoi and *Epimachairodus hungaricus* Kretzoi in having a distinct talonid in the first lower molar.

Epimachairodus romeri is distinguished from *Epimachairodus latidens* (Owen) in possessing an upper canine in which the height of the crown is in excess of that of the root.

Epimachairodus romeri differs from *Epimachairodus ultimus* (Teilhard) in having an upper canine in which the height of the crown is more than that of the root, a larger third upper premolar with a lower crown index, a non-styliform and two-rooted third lower premolar, an absolutely as well as relatively larger fourth lower premolar and a slightly shorter first lower molar with a distinct talonid.

Epimachairodus romeri is distinguished from *Epimachairodus ethiopicum* in having a larger fourth lower premolar and a larger first lower molar.

The account given above clearly establishes that *Epimachairodus romeri* is distinct from all the species of genus *Epimachairodus* known to date. In other words, *Epimachairodus romeri* clearly represents a new species of genus *Epimachairodus* Kretzoi.

CONCLUSION

1. The skull, of classical Pontian Age, from Küçükyozgat belongs to a new species of *Epimachairodus*, which I have named *Epimachairodus romeri.*

2. The systematic position of an isolated Machaerodont upper canine from the same place, which is larger than that of *Epimachairodus romeri*, remains uncertain.

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EXPLANATION OF THE FIGURES

(The scale is in centimeters)

Fig. 1. The skull of *Epimachairodus romeri* Şenyürek from Küçükyozgat, in the ground.

Fig. 2. The skull of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma verticalis.

Fig. 3. The skull of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma lateralis (right side).

Fig. 4. The skull of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma lateralis (left side).

Fig. 5. The mandible of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma verticalis.

Fig. 6. The mandible of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma lateralis (right side).

Fig. 7. The mandible of *Epimachairodus romeri* Şenyürek from Küçükyozgat in norma lateralis (left side).

Figs. 8-9 The anterior view of the upper incisors of *Epimachairodus romeri* Şenyürek from Küçükyozgat.

Fig. 10. The lateral view of the right upper canine of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 11. The anterior view of the right upper canine of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 12. The lateral view of the right P^3 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 13. The occlusal view of the left P^3 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 14. The lateral view of the left P^3 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 15. The internal view of the left P^3 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 16. The lateral view of the right P^4 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 17. The lateral view of the left P^4 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 18. The occlusal view of the left M_1 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 19. The lateral view of the left M_1 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 20. The internal view of the left M_1 of *Epimachairodus romeri* Şenyürek from Küçükyozgat.
Fig. 21. The lateral view of the isolated upper canine from Küçükyozgat.
Fig. 22. The internal view of the isolated upper canine from Küçükyozgat.

TABLE 1

Measurements of Corpus Mandibulae of *Epimachairodus romeri*,n. sp.[1]

a) Height of Symphysis	60.00
b) Angle of Symphysis	119°
c) Distance from most posterior point of crown of lower canine to most anterior point of P_3 (Diastema length)[2]	31.50
d) Distance from most posterior point of crown of lower canine to most distal point of crown of M_1	101.50
e) Height of Corpus Mandibulae: in front of P_3	34.10 (average of two sides)
f) Height of Corpus Mandibulae: at posterior mental foramen (under middle of P_3)	34.00
g) Height of Corpus Mandibulae: below middle of P_4	36.50 (left)
h) Height of Corpus Mandibulae: below middle of M_1	32.50? (right)
i) Index $=\frac{d}{f}$	2.98

[1] The mandibular and dental measurements given in this paper are all in millimeters.

[2] The distance between the posteriormost point of the exposed part of the root of C_1 and the anteriormost point of the crown of P_3 is 29.00 mm.

TABLE 2

Measurements of the Upper Teeth of *Epimachairodus romeri*, n.sp.[1]

	Max. Length (Mesio-distal diameter)	Max. Breadth (Bucco-lingual diameter)	Buccal Height (Crown)	Robustness Value[2]	Crown Index[3]
I^3	11.00	12.50	—	137.50	113.63
C^1	29.00	12.30	65.20+	356.70	42.41
P^3	22.10	9.40	—	207.74	42.53

[1] The crown height of the canine is measured along the middle of the buccal surface of the crown. The measurements of P^3 are averages of two sides. The length and breadth of the canine are measured at the level of the point on buccal surface, used in the measurement of the height.

[2] Robustness Value=Maximum length × maximum breadth.

[3] Crown index$=\frac{\text{Maximum breadth} \times 100}{\text{Maximum length}}$.

TABLE 3

Measurements of the Lower Teeth of *Epimachairodus romeri*, n.sp.

	Max. Length (Mesio-distal diameter)	Max. Breadth (Bucco-lingual diameter)	Robustness Value	Crown Index
C_1	15.30	10.40	159.12	67.97
P_3	16.70	7.60	126.92	45.50
P_4	23.70+	10.00	237.00+	42.19
M_1	29.40	12.60	370.44	42.85
P_3-M_1	70.50	—	—	—

TABLE 4

Measurements of the Isolated Upper Canine from Küçükyozgat

	Max. Length (Mesio-distal diameter)	Max. Breadth (Bucco-lingual diameter)	Buccal Height (Crown)	Robustness Value	Crown Index
C^1	36.50	15.00	80.20+	547.50	41.09

TABLE 5

Measurements of the Mandibles of Machaerodontinae

	Height of Symphysis	Diastema Length
Epimachairodus romeri Şenyürek from Küçükyozgat.	60.00	31.50
Epimachairodus taracliesnsis (Riabinin) from Pikermi (Specimen described by Wagner, 1860). Gaudry, 1873.	40.00	24.00
Epimachairodus palanderi (Zdansky) from China. Zdansky, 1924.	—	35.50
Epimachairodus tingii (Zdansky) from China. Zdansky, 1924.	—	56.00
Epimachairodus ultimus (Teilhard) from China. Specimen 3. Teilhard de Chardin, 1939.	—	38.00
Epimachairodus ultimus (Teilhard) from China. Specimen D. Teilhard de Chardin, 1939.	—	38.00
Machairodus aphanistus (Kaup) from Mont Léberon. Gaudry, 1873.	55.00	31.00
Machairodus aphanistus (Kaup) from Eppelsheim. Pilgrim, 1931.	—	34.00
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	—	54.00
Machairodus aphanistus (Kaup) from Pikermi. (Specimen described by Roth and Wagner, 1855). Gaudry, 1873.	91.00	55.00
Paramachaerodus orientalis (Kittl) from Pikermi. Pilgrim, 1931.	—	20.00
Paramachaerodus pilgrimi Kretzoi from India. Pilgrim, 1932.	—	16.30
Paramachaerodus indicus (Kretzoi) from India. Pilgrim, 1932.	—	17.00
Sivasmilus copei Kretzoi from India. Pilgrim, 1932.	—	18.80
Propontosmilus sivalensis (Lydekker) from India. Pilgrim, 1932.	—	19.10
Megantereon (?) *palaeindicus* (Bose) from India. Pilgrim, 1932.	—	34.50 (app.)

TABLE 6

Measurements of the Upper Canines of Machaerodontinae

	Max. Length	Max. Breadth	Height (Crown)	Robustness Value	Crown Index
Epimachairodus romeri Şenyürek from Küçükyozgat.	29.00	12.30	65.20+	356.70	42.41
Isolated upper canine from Küçükyozgat.	36.50	15.00	80.20+	547.50	41.09
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen I. Riabinin, 1929.	32.00	13.00	72.00 (Buc.) 71.00 (ling.)	416.00	40.62
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 2. Riabinin, 1929.	34.00	12.00	—	418.00	35.29
Epimachairodus palanderi (Zdansky) from China. Specimen 1. Zdansky, 1924.	45.00	16.50	—	742.50	36.66
Epimachairodus palanderi (Zdansky) from China. Specimen 3. Zdansky, 1924.	38.00	13.50	—	513.00	35.52
Epimachairodus palanderi (Zdansky) from China. Teilhard de Chardin, 1945 (with Leroy).	27.00 (Av.)	11.50	72.00	310.50	42.59
Epimachairodus tingii (Zdansky) from China. Zdansky, 1924.	40.00	16.50	—	660.00	41.25
Epimachairodus cf. crenatidens (Fabrini) from China. Teilhard de Chardin and Piveteau, 1930 (see also Teilhard, 1945).	29.00	11.50	70.00	333.50	39.65
Machairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1939.	25.00	10.00	—	250.00	40.00
"*Machairodus*" *nestianus* Fabrini from Perrier. [1] Teilhard de Chardin and Piveteau, 1930 and Teilhard de Chardin, 1945.	38.00	17.00	107.00	646.00	44.73

TABLE 6 (Continued)
Measurements of the Upper Canines of Machaerodontinae

	Max. Length	Max. Breadth	Height (Crown)	Rubustness Value	Crown Index
"*Machairodus*" *nestianus* Fabrini from Perrier. Piveteau, 1948.	—	—	—	—	47.00
"*Machairodus*" *nestianus* Fabrini. Schaub, 1934.	35.0—38.0	17.00	95.0-108.0	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	35.00	15.00	119.00?	525.00	42.85
Machairodus aphanistus (Kaup) from Salonika. Arambourg and Piveteau, 1929.	—	—	100.00	—	—
Machairodus (?) *copei* (Pavlow) from Grebeniki. Pavlow, 1914.	45.00 (alveolus)	—	—	—	—
Paramachaerodus orientalis (Kittl) from Küçükçekmece. Malik and Nafiz, 1933.	13.00? (thickness)	—	—	—	—
Paramachaerodus orientalis (Kittl) from Maragha. Kittl, 1887.	17.00	9.60	—	163.20	56.47
Sansanosmilus (?) *rhomboidalis* Pilgrim from India. Pilgrim, 1932.	12.00	7.00	—	84.00	58.33
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	22.00	10.00	82.00	220.00	45.45
Megantereon. Piveteau, 1948.	—	—	—	—	50.00
Megantereon maximiliani (Zdansky) from China (*Machairodus maximiliani* Zdansky). Specimen 1. Zdansky, 1924.	20.5? (alveolus)	11.00 (alveolus)	—	225.50	53.65
Megantereon maximiliani (Zdansky) from China (*Machairodus maximiliani* Zdansky). Specimen 2. Zdansky, 1924.	18.00	11.00?	—	198.00	61.11

TABLE 6 (Continued)

Measurements of the Upper Canines of Machaerodontinae

	Max. Length	Max. Breadth	Height (Crown)	Robustness Value	Crown Index
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin, 1945.	28.00	14.00	90.00	392.00	50.00
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin, 1945.	22.00	—	71.00	—	—
"*Machairodus*"? from Loc. I, Choukoutien. Right. Pei, 1934.	25.00	11.00	63.00	275.00	44.00
"*Machairodus*"? from Loc. I, Choukoutien. Left. Pei, 1934.	27.00	12.00	55.00	324.00	44.44
"*Machairodus*"? from Choukoutien. Zdansky's specimen. Pei, 1934.	30.50	12.00	—	366.00	39.34

[1] The specimen from Perrier, the measurements of which are listed in these tables, was originally leabelled *Machairodus crenatidens* by Teilhard de Chardin and Piveteau (see Teilhard de Chardin and Piveteau, 1930, p. 116). Subsequently, however, upon the critical review of Schaub and his identifying it with "*Machairodus*" *nestianus* (see Schaub, 1934, p. 405), the late Teilhard de Chardin corrected it as *Machairodus nestianus* (see Teilhard de Chardin, 1939, p. 254). Hence, in the present tables it is listed as "*Machairodus*" *nestianus*.

TABLE 7

Measurements of P^2 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus palanderi (Zdansky) from China. Specimen 1. Zdansky, 1924.	3.50	7.00	24.50	200.00
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Right. Zdansky, 1924.	4.20	5.50	23.10	130.95
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Left. Zdansky, 1924.	4.20	4.80	20.16	114.27
Epimachairodus palanderi (Zdansky) from China. Specimen 4. Zdansky, 1924.	4.40	3.30	14.52	75.00
Epimachairodus tingii (Zdansky) from China. Zdansky, 1924.	17.20	13.90	239.08	80.81

TABLE 8
Measurements of P^3 Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus romeri Şenyürek from Küçükyozgat.	22.10	9.40	207.74	42.53
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 1. Riabinin, 1929.	25.00	10.50	262.50	42.00
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 2. Riabinin, 1929.	23.00	10.00	230.00	43.47
Epimachairodus palanderi (Zdansky) from China. Specimen 1. Zdansky, 1924.	23.00	9.40	216.20	40.86
Epimachairodus palanderi(Zdansky) from China. Specimen 2. Zdansky, 1924.	22.50	9.50	213.75	42.22
Epimachairodus palanderi (Zdansky) from China. Specimen 3. Zdansky, 1924.	26.00	11.00	286.00	42.30
Epimachairodus palanderi (Zdansky) from China. Specimen 4. Zdansky, 1924.	24.50	9.70	237.65	39.59
Epimachairodus palanderi (Zdansky) from China. Teilhard de Chardin, 1945.	23-36	—	—	—
Epimachairodus tingii (Zdansky) from China. Zdansky, 1924.	26.60	11.00	292.60	41.35
Epimachairodus cf. crenatidens (Fabrini) from China. Teilhard de Chardin and Piveteau, 1930.	10.00	—	—	—
Epimachairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1939.	5.50	3.50	19.25	63.63
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin, 1945.	10.50	6.50	68.25	61.90
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	23.00	—	—	—
Machairodus (?) *copei* (Pavlow) from Grebeniki. Pavlow, 1914.	25.00	—	—	—

TABLE 8 (Continued)

Measurements of P^3 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Paramachaerodus orientalis (Kittl) from Macedonia. Schlosser, 1921.	16.00	—	—	—
Paramachaerodus orientalis (Kittl) from Küçükçekmece. Malik and Nafiz, 1933.	12.00	6.00	72.00	50.00
Paramachaerodus orientalis (Kittl) from Maragha. Kittl, 1887.	15.00	—	—	—
Sansanosmilus (?) *rhomboidalis* Pilgrim from India. Pilgrim. 1932.	9.00	5.00?	45.00	55.55
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	13.00	—	—	—
Megantereon (?) *falconeri* Pomel from India. Pilgrim 1932.	12.50	6.50	81.25	52.00
Megantereon maximiliani (Zdansky) from China (*Machairodus maximiliani* Zdansky). Zdansky, 1924.	16.30	7.20	117.46	44.17
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	14.00	—	—	—
Megantereon inexpectatus Teilhard from China. Teilhard de Chardin, 1945.	16.00	—	—	—

TABLE 9

Measurements of P^4 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index	$\frac{P^4L \times 100}{P^4L}$
Epimachairodus taracliensis (Riabinin) from Taraklia. Spacimen 1. Riabinin, 1929.	45.00	18.00	810.00	40.00	55.55
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 2. Riabinin, 1929.	39.00	—	—	—	58.97
Epimachairodus cf. crenatidens (Fabrini) from China. Teilhard de Chardin and Piveteau, 1930.	38.00	—	—	—	26.31
Epimachairodus palanderi (Zdansky) from China. Specimen 1. Zdansky, 1924.	41.00?	17.00?	697.00	41.46	56.09
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Zdansky, 1924.	40.00	16.50	660.00	41.25	56.25
Epimachairodus palanderi (Zdansky) from China. Specimen 3. Zdansky, 1924.	45.00	15.00	675.00	33.33	57.77
Epimachairodus palanderi (Zdansky) from China. Specimen 4. Zdansky, 1924.	—	15.00	—	—	—
Epimachairodus palanderi (Zdansky) from China. Specimen 5. Zdansky, 1924.	43.30	16.00	692.80	36.95	—
Epimachairodus palanderi (Zdansky) from China. Teilhard de Chardin, 1945.	40-45	—	—	—	—
Epimachairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1939.	40.00	10.00	400.00	25.00	13.75
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin, 1945.	42.00	14.00	588.00	33.33	25.00
"*Machairodus*" *nestianus* Fabrini. Schaub, 1934.	40-44.5	—	—	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	42.00	—	—	—	54.76
Machairodus aphanistus (Kaup) from Salonika. Arambourg and Piveteau, 1929.	42.00	16.00	672.00	38.09	—

TABLE 9 (Continued)

Measurements of P^4 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index	$\frac{P^4L \times 100}{P^4L}$
Machairodus (?) *copei* (Pavlow) from Grebeniki. Pavlow, 1914.	42.00	—	—	—	59.52
Machairodus horribilis Schlosser from China. Schlosser, 1903.	37.00 (alveolus)	—	—	—	—
Paramachaerodus orientalis (Kittl) from Macedonia. Schlosser, 1921.	28.00	—	—	—	57.14
Paramachaerodus orientalis(Kittl) from Maragha. Kittl, 1887.	28.00	—	—	—	53.57
Paramachaerodus orientalis (Kittl) from Maragha. Pilgrim, 1931.	28.50	14.00	399.00	49.12	—
Sansanosmilus (?) *rhomboidalis* Pilgrim from India. Pilgrim, 1932.	21.50	—	—	—	—
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	28.00	—	—	—	46.42
Megantereon (?) *praecox* Pilgrim from India. Pilgrim, 1932.	31.00	13.50	418.50	43.54	—
Megantrereon (?) *falconeri* Pomel from India. Pilgrim, 1932.	33.00	12.30	405.90	37.27	37.87
Megantereon maximiliani (Zdansky) from China (*Machairodus maximiliani* Zdansky). Zdansky, 1924.	29.00	13.30	385.70	45.86	56.20
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	31.00	—	—	—	45.16
Megantereon nihowanensis (Teilhard and Piveteau,) from China. Teilhard de Chardin, 1945.	33.00	—	—	—	42.42
Megantereon inexpectatus Teilhard from China. Teilhard de Chardin, 1945.	35.00	—	—	—	45.71

TABLE 10

Measurements of M^1 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 1. Riabinin, 1929.	8.50	11.80	100.30	138.82
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 2. Riabinin, 1929.	4.00	5.00	20.00	125.00
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Zdansky, 1924.	6.50	10.80	70.20	166.15
Epimachairodus palanderi (Zdansky) from China. Specimen 3. Zdansky, 1924.	6.50	11.30	73.45	173.84
Epimachairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1939.	5.00	5.00	25.00	100.00
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin, 1945.	—	10.00	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	11.00	—	—	—
Megantereon maximiliani (Zdansky) from China. Zdansky, 1924.	5.20	9.90	51.48	190.38
Megantereon (?) *falconeri* Pomel from India. Pilgrim, 1932.	4.50	8.00	36.00	177.77

TABLE 11

Measurements of the Lower Canine in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus romeri Şenyürek from Küçükyozgat.	15.30	10.40	159.12	67.97
Epimachairodus taracliensis (Riabinin) from Pikermi (Specimen described by Wagner, 1860). Gaudry, 1873.	15.00	—	—	—
Epimachairodus taracliensis (Riabinin) from Pikermi. Pilgrim, 1931.	17.00	—	—	—
Epimachairodus taracliensis (Riabinin) from Taraklia. Riabinin 1929.	13.00?	—	—	—
Epimachairodus palanderi (Zdansky) from China. Zdansky, 1924.	14.30	10.30	147.29	72.02
Epimachairodus tingii (Zdansky) from China. Specimen 1. Zdansky, 1924.	17.60	12.0	211.20	68.18
Epimachairodus tingii (Zdansky) from China. Specimen 3. Zdansky, 1924.	16.60	11.80	195.88	71.08
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin and Piveteau, 1930.	47.00?[1]	—	—	—
Machairodus aphanistus (Kaup) from Mont Léberon. Gaudry, 1873.	15.00	—	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	15.00	—	—	—
Machairodus horribilis Schlosser from China. Schlosser, 1903.	—	14.50 (breite?)	—	—
Paramachaerodus orientalis (Kittl) from Pikermi. Weithofer, 1888.	11.40	7.30	83.22	64.03
Paramachaerodus indicus (Kretzoi) from India. Pilgrim, 1932.	12.10	—	—	—
Paramachaerodus pilgrimi Kretzoi from India. Pilgrim, 1932.	13.70	8.30	113.71	60.58

TABLE 11 (Continued)
Measurements of Lower Canine in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Propontosmilus sivalensis (Lydekker) from India. Pilgrim, 1932.	11.80	8.20	96.76	69.49
Sivasmilus copei Kretzoi from India. Pilgrim, 1932.	11.00	6.70	73.70	60.90
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	31.00?	—	—	—
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	15.00	—	—	—
"*Machairodus*" from Loc. 1, Choukoutien. Pei, 1934.	15.20	—	—	—

[1] As is Pointed out by Schaub this figure is propably wrong (see Schaub, 1934, p. 405), which may also be the case with the length measurement of the lower canine of *Megantereon megantereon* listed.

TABLE 12
Measurements of P_3 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus romeri Şenyürek from Küçükyozgat.	16.70	7.60	126.92	45.50
Epimachairodus taracliensis (Riabinin) from Pikermi. Gaudry, 1862-1867.	18.00	—	—	—
Epimachairodus taracliensis (Riabinin) from Pikermi. Pilgrim, 1931.	15.00	—	—	—
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 1. Riabinin, 1929.	18.30	8.50	157.25	45.94
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Zdansky, 1924.	15.10	7.40	111.74	49.00
Epimachairodus tingii (Zdansky) from China. Specimen 1. Zdansky, 1924.	18.80	8.40	157.92	44.68
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin and Piveteau, 1930.	6.00	—	—	—
Machairodus aphanistus (Kaup) from Mont Léberon. Gaudry, 1873.	19.00	—	—	—
Machairodus aphanistus (Kaup) from Eppelsheim. Specimen 49967a. Pilgrim, 1931.	21.00	—	—	—
Machairodus aphanistus (Kaup) from Eppelsheim. Specimen M 413. Pilgrim, 1931.	21.00	—	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	21.00	—	—	—
Paramachaerodus orientalis (Kittl) from Hungary (*Machairodus hungaricus* Kormos). Pilgrim, 1931.	14.50	—	—	—
Paramachaerodus orientalis (Kittl) from Pikermi (A). Weithofer, 1888.	12.70	6.10	77.47	48.03
Paramachaerodus orientalis (Kittl) from Pikermi (B). Weithofer, 1888.	12.50	6.30	78.75	50.40
Paramachaerodus orientalis (Kittl) from Pikermi, Pilgrim, 1931.	14.00	—	—	—

TABLE 12 (Continued)
Measurements of P_3 in Machaerodontinae

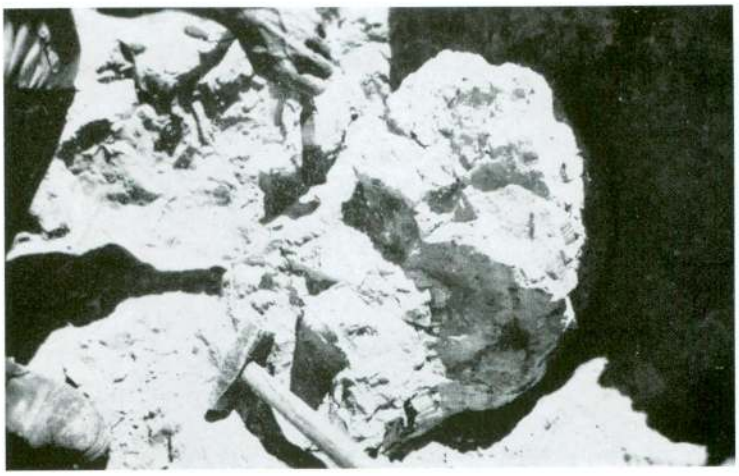
	Max. Length	Max. Breadth	Robustness Value	Crown Index
Paramachaerodus ogygia (Kaup) from Pikermi. Weithofer, 1888.	10.80	5.70	61.56	52.77
Paramachaerodus indicus (Kretzoi) from India. D 141. Pilgrim, 1932.	13.00	—	—	—
Paramachaerodus pilgrimi Kretzoi from India. Pilgrim, 1932.	14.00	7.40	103.60	—
Propontosmilus sivalensis (Lydekker) from India. Pilgrim, 1932.	13.30	—	—	—
Sivasmilus copei Kretzoi from India. Pilgrim, 1932.	8.20	4.50	36.90	54.87
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	10.00	—	—	—
Megantereon (?) *falconeri* Pomel from India. Pilgrim, 1932.	8.00	6.30	50.40	78.75
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	9.50	—	—	—

TABLE 13
Measurements of P_4 in Machaerodontinae

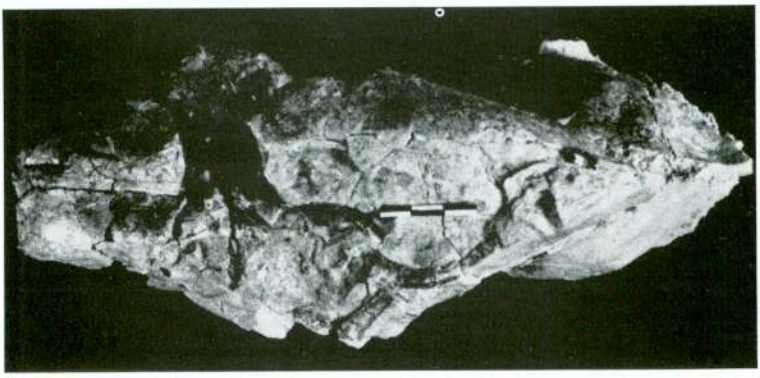
	Max. Length	Max. Breadth	Robustness Value	Crown Index
Epimachairodus romeri Şenyürek from Küçükyozgat.	23.70+	10.00	237.00+	42.19
Epimachairodus taracliensis (Riabinin) from Pikermi. Pilgrim, 1931.	25.00	—	—	—
Epimachairodus taracliensis (Riabinin) from Taraklia. Specimen 1. Riabinin, 1929.	29.00	11.50	333.50	39.65
Epimachairodus taracliensis (Riabinin). Arambourg, 1947.	27.00	11.40	307.80	42.22
Epimachairodus crenatidens (Fabrini). Arambourg, 1947.	21.50	—	—	—
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Zdansky, 1924.	25.70	10.40	267.28	40.46
Epimachairodus palanderi (Zdansky) from China. Teilhard de Chardin, 1945.	21.00	—	—	—
Epimachairodus tingii (Zdansky) from China. Zdansky, 1924.	29.00	12.40?	359.60	42.75
Epimachairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1945.	17.00	—	—	—
Epimachairodus ethiopicum Arambourg from Omo. Arambourg, 1947.	21.00	9.60	201.60	45.71
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin and Piveteau, 1930.	17.00	—	—	—
"*Machairodus*" *nestianus* Fabrini. Arambourg, 1947.	18.00	—	—	—
Machairodus aphanistus (Kaup) from Eppelsheim. Specimen 49967a. Pilgrim, 1931.	26.00	—	—	—
Machairodus aphanistus (Kaup) from Eppelsheim. Specimen M413. Pilgrim, 1931.	27.50	—	—	—
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	27.00	—	—	—

TABLE 13 (Continued)
Measurements of P_4 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Machairodus horribilis Schlosser from China. 3 specimens. Schlosser, 1903.	25-26-27	—	—	—
Paramachaerodus orientalis (Kittl) from Hungary (*Machairodus hungaricus* Kormos). Pilgrim, 1931.	19.00	—	—	—
Paramachaerodus orientalis (Kittl) from Pikermi(A). Weithofer, 1888.	18.80	8.40	157.92	44.68
Paramachaerodus orientalis (Kittl) from Pikermi. Pilgrim, 1931.	19.00	—	—	—
Paramachaerodus indicus (Kretzoi) from India. D141. Pilgrim, 1932,	17.30	8.30	143.59	47.97
Paramachaerodus pilgrimi Kretzoi from India. Pilgrim, 1932.	18.50	8.60	159.10	46.48
Paramachaerodus cf. pilgrimi Kretzoi from India. Pilgrim, 1932.	18.00	8.00	144.00	44.44
Sansanosmilus palmidens (Blainville). Arambourg, 1947.	18.50	—	—	—
Sansanosmilus (?) serratus Pilgrim from India. Pilgrim, 1932.	15.50	7.00	108.50	45.16
Propontosmilus sivalensis (Lydekker) from India. Pilgrim, 1932.	17.50	—	—	—
Sivasmilus copei Kretzoi from India. Pilgrim, 1932.	13.80	6.90	95.22	50.00
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Teilhard de Chardin and Piveteau, 1930.	17.50	—	—	—
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*). Arambourg, 1947.	17.00	7.50	127.50	44.11
Megantereon (?) *palaeindicus* (Bose) from India. Pilgrim, 1932.	23.50	11.00	258.50	46.80
Megantereon (?) *falconeri* Pomel from India. Pilgrim, 1932.	21.00	10.50	220.50	50.00



←Fig. 1



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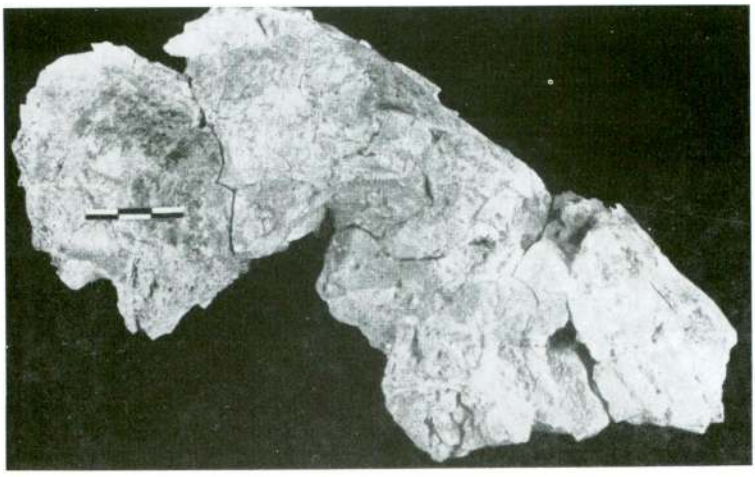

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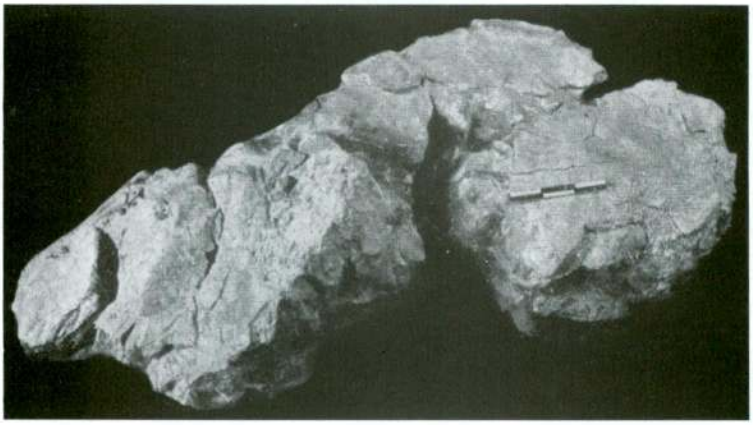

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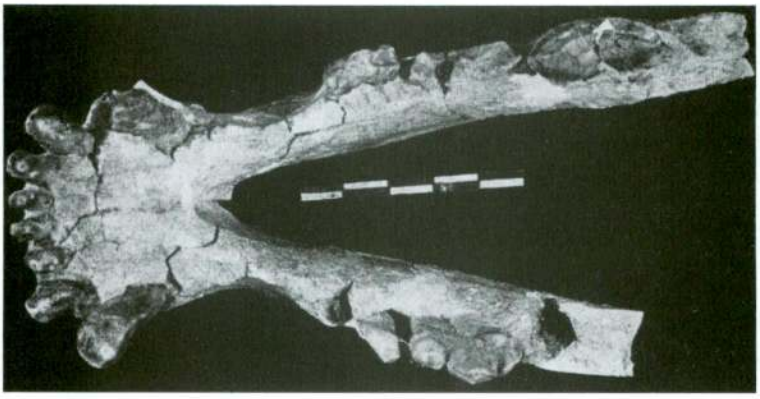

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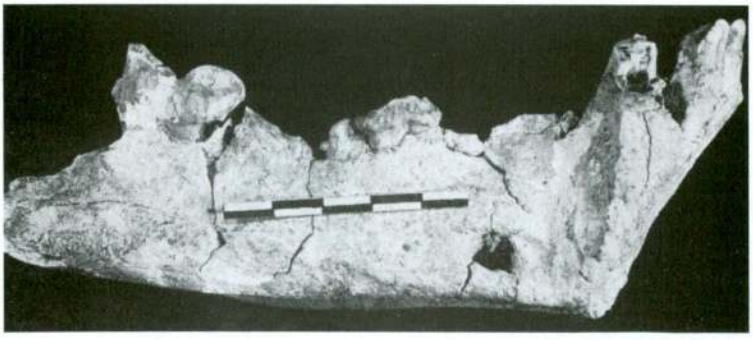

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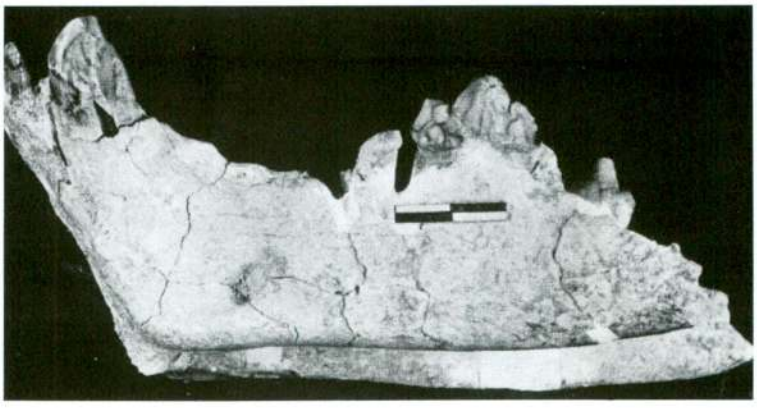

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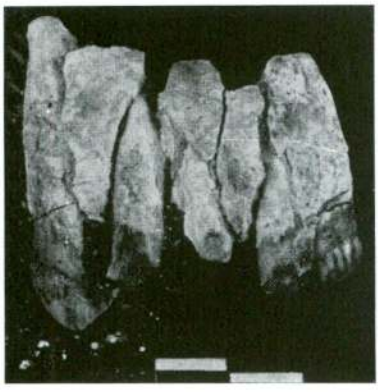

Fig. 8

Fig. 9

Fig. 10

Fig. 11

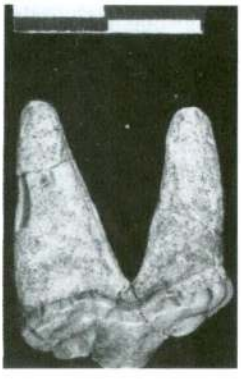

Fig. 12

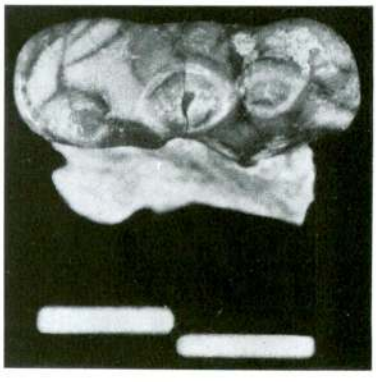

Fig. 13

Fig. 14

Fig. 15

←Fig. 16

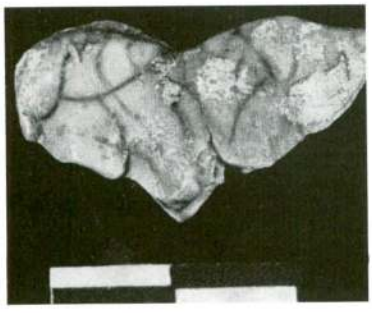

Fig. 17

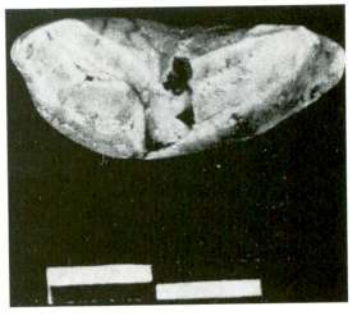

Fig. 18

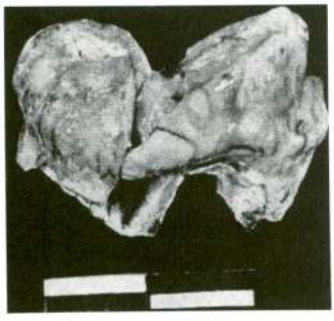

Fig. 19

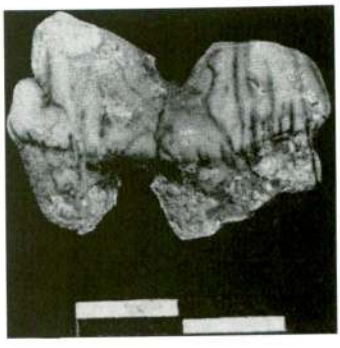

Fig. 20

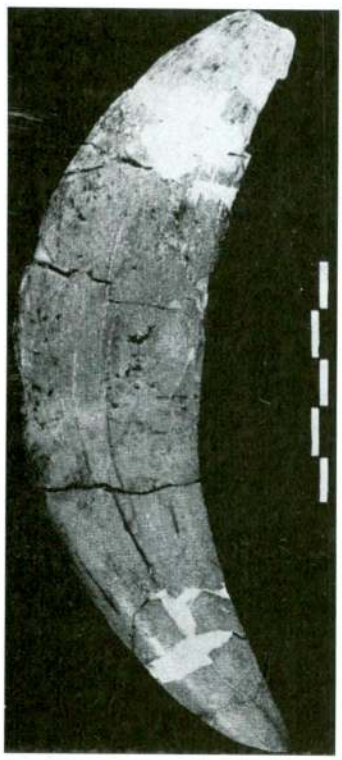

Fig. 21

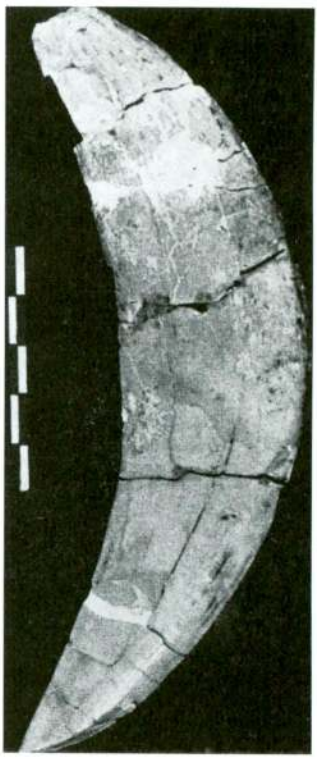

Fig. 22

TAELE 13 (Continued)
Measurements of P_4 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index
Megantereon (?) *falconeri* Pomel. Arambourg, 1947.	21.00	—	—	—
Megantereon maximiliani (Zdansky) from China. (*Machairodus maximiliani* Zdansky). Zdansky, 1924.	—	8.20	—	—
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	19.00	—	—	—

TABLE 14

Measurements of M_1 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index	$\frac{P_3L \times 100}{M_1L}$	$\frac{P_4L \times 100}{M_1L}$
Epimachairodus romeri Şenyürek from Küçükyozgat.	29.40	12.60	370.44	42.85	56.80	80.61
Epimachairodus taracliensis (Riabinin) from Pikermi. Gaudry, 1862—1867.	31.00	—	—	—	58.06	—
Epimachairodus taracliensis (Riabinin) from Pikermi. Pilgrim, 1931.	30.00	—	—	—	50.00	83.33
Epimachairodus taracliensis (Riabinin) from Taraklia. Riabinin, 1929.	30.50	14.50	442.25	47.54	60.65	95.08
Epimachairodus taracliensis (Riabinin). Arambourg, 1947.	30.00	13.00	390.00	43.33	—	90.00
Epimachairodus crenatidens (Fabrini). Arambourg, 1947.	29.00	—	—	—	—	74.00
Epimachairodus palanderi (Zdansky) from China. Specimen 2. Zdansky, 1924.	28.80	12.90	371.52	44.79	52.43	89.23
Epimachairodus palanderi (Zdansky) from China. Teilhard de Chardin, 1945.	29.00	—	—	—	—	—
Epimachairodus ultimus (Teilhard) from China. Teilhard de Chardin, 1939 and 1945.	32.00	12.00	384.00	37.50	—	53.12
Epimachairodus ethiopicum Arambourg from Omo. Arambourg, 1947.	26.30	12.50	328.75	47.52	—	80.00
"*Machairodus*" *nestianus* Fabrini from Perrier. Teilhard de Chardin and Piveteau, 1930.	32.00	—	—	—	18.75	53.12
"*Machairodus*,, *nestianus* Fabrini. Schaub, 1934.	32-33	—	—	—	—	—
"*Machairodus*" *nestianus* Fabrini. Arambourg, 1947.	33.00	—	—	—	—	54.00
Machairodus cf. aphanistus (Kaup) from Soblay. Viret and Mazenot, 1948.	30.50	—	—	—	—	—
Machairodus aphanistus (Kaup) from Eppelsheim. Specimen 49967a. Pilgrim, 1931.	30.00	—	—	—	70.00	86.66

TABLE 14 (Continued)
Measurements of M_1 in Machaerodontinae

	Max. Length.	Max. Breadth	Robustness Value	Crown Index	$\frac{P_3L \times 100}{M_1L}$	$\frac{P_4L \times 100}{M_1L}$
Machairodus aphanistus (Kaup) from Pikermi. Roth and Wagner, 1855.	31.00	—	—	—	67.74	87.09
Machairodus aphanistus (Kaup) from Salonika. Arambourg and Piveteau, 1929.	32.00	—	—	—	—	—
Machairodus horribilis Schlosser from China. Schlosser, 1903.	35.00	16.00	560.00	45.71	—	—
Paramachaerodus orientalis (Kittl) from Hungary (*Machairodus hungaricus* Kormos). Pilgrim, 1931.	21.00	—	—	—	69.04	90.47
Paramachaerodus orientalis (Kittl) from Pikermi(A). Weithofer, 1888.	21.30	9.00	191.70	42.25	59.62	88.26
Paramachaerodus orientalis (Kittl) from Pikermi. Pilgrim, 1931.	22.00	9.50	209.00	43.18	63.63	86.36
Paramachaerodus orientalis (Kittl) from Maragha. Pilgrim, 1931.	23.00	10.00	230.00	43.47	—	—
Paramachaerodus indicus (Kretzoi) from India. D141. Pilgrim, 1932.	19.50	7.70	150.15	39.48	66.15	88.71
Paramachaerodus indicus (Kretzoi) from India. D251. Pilgrim, 1932.	21.00	9.00	189.00	42.85	—	—
Paramachaerodus pilgrimi Kretzoi from India. Pilgrim, 1932.	22.50	9.00	202.50	40.00	62.22	82.22
Paramachaerodus cf. pilgrimi Kretzoi from India. Pilgrim, 1932.	19.50	9.00	175.50	46.15	—	92.30
Sansanosmilus palmidens (Blainville). Arambourg, 1947.	21.00	—	—	—	—	88.00
Sansanosmilus (?) *serratus* Pilgrim from India. Pilgrim, 1932.	19.50 (app.)	8.00	156.00	41.02	—	79.48
Propontosmilus sivalensis (Lydekker) from India. Pilgrim, 1932.	21.00	8.70	182.70	41.42	63.33	83.33
Megantereon megantereon Croizet and Jobert (*Machairodus cultridens*) Teilhard de Chardin and Piveteau, 1930.	19.00	—	—	—	52.63	92.10

TABLE 14 (Continued)

Measurements of M_1 in Machaerodontinae

	Max. Length	Max. Breadth	Robustness Value	Crown Index	$\frac{P_3L \times 100}{M_1L}$	$\frac{P_4L \times 100}{M_1L}$
Megantereon megantereon Croizet and Jobert. Pilgrim, 1932.	20.00	10.00	200.00	50.00	—	—
Megantereon megantereon. Croizet and Jobert *(Meg. cultridens)*.Arambourg,1947.	19.00	8.50	161.50	44.73.	—	89.00
Megantereon (?) *falconeri* Pomel from India. Pilgrim, 1932.	26.00	13.00	338.00	50.00	30.76	80.76
Megantereon (?) *falconeri* Pomel from India. Type. Pilgrim, 1932	24.50	11.00	269.50	44.89	—	—
Megantereon falconeri Pomel. Arambourg, 1947.	25.00	—	—	—	—	84.00
Megantereon maximiliani (Zdansky) from China (*Machairodus maximiliani* (Zdansky). Zdansky, 1924.	21.50	9.90	212.85	46.04	—	—
Megantereon nihowanensis (Teilhard and Piveteau) from China. Teilhard de Chardin and Piveteau, 1930.	24.00	—	—	—	39.58	79.16
"*Machairodus*"? from Loc. I, Choukoutien. Pei, 1934.	28.00	11.00	308.00	39.28	—	—
"*Machairodus*" from Loc. 9, Choukoutien. Pei, 1934.	29.20	13.00	379.60	44.52	—	—