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A STUDY OF THE PONTIAN FAUNA OF GÖKDERE (ELMADAĞI), SOUTH-EAST OF ANKARA

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The fossiliferous site of Gökdere, which is near the village of Evciler Ağılları, about 28 kilometers south-east of the city of Ankara, in a straight line, and south of Elmadağı, was first discovered by the geologist, Oğuz Erol in 1948, during the preparation of his doctorate thesis.[1] I, at first, arranged a students' excursion[2] to this place in 1951, and afterwards paid a second visit, together with Mrs. E. Şenyürek, in the same year. I have already published a preliminary report on the fossils found during these two visits.[3]

[1] In 1948, Oğuz Erol had found, in the vicinity of the Gökdere stream, a horn-core fragment, an astragalus and a phalanx and had shown them to my former student, Fikret Ozansoy. Ozansoy attributed the horn-core fragment to *Oioceros rothii* Wagner and the astragalus and the phalanx to the genus *Hipparion* (see Erol, 1949). In his subsequent study on the Pontian fauna of Muğla, Ozansoy also briefly refers to the presence of a Hipparion fauna at this place (see Ozansoy, 1951, p. 150).

In 1948, Oğuz Erol had also found a second astragalus, part of which is broken and missing. The genus and species of this second astragalus, which belongs to an Artiodactyl, still remain indetermined.

[2] For this excursion see Şenyürek, 1951, p. 68.

[3] Ibid.

Subsequently, with the help of a grant given by the Faculty of Letters (Faculty of Language, History and Geography) of the University of Ankara,[4] I went to Gökdere, accompanied by Mrs. Şenyürek, and carried out excavations at this place.[5] During this field work (10-17 August, 1951), I at first excavated at the spot discovered by Oğuz Erol in 1948, which is just west of the Gökdere stream (figs. 1, 2 and 3). In this report this first fossiliferous pocket is called "Gökdere pit" (fig. 4). During the course of this sojourn in the Gökdere region, we discovered and excavated two more fossiliferous points, one just east of the village of Evciler Ağılları, and the other between this and the Gökdere pit. The latter two spots are respectively called Akkırma pit I and II (fig. 5). The dimensions of the three excavated pits are as follows :

	Length	Width	Depth Reached (from the surface)
Gökdere pit	7.50 m.	5.50 m.	0.70 m.
Akkırma pit II	5.60 ,,	5.20 ,,	1.30 ,,
Akkırma pit I	3.36 ,,	3.00 ,,	1.36 ,,

In all three pits, which contained remains of *Hipparion gracile* Kaup, the fossils are found in deposits of marl. In all three pits, the fossils, which are found just below the surface and in damp deposits, have badly decayed. Therefore, only the teeth and some isolated or fragmentary bones or horns could be retrieved.

In this report I will only deal with the fossil Mammalian remains from Gökdere, and not dwell on the geology of the region,[6] which is treated by Oğuz Erol in a separate paper.[7] Also for the map showing the location of Gökdere the reader is referred to Oğuz Erol's report.

[4] On this occasion I wish to extend my thanks to the office of the Dean, the Council of Professors and the Eastern Anatolian Research Station of the Faculty of Language, History and Geography of the University of Ankara for this grant.

[5] In this connection I also wish to extend my thanks to my wife for her help during this field work.

[6] See Erol : 1951. In Şenyürek, 1951, p. 71.

[7] Erol, : 1952 (In this issue of Belleten).

ORDER PROBOSCIDEA

FAMILY MAMMUTIDAE CABRERA (FAMILY MASTODONTIDAE) [8]

MASTODON PENTELICI GAUDRY AND LARTET

Mastodon pentelici Gaudry and Lartet is represented by an upper second molar of the right side, [9] found at the Gökdere pit. [10] In this five-cusped upper second molar, the two anterior cusps, of which one is buccal and the other lingual in position, are arranged in a transverse line and form the anterior lobe of the tooth which is narrower than its posterior lobe (fig. 6). In the posterior lobe of this tooth, there are two cusps on the lingual side and one cusp on the buccal side of the occlusal surface, the buccal cusp being more posterior in position than the mesio-lingual cusp of this lobe, as in the specimens of *Mastodon pentelici* from Pikermi, described by Gaudry, [11] and as in those from Maragha. [12] The thickened and crenulated mesial and distal margins of the occlusal surface represent the cingulum. In addition there is a thickened belt of cingulum at the base of both the buccal and lingual surfaces which are, on either side, continuous with the thick mesial and distal margins of the chewing surface of the crown (fig. 7). In other words, this tooth from Gökdere is encircled by a complete belt of cingulum, which is pronounced on mesial and distal sides and weaker on buccal and lingual surfaces. All the cusps of this tooth are worn, the lingual cusps being more worn than the buccal cusps.

[8] From Simpson, 1950, p. 133. In this report all the family names are from Simpson, 1950.

[9] For the designation of the molars of Mastodons the terminology used by De Mecquenem (1924, p. 138) and Arambourg and Piveteau (1929, p. 75) has been adopted. For this Arambourg and Piveteau (1929, p. 75) state: "*En tout cas, la distinction entre molaires de lait et prémolaires est toujours délicate, souvent impossible. Nous emploierons donc ici, comme l'a déjà proposé M. Boule, l'ancienne terminologie établie par Gervais et de Blainville, et nous dirons simplement première, deuxième, troisième, quatrième, cinquième et sixième molaires, marquant seulement l'ordre d'apparition de ces diverses dents, sans essayer de distinguer entre dents de lait et prémolaires.*"

[10] In addition to some fragmentary bones, also there is a left astragalus (max. length = 111.00 mm; max. width = 111.00 mm.) of a proboscidean, which was mentioned before (Şenyürek, 1951, p. 70). But it is not known whether it belong to this species or to another species.

[11] Gaudry, 1862, p. 144.

[12] See De Mecquenem, 1924, pl. I, figs. 7 and 8.

Gaudry described the upper second molar of the specimen from Pikermi as follows : "*...elle est plus longue que large et plus étroite en avant qu'en arrière; on y compte trois rangs de collines et un bourrelet en avant; elle n'a pas de talon en arrière; les deux mamelons qui forment la seconde colline ne sont pas placés sur un même rang; celui du côté interne est plus en avant que celui du côté externe; bien que la dent ait été en exercise pendant longtemps, en voit encore du cément dans les vallées; je n'ai pas remarqué de bourrelet sur les faces latérales*"[13] The tooth from Gökdere, in general, resembles the corresponding tooth from Pikermi, [14] but differs from it mainly in having a belt of cingulum on the buccal and lingual faces of the crown.

De Mecquenem gives the following description for the upper second molar from Maragha : "*La 2e molaire supérieure (Pl. I, fig. 7 et 8) est divisée en deux lobes par un pli profond de la muraille externe, un léger pli de la muraille interne; le premier lobe est en presqu' île; il est plus étroit que le second; il comporte un bord antérieur bourgeonné, une rangée de deux tubercules; le lobe postérieur a une rangée de tubercules et un troisième tubercule un peu en retrait du côté interne; il est flanqué de ce côté d'un groupe de petits tubercules secondaires; en arrière est un talon bourgeonné, dont les tubercules extrêmes sont assez forts; à l'usure on retrouve bien la M2 de Pikermi.*" [15] This description of De Mecquenem would almost fit the specimen from Gökdere. Furthermore, although not mentioned by De Mecquenem,[16] as can be seen from the picture published by him,[17] in the Maragha specimen there are clear traces of cingulum on the buccal and lingual faces of the crown. In short, the morphology of the upper second molar of *Mastodon pentelici* from Gökdere resembles more that of the specimen from Maragha than that from Pikermi.

The measurements of the Gökdere tooth [18] are compared with

[13] Gaudry, 1862, p. 144.
[14] Ibid, Pl. XXII, fig. 2.
[15] De Mecquenem, 1924, p. 140.
[16] Ibid., p. 140.
[17] Ibid., Pl. 1, fig. 8.
[18] The height of this tooth has been reduced by wear. The height measurements of the already worn crown are as follows :

Height (Mesio-buccal cusp)	= 19.00+mm.
Height (Disto-buccal cusp)	= 17.00+mm.
Height (Mesio-lingual cusp)	= 15.00+mm.
Height (Disto-lingual cusp)	= 16.00+mm

those of the upper second molars of *Mastodon pentelici* from Pikermi and Maragha in Table 1. As can be seen from this table the tooth from Gökdere is smaller than those of *Mastodon pentelici* from Pikermi and is in the range of those from Maragha, being, however, nearer to the lower limit of the range of the teeth from the latter place. In crown index the Gökdere specimen is in the range of the upper second molars of *Mastodon pentelici* from Pikermi and Maragha. In the index which expresses the breadth of the anterior lobe as a percentage of that of the posterior lobe of the tooth, the Gökdere specimen is again in the range of the two teeth from Pikermi. A comparison with the teeth from Maragha in this index is not possible as De Mecquenem gives only one breadth measurement.

ORDER PERISSODACTYLA

FAMILY EQUIDAE GRAY

HIPPARION GRACILE KAUP

Hipparion gracile Kaup is represented by a large number of isolated teeth belonging to both the deciduous and permanent dentitions (figs. 8-17), and a number of extremity bones (figs. 19-26). By far the vast majority of the mammalian remains found at Gökdere belong to this species, so that the fauna from this site can justifiably be called a Hipparion fauna.

As can be seen from Table 2, in the total length of the lower cheek teeth (P_2-M_3) one specimen of *Hipparion gracile* from Gökdere is in the range of *Hiparion gracile* from Pikermi and Mont Léberon and is very near to those from Veles in Macedonia.

Regarding the extremity bones, Arambourg and Piveteau make the following statement about the lower extension of the articular facet on the disto-medial corner of the plantar surface of Astragalus of Hipparion : "*Mme A. Pavlow a cru trouver dans l'astragale de l'Hipparion un caractère particulier et auquel elle paraît attacher une grande importance: la facette oblongue interne, qui, chez Anchitherium, arrive jusqu'à la surface tarsienne, serait séparée, chez Hipparion, du bord inférieur de l'os. Ce caractère, que l'on trouve dans quelques espèces de Palaeotherium, n'existerait plus chez les chevaux. Sur une de nos formes il*

n'en est pas ainsi: la facette arrive jusqu'à la surface tarsienne. "[19] Out of the seven astragali from Gökdere where observations on this feature could be made, in five this articular facet is clearly separated from the tarsal surface (see figs. 20-21), while in two it reaches this surface (figs. 22 and 23). In one of these (fig. 22) the facet completely reaches the tarsal surface. In the other specimen, however, the facet reaches this surface in its lateral half while it is separated from it in its medial portion (fig. 23). That is, in this feature, there is still some variation in *Hipparion gracile*. In the maximum length of astragalus (Table 3) *Hipparion gracile* from Gökdere is, on the average, near that from Pikermi and its average is identical with the measurement of the specimen from Lyon, the specimens from Mont Léberon tending, on the whole, to be smaller than these forms.

In the maximum length and width of the first and second phalanges, the specimens from Gökdere are in the range of those from Pikermi (Tables 4 and 5). In these bones, *Hipparion gracile* from Gökdere and Pikermi, on the whole, tend to be somewhat bigger than the form from Mont Léberon.

Regarding the differences between the phalanges of *Hipparion* and *Equus*, Arambourg and Piveteau make the following statement :

"*L'examen d'un grand nombre de pièces nous a convaincus qu'il était possible de distinguer une phalange d'Hipparion d'un phalange de Cheval. La possibilité d'une telle distinction pouvant avoir, dans certains cas, un intérêt stratigraphique, nous allons en dire quelques mots.*

Une phalange d'Hipparion, qu'elle soit antérieure ou postérieure, se distingue d'une phalange de Cheval par deux caractères :

1° Chez l'Hipparion, l'insertion en V du ligament sésamoïdien inférieur s'étend beaucoup moins loin, sur la face plantaire, que chez le Cheval

2° L'élargissement distal de la phalange est beaucoup moins fort que chez le Cheval." [20] The same differences in these two features has also been mentioned by Teilhard de Chardin and Piveteau, in their study of the fossil mammals of China. [21]

It can be seen, with regard to the first feature, from fig. 25 that the V- shaped ridges on the volar surface of the first phalanx of *Hip-*

[19] Arambourg and Piveteau, 1929, p. 85.

[20] Ibid., p. 85.

[21] Teilhard de Chardin and Piveteau, 1930, p. 29.

parion gracile from Gökdere is really much shorter than that of *Equus*, as also observed by Arambourg and Piveteau[22] and Teilhard de Chardin and Piveteau.[23]

As for the second feature, I have listed the maximum lengths, proximal and distal widths of the first and second phalanges of *Hipparion gracile* from Gökdere, *Hipparion houfenense* from China and some *Equus*, taken from the literature, in Tables 6 and 7 and I have calculated three indices from these measurements. As can be seen from Table 7, in the indices $\frac{\text{Distal Width} \times 100}{\text{Length}}$ and $\frac{\text{Distal Width} \times 100}{\text{Proximal Width}}$ the first phalanges of *Hipparion* are within the range of *Equus*, the minimum for *Equus* being lower than that of *Hipparion*, and the maximum for *Equus* exceeding that of *Hipparion*. Again in the indices expressing the distal width as a percentage of length and proximal width, the ranges of the second phalanges of *Hipparion* and *Equus* overlap to a great extent (Table 7). However, in these two indices the minima for *Hipparion* are lower than those of *Equus*, while the maxima of the latter genus exceed those of the former.

From these comparisons it is seen that, contrary to the opinions of Arambourg and Piveteau[24] and Teilhard de Chardin and Piveteau,[25] in at least a considerable number of cases, the relative sizes of the distal extremities of the phalanges of *Hipparion* do not differ much from those of some forms of *Equus*, that is, it is at least not always possible to make a distinction between the two genera on this basis.

However, in minima and maxima where differences were cited above, it may perhaps be possible to make a distinction between the two genera, but even in this more specimens of *Hipparion* are needed to be quite sure.

[22] Arambourg and Piveteau, 1929, p. 85.
[23] Teilhard de Chardin and Piveteau, 1930, p. 29.
[24] Arambourg and Piveteau, 1929, p. 85.
[25] Teilhard de Chardin and Piveteau, 1930, p. 29.

FAMILY CHALICOTHERIIDAE GILL

GEN. AND SP. INDETERMINED

This family is represented by two somewhat worn phalanges which were found on the surface near the Gökdere pit. In both phalanges the distal extremity is forked and the proximal extremity presents a concave articular surface which is not perpendicular to the long axis of the bone, but stands obliquely (fig. 27). One of these specimens is nearly complete, while in the other the proximal extremity is damaged. The measurements of these two phalanges are as follows :

	Specimen 1	Specimen 2
Maximum Length	62.00 mm.	—
Length from the middle point of the anterior margin of proximal articular surface to the point where the distal extremity is forked	33.00 mm.	31.00 mm.
Maximum width of Proximal Extremity	41.00 mm.	—
Maximum width of Distal Extremity ..	34.00 mm.	31.50 mm.

FAMILY RHINOCEROTIDAE OWEN

ACERATHERIUM SP.

The genus *Aceratherium* is represented by the buccal parts of two lower molars of the left side (figs. 28-29), found on the surface near Akkırma pit I. The lingual parts of both of these teeth are unfortunately broken and missing. In the larger specimen the buccal surface of the mesial lobe and most of the buccal surface of the distal lobe is preserved. In the smaller specimen most of the buccal surface of the mesial lobe and only the mesial half of the distal lobe are retained. The larger molar has a length of 42.00 mm. at the base. In both teeth a conspicuous belt of cingulum starts somewhat below the cutting edge on the mesio-buccal corner, descends downward and then bending at the base continues and reaches the furrow between the two lobes. In the larger tooth a faint belt of cingulum crosses the base of the buccal surface of the distal lobe and then it bends and continues upward as a thick belt at the disto-buccal corner. On the other hand, in the smaller tooth the mesial half of the buccal surface of the distal lobe is smooth.

ORDER ARTIODACTYLA

FAMILY SUIDAE GRAY

SUS ERYMANTHIUS ROTH AND WAGNER

Sus erymanthius Roth and Wagner is represented by a permanent first right lower molar [26] and two upper first molars (fig. 30), one right and one left, from the Gökdere pit. These two upper first molars, atlhough found isolated, but close together, probably belong to the same individual as they are of nearly the same size and of the same development. In addition we have the right lower permanent P_3, P_4, M_1, M_2 and M_3, of another individual, which were found in Akkırma pit II (fig. 31-37). Although these five teeth had been found in a row in a right corpus mandibulae, the latter had completely decayed and could not be retrieved.

The lower last premolar (P_4) of *Sus erymanthius* from Gökdere differs from that of *Sus scrofa* in not possessing such a well-developed tubercle on the mesio-lingual corner of the tooth, which is, although variable, usually larger and sometimes quite conspicuous in *Sus scrofa*. [27] However, a close scrutiny (see fig. 33-34) reveals that on the mesio-lingual corner of the lingual surface of P_4 from Gökdere there are three slight swellings, two subjacent to the cutting edge anterior to the main tip of the premolar and one below them. In the unworn lower last premolar of a *Sus scrofa* I have for comparison, there are also two slight swellings subjacent to the cutting edge anterior to the main tip of the tooth and a well-developed tubercle below them. This situation is similar to that of *Sus erymanthius* from Gökdere, with the exception of the tubercle which is lacking in the fossil specimen. However, it is quite evident that the lowermost swelling on the enamel on the mesio-lingual corner of P_4 of *Sus erymanthius* is an incipient beginning of the tubercle seen in *Sus scrofa*.

The last lower premolar (P_4) from Gökdere also differs from that of *Sus scrofa* in having a well-developed tubercle on the disto-lingual corner of the crown, which is also present, according to the

[26] This first lower molar (fig. 38) has already been briefly referred to in my earlier paper. See Şenyürek, 1951, p. 70.

[27] See also Arambourg and Piveteau, 1929, pp. 87-88.

description of De Mecquenem, [28] in the lower premolars of *Sus erymanthius* from Maragha. [29] In *Sus scrofa* this tubercle is very small. In P_3 of *Sus erymanthius* from Gökdere this tubercle is still very rudimentary.

The lower P_3 and P_4 of *Sus erymanthius* from Gökdere show, in their morphology, a close resemblance to those of *Sus erymanthius* from Pikermi [30] and that of *Sus major* from Mont Léberon. [31]

The upper first molars from Gökdere are four-cusped, with a small talon, and resemble closely those of *Sus erymanthius* from Salonica [32] and *Sus major* from Mont Léberon. [33] The first and second lower molars from Gökdere are again four-cusped, the buccal cusps, as is also the case in the upper first molars, being more anterior in position than the corresponding lingual cusps. In both the first and second lower molars from Gökdere there is a small talon at the distal end of the crown, and there are four roots. The third lower molar from Gökdere is by far the largest tooth of the three lower molars, with a large talon in its distal part, in which again the main buccal cusps are more anterior in position than the corresponding lingual cusps.

On the whole, the morphology of the lower molars of *Sus erymanthius* from Gökdere closely resembles those of *Sus erymanthius* from Pikermi [34] and *Sus major* from Mont Léberon. [35]

In the number of the accessory tubercles the upper and lower molars of *Sus erymanthius* from Gökdere come close to those of *Sus scrofa*, as is also the case in *Sus erymanthius* from Salonica, as already recorded by Arambourg and Piveteau, [36] and unlike the specimens of *Sus erymanthius* from Pikermi, in which these tubercles are, according to Gaudry, "*peut-être un peu moins compliqués*". [37]

[28] De Mecquenem, 1924, p. 155.

[29] De Mecquenem (1924-1925) unfortunately has not published the pictures of the teeth of *Sus erymanthius* from Maragha.

[30] Gaudry, 1862, pl. XXXVIII, figs. 3 and 4.

[31] Gaudry, 1873, pl. VIII, fig. 4.

[32] See Arambourg and Piveteau, 1929, pl. IV, fig. 6.

[33] See Gaudry, 1873, pl. VII, fig. 3.

[34] See Gaudry, 1862, pl. XXXVIII, figs. 3 and 4.

[35] Gaudry, 1873, pl. VIII, fig. 3.

[36] Arambourg and Piveteau, 1929, p. 88.

[37] Gaudry, 1862, p. 236.

The measurements of the teeth of *Sus erymanthius* from Gökdere are compared with those of other forms of *Sus* in Table 8. From this table it is seen that the upper first molar of *Sus erymanthius* from Gökdere is of nearly the same length, being very slightly longer, but narrower than that of *Sus erymanthius* from Pikermi. On the other hand, all the available lower teeth (P_3 to M_3) of *Sus erymanthius* from Gökdere exceed the corresponding teeth of the same species from other places in length. In the second and third lower molars where the breadth measurements for *Sus erymanthius* from other places are available, the specimens from Gökdere also exceed them in this dimension. The third lower molar of *Sus erymanthius* from Gökdere is larger in both length and breadth than that of *Sus major* from Mont Léberon. On the other hand, in length measurement the lower teeth of *Sus erymanthius* from Gökdere come close to those of *Sus antiquus*, in one tooth the latter and in the others the former being slightly in excess. In breadth measurement, P_4 and M_1 of *Sus antiquus* exceed those of *Sus erymanthius* from Gökdere, in M_2 they are identical and in M_3 nearly equal, that of *Sus erymanthius* from Gökdere being very slightly the larger. Thus it is seen that in size the teeth of *Sus erymanthius* from Gökdere show considerable variation. The upper first molars from Gökdere have lower robustness values than that of the same species from Pikermi, while the lower teeth, which clearly belong to a larger form, close the gap in size between the teeth of *Sus erymanthius* and *Sus antiquus*.

Regarding the affinites of *Sus erymanthius* Arambourg and Piveteau state: "*Le Sanglier de Pikermi a été décrit par Roth et Wagner, puis par Gaudry, sous le nom d'erymanthius. Il est voisin de celui du Léberon nommé par Gervais Sus major. Pour Gaudry, la seule différence que l'on puisse relever entre ces deux espèces c'est la présence, dans la première, de grosses protubérances latérales au maxillaire supérieur. Mais l'étude des Sangliers actuels montre que c'est un caractère très variable, en rapport, semble-t-il, avec l'âge du sujet. Et Gaudry écrit: 'je pense donc que le Sus erymanthius pourrait être un Sus major, chez lequel les protubérances des maxillaires se seraient développées'*

A Eppelsheim, Kaup a figuré sous le nom de Sus antiquus une troisième forme sans doute identique à Sus major.

Il est fort probable que des matériaux plus complets nous conduiraient à placer dans une seule et même espèce ces differents Suidés. Ici, nous

ne pouvons que signaler ce rapprochement".[38] The material from Gökdere, although too fragmentary, tends to support further this statement made by Arambourg and Piveteau.

FAMILY GIRAFFIDAE GRAY

HELLADOTHERIUM DUVERNOYI GAUDRY AND LARTET

I have tentatively attributed to the species *Helladotherium duvernoyi* a well-preserved large astragalus of the left side (figs. 39-40) and the internal part of another left astragalus (fig. 41), found at Gökdere pit. The astragalus from Gökdere (figs. 39 and 40) closely resembles in its morphology that of *Helladotherium duvernoyi* Gaudry and Lartet from Pikermi.[39]

The measurements of the two astragali from Gökdere are as follows :

	Specimen No. 1	Specimen No. 2
Length (external) :	105.00 mm.	—
Length (internal) :	95.00 ,,	94.00 mm.
Width (proximal) :	72.00 ,,	—
Width (distal) :	70.00 ,,	—

As can be seen from Table 9, in length measurement the astragalus from Gökdere approaches that of *Helladotherium duvernoyi*, while in maximum breadth it is slightly narrower.

FAMILY BOVIDAE GRAY

TRAGOCERUS AMALTHEUS ROTH AND WAGNER

Among the fossil material from Gökdere *Tragocerus amaltheus* is represented by an upper right p^4 from the Gökdere pit and by a left lower M_3 from Akkırma pit II.

The three rooted upper P^4 (fig. 42) resembles, in its morphology, closely a specimen from Salonica depicted by Arambourg and Piveteau.[40] The third lower molar (fig. 43), in its morphology, comes close to the specimens of *Tragocerus amaltheus* from Pikermi,[41]

[38] Arambourg and Piveteau, 1929, p. 88.
[39] See Gaudry, 1862, pl. XLIII, figs. 10 and 12.
[40] See Arambourg and Piveteau, 1929, pl. VII, fig. 3.
[41] See Gaudry, 1862, pl. XLIX, fig. 4.

Mont Léberon,[42], Maragha[43] and Salonica.[44] This third lower molar from Gökdere has a well-developed basal pillar on the buccal surface between the anterior and middle lobes, as is a characteristic of *Tragocerus amaltheus*.[45]

The measurements of P^4 and M_3 are compared with those of other specimens of *Tragocerus* from other sites respectively in Tables 10 and 11. From Table 10 it is seen that the p^4 from Gökdere is in the range of *Tragocerus amaltheus* from other sites in both size and crown index.[46] The third lower molar from Gökdere is equal in length to the specimen of *Tragocerus amaltheus* from Pikermi measured by Gaudry[47] and in breadth it is intermediate between the specimens of *Tragocerus amaltheus* and *Tragocerus rugosifrons* from Samos measured by Schlosser.[48]

Helicotragus Rotundicornis Weithofer

The genus *Helicotragus* is represented by two horn-cores; one left and one right, probably belonging to the same individual, as they were found near each other in the Gökdere pit. Although, in both specimens the tip portion is broken (figs. 44-47), a somewhat greater portion of the horn-core is preserved on the right than on the left side.

These two horn-cores from Gökdere, which have sub-circular cross-sections, first curve outward, then backward and then slightly inward and are twisted along their axis, as is characteristic of the genus Helicotragus.[49] The surface of the horn-cores is covered with slight furrows and there is a weak keel on the mid-part of the external surface, which, toward the tip, passes onto the inner side as the horn-core is twisted. In addition there is another weak keel

[42] See Gaudry, 1873, pl. X, fig. 6.

[43] See De Mecquenem, 1925, pl. V, fig. 6.

[44] See Arambourg and Piveteau, 1929, pl. VII, fig. 2.

[45] For this see Gaudry, 1862, pp. 279-280; Gaudry, 1873, p. 52; De Mecquenem, 1925, p. 35.

[46] See also the long list of measurements given by Andree, 1926, table 2.

[47] See Gaudry, 1862, p. 82.

[48] See Schlosser, 1904, p. 61 and p. 65.

[49] For the characteristic features of horn-cores of Helicotragus see De Mecquenem, 1925, p. 11; Pilgrim and Hopwood, 1928, p. 18; Arambourg and Piveteau, 1929, p. 111.

on the internal surface of the horn-core. In possessing two keels these two horn-cores from Gökdere agree with *Helicotragus rotundicornis* Weithofer, which, as is stated by Pilgrim and Hopwood,[50] possess two keels and differ from *Helicotragus fraasii* Andree which exhibits one keel.[51]

According to Andree, the angle of divergence of the horn-cores is less in *Helicotragus rotundicornis* of Pikermi (71°) than in *Helicotragus fraasii* Andree of Samos (96°),[52] which is a new species established by this author.[53] As the specimens of horn-cores from Gökdere are isolated an exact measurement of the angle of divergence of the two horn-cores is not possible. The distance from the base to the point where the horn-core begins to turn inward, measured on the inner side, is 110.00 mm. on the right and 111.00 mm. on the left horn-core from Gökdere. In this measurement these two specimens come nearer to *Helicotragus rotundicornis* than to *Helicotragus fraasii*, as according to Andree this distance is 105 mm. in *Helicotragus rotundicornis* and 190 mm. in *Helicotragus fraasii*. [54]

Other measurements of the horn-cores from Gökdere, and those of *Helicotragus rotundicornis* from Pikermi and *Helicotragus fraasii* from Samos, given by Andree [55] are listed in Table 12. A small portion of the left horn-core from Gökdere is broken and I have restored it with Plaster-of-Paris. But as only a small portion is missing, the straight length measured on the inner side from the base to the restored tip (176.00 mm) is probably near the actual length. In length, the horn-core from Gökdere is much shorter than that of *Helicotragus fraasii* Andree and comes nearer to that of *Helicotragus rotundicornis* Weithofer. In antero-posterior length at the base, the horn-cores from Gökdere are again much smaller than that of *Helicotragus fraasii* Andree. In the transverse diameter at the base, the specimens from Gökdere are again much narrower than that of *Helicotragus raasii* and in the range of *Helicotragus rotundicornis* from Pikermi. In the transverse diameter in the middle, the horn-cores from Gökdere

[50] Pilgrim and Hopwood, 1928, p. 21.
[51] Ibid, p. 23.
[52] Andree, 1926, p. 165.
[53] Ibid., p. 163.
[54] Ibid., p. 165.
[55] Ibid., p. 165.

are smaller than that of *Helicotragus fraasii*, and are identical with one of the specimens from Pikermi and very near to the other.

In short, this metric comparison and their morphology show that the horn-cores from Gökdere belong to *Helicotragus rotundicornis* Weithofer and not to *Helicotragus fraasii* Andree.

Gazella Deperdita Gervais

Gazella deperdita Gervais is represented in the Gökdere collection by two fragments of horn-cores (figs. 48-49), one right and one left, and one right lower third molar found in Akkırma pit II. In one of the specimens (No. 1) the greatest portion of the horn-core is preserved.

In their study of the vertebrates from Salonica, Arambourg and Piveteau describe the horn-cores of *Gazella deperdita* from this place as follows : "*Les Chevilles des cornes sont relativement courtes et massives; elles s'infléchissent assez brusquement en arrière à partir de leur premier tiers inférieur en restant dans le plan de leur diamètre antéro-postérieur; toutefois, vers la pointe, elle marquent un légère tendance à revenir vers l'intérieur. Leur section est subcirculaire ou ovale suivant les individus, avec un léger applatissement du côté externe. Ces caractères rappellent beaucoup ceux d'une espèce africaine actuelle : G. isabella Gray*". [56]

This description completely fits the two specimens of horn-cores from Gökdere, in both of which the cross-section at the base is subcircular and the external surface of this part is slightly flattened as in Salonica specimens, while the internal surface is convex. In the more complete specimen from Gökdere, the horn-core is also noticeably curved backward in norma lateralis, while the tip portion is, in the anterior view, slightly bent inward again as in the specimens of *Gazella deperdita* from Salonica. In both specimens from Gökdere the surface of the horn-core presents a number of conspicuous longitudinal furrows, of which the ones at the back are the more pronounced, exactly as in the specimens of *Gazella deperdita* (*G.brevicornis*) from Pikermi as described by Gaudry.[57]

[56] Arambourg and Piveteau, 1929, pp. 99-100.

[57] Gaudry (1862, p. 300) described the horn-cores of *Gazella deperdita* (*Gazella brevicornis*) from Pikermi as follows: "*Les cornes naissent au-dessus des orbites, et divergent un peu en se dirigeant en arrière; elles sont légèrement arquées; leur surface porte des sillons qui commencent à* 0^m , *02 au-dessus de la base; les plus profonds sont situés à leur*

The curvature of the *Gazella deperdita* horn-core from Gökdere (fig. 49), in norma lateralis, is much less than that of *Gazella deperdita* specimen depicted by Gervais[58] and also less than that of the horn-core from Mont Léberon depicted by Gaudry.[59] On the other hand, the degree of curvature, in norma lateralis, of the specimen from Gökdere comes near to those of the specimens of *Gazella deperdita* (*Gazella brevicornis*) from Pikermi and Salonica, depicted respectively by Gaudry[60] and Arambourg and Piveteau.[61]

The measurements of the horn-cores from Gökdere are listed in Table 13 and they are compared with the measurements of other Gazellas in Table 16. From Table 16 it is seen that the horn-cores of *Gazella deperdita* from Gökdere are characterized by a high length-breadth index. In length-breadth index of the horn-cores *Gazella deperdita* from Gökdere exceeds the horn- cores of *Gazella gaudryi* Schlosser *(G. Pilgrimi)*, which is another and common species of Gazella in the Pontian deposits of Western Asia and South-Eastern Europe. As far as can be judged from the picture, the horn-cores of *Gazella deperdita* from Gökdere come near to the specimen of *Gazella deperdita* from Salonica depicted by Arambourg and Piveteau,[62] in both the antero-posterior diameter at the base and in total length.[63] A small part of the tip portion of the better preserved horn-core specimen from Gökdere is broken and I have restored it with Plaster-of-Paris (see fig. 48). However, the total length measured on the anterior surface from the base to the restored tip (129.00 mm.) is probably not far from the actual length of the horn-core when it was intact. As can be seen from Table 16, in total length the specimen from Gökdere is in the range of both *Gazella deperdita* and also *Gazella gaudryi* Schlosser *(G. pilgrimi)*. That is, in total length it is not distinguished from both *G. deperdita* and *G. gaudryi* (*G. pilgrimi*).

partie postérieure. Elles sont habituellement rondes, mais quelquefois comprimées sur les côtés; leur épaisseur et leur courbure varient également."

[58] Gervais, 1859, pl. 12, fig. 3.

[59] Gaudry, 1873, pl. XI, fig. 1 and pl. XII, fig. 2.

[60] Gaudry, 1862, pl. LVI, fig. 1.

[61] Arambourg and Piveteau, 1929, pl. VII, fig. 1.

[62] Ibid., pl. VII, ig. 1.

[63] In both specimens, however, the tip portion of the horn-core is broken.

Arambourg and Piveteau describe the lower molars of *Gazella dperdita* from Salonica as follows: "*Les arrière-molaires ont la muraille interne fortement plissée; le pli antérieur du premier lobe est surtout très saillant. Du côté externe, les pliers correspondant aux conides sont comprimés, anguleux, très obliques, relativement peu épais. Le troisième lobe de* M_3 *est bien développé et arrondi. Il n'y a point de tubercules interlobaires aux deux mâchoires.*"[64] On the other hand, Arambourg and Piveteau describe the lower molars of *Gazella gaudryi* (*G. pilgrimi*) as follows: "*Les arrière-molaires ont une muraille interne peu plissée, mais portent un très léger pli antérieur du côté externe du premier lobe. Les piliers externes sont moins obliques et moins anguleux que chez G. deperdita. Le troisième lobe de* M_3 *est plus petit et plus anguleux que chez cette dernière.*"[65] The third lower molar from Gökdere (figs. 50-51) fits the description of *Gazella deperdita* from Salonica almost exactly. In this third lower molar from Gökdere, the lingual surface is well-plicated, the first and middle lobes, in occlusal view, are narrow and triangular in shape, slanting noticeably backward, and in the anterior part of the lingual surface there is a conspicuous anterior fold as described by Arambourg and Piveteau.[66] On the buccal side there is a ledge at the base connecting the first and middle lobes, but there is no distinct pillar.[67] In this Gökdere specimen the third or last lobe is also well-developed.

The measurements of the third lower molars of the genus *Gazella*, available to me, are listed in Table 14. From this table it is seen that the specimen from Gökdere is identical in length with the third lower molar of *Gazella deperdita* from Pikermi and

[64] Arambourg and Piveteau, 1929, p. 100.

[65] Ibid., p. 102.

[66] Ibid., p. 100.

[67] According to Max Schlosser (1904, p. 66) the basal pillars occur in the lower molars of *Gazella deperdita*, but not in the second and third lower molars of *Gazella gaudryi* (*G. pilgrimi*), while it may occur in the first lower molar of this species (for the latter see also Bohlin, 1941, p. 114, note 1). However, I would like to point out that pillars are not found in the lower molars of *Gazella deperdita* from Salonica (see Arambourg and Piveteau, 1929, p. 100), while they occur in the specimens of *Gazella deperdita* (*Gazella brevicornis*) from Pikermi, as described by Gaudry (Gaudry, 1862, p. 299). That is, with regard to the presence of basal pillars, on the buccal side of the lower molars, the various forms of *Gazella deperdita* from various localities are quite variable.

with that of *Gazella gaudryi* (*G. pilgrimi*) from Samos. All the specimens mentioned above are shorter than the third lower molar from Küçükçekmece which Malik and Nafiz [68] have attributed to *Gazella gaudryi* (*G. pilgrimi*). In breadth the third lower molar of *Gazella deperdita* from Gökdere is only slightly broader than that of *Gazella gaudryi* (*G. pilgrimi*) from Samos, but the difference is not great. The third lower molar from Gökdere, however, differs from that of *Gazella gaudryi* (*G. pilgrimi*) from Samos in having a lower height, as is characteristic of *Gazella deperdita.* [69]

Regarding *Gazella deperdita*, Arambourg and Piveteau make the following statements : "*Les spécimens que nous venons de décrire ne diffèrent en rien de ceux qui proviennent de pikermi et ont été figurés par Gaudry sous le nom de G. brevicornis ; ils sont également conformes à ceux de Maragha décrits sous le même nom par de Mecquenem (XL, p. 30, Pl. III, fig. 2, 5, 8). D'autre part, il nous paraît impossible de distinguer spécifiquement l'espèce du Léberen de celle de Grèce, comme l'ont proposé certains auteurs, nous en tenant aussi à l'opinion de Lydekker, F. Major et Gaudry lui-même, qui, en présence des variations individuelles que présentent les Gazelles, pensait ne voir entre ces deux formes que des différences de race. C'est ce que confirme l'examen du nombreux matériel de Maragha, de Pikermi et de Salonique, où se retrouvent tous les termes de passage entre les types extrêmes : G. brevicornis à chevilles osseuses presque roundes et divergentes dès la base, G. deperdita à chevilles osseuses légèrement comprimées et plus ou moins lyrées.*" [70]

As for the relations of our specimens, the horn-cores of *Gazella deperdita* from Gökdere resemble those of *Gazella deperdita* from Pikermi, Salonica and Maragha, differing noticeably from that of *Gazella deperdita* from the Pontian of France described by Ger-

[68] Malik and Nafiz, 1933, p. 63.

[69] In comparing the teeth of *Gazella deperdita* and *Gazella gaudryi* (*G. pilgrimi*), Schlosser, (1904, p. 66) states that the teeth in *Gazella gaudryi* (*G. pilgrimi*) are "*...sehr beträchtliche Höhe...*" In this connection, it may also be noted that the height of the third lower molar of *Gazella deperdita* from Gökdere is far below those of the third lower molars of *Gazella* (*Protetraceros*) *gaudryi* from the Pontian of China studied by Bohlin (see Bohlin, 1941, pp. 102 and 104).

[70] Arambourg and Piveteau, 1929, p. 100.

vais [71] and Gaudry. [72] In other words, the relation of *Gazella deperdita* from Gökdere [73] is closer with the variety of *Gazella deperdita*, which is sometimes known also as *Gazella brevicornis* Roth and Wagner.

Gazella Gaudryi Schlosser (=Gazella Pilgrimi Bohlin)[74]

In my preliminary report on the Pontian fossils from Gök-

[71] Gervais, 1859, p. 140.

[72] Gaudry, 1873, p. 57.

[73] It may also be noted here that Thenius has attributed a horn-core and a metatarsal fragment from İlhançayı, west of Ankara, to *Gazella cfr. deperdita Gervais* (Thenius, 1949, p. 658). But this author does not state whether this specimen is closer to the variety of *Gazella deperdita* from Pikermi or France.

[74] In his study of the fossil mammals from China in 1903, Max Schlosser had distinguished a new species and named it as *Protetraceros gaudryi* (Schlosser, 1903. Cited by Teilhard de Chardin and Young, 1931, p. 35, Pilgrim, 1937, p. 810, Bohlin, 1941, pp. 80-81 and 114-115), while a year later he named a new species of *Gazella* from the Pontian deposits of Samos as *Gazella gaudryi* (Schlosser, 1904, p. 66). The subsequent inclusion of "*Protetraceros*" from China in the genus Gazella, and renaming the species as *Gazella gaudryi* (Schlosser) (see Teilhard de Chardin and Young, 1931, p. 35; Bohlin, 1941, p. 114) has led to a great deal of confusion in the literature. Regarding the relationship of Chinese and European species Bohlin (Bohlin, 1941, p. 114) states: "*Gazella gaudryi Schlosser 1904 and G.* ("*Protetraceros*") *gaudryi* (*Schlosser*) *1903 are thus two different things at least as they appear in the literature, and, when the latter is included in the Genus Gazella, the former has to be renamed. They may be identical, but this has to be proved and, as far as I can see, the evidence is against an identity.*" Accordingly, Bohlin (Bohlin, 1935. Cited by Bohlin, 1941) has renamed the Samos species as *Gazella pilgrimi* which name (*Gazella pilgrimi* Bohlin) has also been used by Guy E. Pilgrim in his later study (Pilgrim, 1937, p. 809). However, it cannot yet be stated that the new name, that is *Gazella pilgrimi* Bohlin, has been firmly established, as in his later study Bohlin (Bohlin, 1941, p. 115) makes the following statement: "*In their paper 1929 Arambourg & Piveteau describe Gazella gaudryi* (*pilgrimi*) *from Saloniki and mention among other dental characters* (*p. 46*) *: 'La muraille externe des arrière-molaires est légèrement plissée, mais beaucoup moins que chez G. deperdita...' These authors state that Gazella gaudryi* (*pilgrimi*) *does not seem to differ, neither in its cranial, nor in its dental characters from G. Schlosseri* Pavlow *and this latter name is put as a synonym—a thing which I overlooked in 1935. It seems to me, as if the horn-pedicles in Pavlow's species were higher than in G. pilgrimi* (*Pavlow, 1913, pl. II*), *but if the two species really are identical, it is evident that the species name schlosseri has the priority to my new name pilgrimi. A species G. schlosseri* Andree *1926* (= *Gazella sp.* Schlosser, *1904*) *was renamed as G. mytilini by Pilgrim & Hopwood, as the species name schlosseri was preoccupied.*" Thus because of the uncertainty prevailing, I have in the present paper preferred to keep the name *Gazella gaudryi* Schlosser for the Sa-

dere I had illustrated [75] and described as *Gazella sp.* fragments of five horn-cores, of which four were basal fragments. [76] In my earlier report I had made the following statement on their affinities : "*The measurements of the horn-cores from Gökdere, although a bit smaller and relatively narrower, approach those of Gazella gaudryi* Schlosser *from the Pontian of Salonica region. The form of these horn-cores, their elliptical cross-sections and the deep grooves seen on their surfaces also recall those of Gazella gaudryi* Schlosser. *But the fragmentary condition of the available horn-cores makes it difficult to determine with certainty the species represented*" [77].

However, during the course of subsequent excavations, the finding of the horn-cores of *Gazella deperdita* Gervais and the discovery of additional horn-core fragments of the same form and of nearly the same size as the fragments described in my preliminary report [78] have clarified the issue and have indicated that a form of *Gazella gaudryi* Schlosser (*G. pilgrimi*) is being dealt with here. During the course of subsequent excavations I found four more basal fragments of horn-cores and in addition a fifth middle fragment which fitted perfectly one of the basal fragments (No. 2) I had collected before (see figs. 52 and 53). The photographs of the horn-cores of this species are shown in figs. 52-55.

Max Schlosser, original describer of *G. gaudryi* (*G. pilgrimi*), had described the horn-cores of this species from Samos as follows : "*Die Augenhöhlen liegen nicht ganz genau unter der Hornbasis, sondern stehen noch ein wenig vor, die stirnbeinnacht bildet einen schwachen Wulst. Die Hörner stehen ziemlich weit auseinander und beginnen erst in einem ziemlichen Abstand von Schädeldach. Sie haben deutlich elliptischen Querschnitt und krümmen sich gleichmässig, aber nicht auffallend stark nach rückwärts*

mos species, but with the understanding that it is a different species from *Gazella gaudryi* (Schlosser) of China. However, in order to prevent confusion in the text I have written the Samos and Near Eastern species as *Gazella gaudryi* Schlosser (*G. Pilgrimi* Bohlin), or more simply as *Gazella gaudryi* (*G. pilgrimi*), while I have written the Chinese species as *Gazella* (*Protetraceros*) *gaudryi* (Schlosser), as is done by Bohlin in his more recent study (see Bohlin, 1941, p. 115).

[75] Şenyürek, 1951, pl. II, fig. 1.

[76] Ibid., pp. 64 and 69.

[77] Ibid., p. 69.

[78] Ibid., pp. 64 and 69.

und überdies auch ein wenig nach auswärts. Ihre Oberfläche ist mit vielen tiefen Längsrinnen versehen, von denen jede sich fast über die ganze Länge des Hornes erstreckt"[79]. Arambourg and Piveteau describe the horn-cores of *Gazella gaudryi* Schlosser (*G. pilgrimi*) as follows: "*Les cornes sont longues et insérées au-dessus de la deuxième moitié des orbites; les chevilles, assez fortes, sont inclinées en arrière suivant un angle d'environ 40° avec l'horizontale, elles sont faiblement divergentes et légèrement, mais régulièrement arquées en arrière; leur longueur devait être d'environ 15 centimètres, ce qui correspond à des étuis cornés de 20 à 22 centimètres. Leur section est elliptique et plus ou moins comprimée latéralement suivant les individus. Leur surface est creusée de nombreuses et profondes cannelures longitudinales*"[80].

The horn-cores from Gökdere fit the description of *Gazella gaudryi* (*G. pilgrimi*) given by Schlosser [81] and Arambourg and Piveteau [82]. All the horn-core fragments from Gökdere attributed to this species have an elliptical cross-section [83], that is they are compressed and on their surfaces considerably deep longitudinal furrows are observed [84]. In norma lateralis, it is seen that all the horn-core fragments gently curve backward. But the degree of curvature, although less than that of *Gazella deperdita*, is quite variable and in some specimens such as the one shown in ig. 54 it is very little. Like the basal fragments, the apical fragment from

[79] Schlosser, 1904, p. 66.

[80] Arambourg and Piveteau, 1929, pp. 101-102.

[81] Schlosser, 1904, p. 66.

[82] Arambourg and Piveteau, 1929, pp. 101-102.

[83] Şenyürek, 1951, p. 64 and p. 69.

[84] In this connection I would like to point out that furrows also occur in the horn-cores of *Gazella deperdita* (*G. brevicornis*) from Pikermi (Gaudry, 1862, p. 300) and Maragha (see De Mecquenem ,1924, pl. III, fig. 2) and in *Gazella deperdita* from Gökdere. Although according to Schlosser (1904, p. 66) in the horn-cores of *Gazella deperdita* "*...die Rinnen fehlen sehr häufig fast vollständig...*" there is no doubt that furrows occur in at least some forms of this species. Furrows also occur in *Gazella paotehensis* (see Teilhard de Chardin and Young, 1931, pl. VII, fig. 2), *Gazella blacki* (see Teilhard de Chardin and Young, 1931, pl. IX, figs. 5-16) from the Pliocene of China, in *Gazella lydekkeri* from the Dhok Pathan formation of Siwalik Hills (Pilgrim, 1937, p. 801), in *Gazella sinensis* (see Teilhard de Chardin and Piveteau, 1930, pl. XI, figs. 2, 3 and 4) and *Gazella* cf. *subgutturosa* (see Teilhard de Chardin and Piveteau, 1930, pl. XI, fig. 1) from the Sanmenian period of China. That is, besides *Gazella gaudryi* (*G. pilgrimi*) ,furrows also occur in other species of the genus Gazella.

Gökdere, I have attributed to this species, is also slightly arched backward in norma lateralis, but when viewed in norma frontalis it is seen to be straight.[85]

In two fragments (Nos 2 and 7) a small portion of the orbit is preserved and from this it appears that the horn-cores were probably somewhat behind the anterior part of the orbit as in the specimens of *Gazella gaudryi* (*G. pilgrimi*) from Samos[86] and Salonica.[87] In short the horn-core fragments of *Gazella gaudryi* (*G. pilgrimi*) from Gökdere differ from those of *Gazella deperdita* from the same place mainly in having an elliptical cross-section and a gentler curvature in norma lateralis.

The measurements of the horn-cores of *Gazella gaudryi* (*G. pilgrimi*) from Gökdere are listed in Table 15 and they are compared with the measurements of horn-cores of the same and other species of Gazella in Table 16. From Table 16 it is seen that the horn-cores of *Gazella gaudryi* (*G. pilgrimi*) from Gökdere differ from those of *Gazella deperdita* in being smaller and in also having a much lower length-breadth index. The horn-cores of *Gazella gaudryi* (*G. pilgrimi*) differ from those from Samos, Salonica and Küçükyozgat in being smaller but are similar to them in having a relatively low length-breadth index. Indeed, the average length-breadth index of the horn-cores from Gökdere is identical (78.33) with the average length-breadth index of the specimens of *Gazella gaudryi* (*G. pilgrimi*) measured by Schlosser (1904), Andree (1926) and Arambourg and Piveteau (1929). Thus it is quite clear that the horn-core fragments from Gökdere represent a form of *Gazella gaudryi* Schlosser (*G. pilgrimi*). But still the horn-cores from Gökdere differ from those of all the other Gazellas from the Pontian period of western Asia and Europe, listed in Table 16, in having a much lower robustness value, that is in being slenderer. Indeed, the horn-cores from Gökdere are even smaller than that of a young Pontian gazella measured by Andree.[88] Thus it appears that the horn-cores from Gökdere

[85] Şenyürek, 1951, pp. 64 and 69.
[86] Schlosser, 1904, p. 66.
[87] Arambourg and Piveteau, 1929, pp. 101-102.
[88] Andree, 1926, Table 6.

represent a slender-horned variety of *Gazella gaudryi* Schlosser (*G. pilgrimi*).

As for the Gazellas from China and India, the horn-cores from Gökdere are much slenderer than those of the large type[89] of *Gazella* (*Protetraceros*) *gaudryi* (Schlosser), *Gazella paothenesis* and *Gazella blacki* from the Pontian of China, *Gazella lydekkeri* from the Dhok Pathan formation of Siwalik Hills, and *Gazella sinensis* and *Gazella prjewalskyi* from the Pleistocene of China (Table 17). In the robustness value the horn-cores from Gökdere exceed, on the average, the two male specimens of the smaller type of *Gazella* (*Protetraceros*) *gaudryi* (Schlosser) and *Gazella dorcadoides* Schlosser from the Pontian of China and differ further from these in tending to have a somewhat lower length-breadth index.

In this connection a few words should be said about *Gazella longicornis* from the Pontian of Samos described as a new species by Andree.[90] Regarding this form Andree states: "*Die neue Gazella steht Gazella Gaudryi nahe, unterscheidet sich aber von ihr durch die sehr viel längeren Hörner und die tiefer eingesenkte Stirn, so dass eine Identifizierung beider Arten nicht möglich ist. Auch verlaufen bei Gazella longicornis die Hornrinnen ganz unregelmässig und die Divergenz der Stirnzapfen ist etwas grösser*"[91] However, a glance at Table 16 will show that in antero-posterior and transverse diameters, in robustness value and in length-breadth index the horn-core of *Gazella longicornis* Andree is very close to the averages of *Gazella gaudryi* (*G. pilgrimi*) measured by Schlosser,[92] Andree[93] and Arambourg and Piveteau.[94] Thus in my opinion it would be more appropriate to consider *Gazella longicornis* Andree not as a species but as another and somewhat longer-horned variety of *Gazella gaudryi* Schlosser (*G. pilgrimi*). The differences-noted by Andree,[95] in my opinion, would not be incompatible with a variety rank.

[89] It may be noted that Bohlin distinguished a large and a small type in this Chinese species (see Bohlin, 1941, pp. 96-98).

[90] Andree, 1926, p. 169.

[91] Ibid., p. 169.

[92] Schlosser, 1904.

[93] Andree, 1926.

[94] Arambourg and Piveteau, 1929.

[95] Andree, 1926, p. 169.

Oioceros Rothii Wagner

Oioceros rothii Wagner is represented by two horn-core fragments, from the basal part of the horn-cores (figs. 58-61), one right and one left, which were found in the Gökdere pit. [96] These horn-cores from Gökdere present an oval cross-section and show the torsion characteristic of Oioceros, [97] the direction of which, as is also stated by Arambourg and Piveteau, [98] is opposite of that of *Helicotragus rotundicornis* Weithofer. On the external surface of both of these horn-cores is seen the noticeable groove which is characteristic of *Oioceros rothii* Wagner. [99] The internal edge of the two horn-cores forms a slight keel which follows the twist of the horn-core. In this feature the specimen from Gökdere differs from that of Pikermi in which the internal surface is rounded [100] and also the typical forms of *Oioceros rothii* Wagner. [101]

While in general, these horn-cores from Gökdere resemble the specimens from Pikermi, [102] Samos [103] and Maragha [104] they differ from them in that the external edge or keel, lateral to the groove, is not as strongly developed as in these forms. On the other hand, in this feature, the specimens from Gökdere closely resemble the horn-core of *Oioceros rothii* Wagner from Salonica described by Arambourg and Piveteau, [105] but as unfortunately these authors do not give a cross-section of the horn-cores, it is not possible to see if this specimen also had a keel on the internal surface or not.

[96] The horn-core fragment of the left side (fig. 61) had been found in 1948 by Oğuz Erol and the fragment from the right side (figs. 58-60) had been collected by me before I started the excavation at the Gökdere pit. See Şenyürek, 1951, p. 70.

[97] See Şenyürek, 1951, p. 70.

[98] Arambourg and Piveteau, 1929, p. 111.

[99] Ibid., p. 113.

[100] See the cross-section of the horn-core published by Gaudry, 1862, pl. LII, ig. 2.

[101] Pilgrim and Hopwood (1928, p. 24) describe the horn-cores of *Oioceros rothii* Wagner as follows: "*Horn-cores rounded, about 15 mm. apart at the base, flattened and subparallel at the tip.*"

[102] See Wagner, 1857, pl. VIII, fig. 20; and Gaudry, 1862, pl. LII, figs. 2-3.

[103] See Andree, 1926, pl. XI, fig. 1.

[104] See De Mecquenem, 1925, pl. VII, fig. 4.

[105] See Arambourg and Piveteau, 1929, pl. VIII, fig. 5.

The measurements of the two horn-cores from Gökdere and of that from Pikermi [106] are as follows :

	The Greater Diameter	The Smaller Diameter
Specimen from Gökdere found in 1948 (left side)	32.00 mm.	25.00 mm,
Specimen from Gökdere found in 1951 (right side)	33.00 mm.	26.00.
The specimen from Pikermi (Gaudry, 1862, p. 298).....	30.00 mm.	—

From these figures it is seen that the specimens from Gökdere are slightly more robust than the specimen from Pikermi.

It would appear that the specimens from Gökdere represent a form different from the typical examples of *Oioceros rothi* Wagner and perhaps a different variety.

ORDER CARNIVORA

Gen. And Sp. Indetermined

Order carnivora is represented by two worn lower canines (fig. 62), found isolated in Akkırma pit II and three broken isolated premolars (figs. 63 and 64) from Gökdere pit. The maximum diameter of the two canines at the base is 17.0 and 18.0 mm.

SUMMARY AND CONCLUSION

The following Mammalian genera and species are so far known from Gökdere :

Mastodon pentelici Gaudry and Lartet
Hipparion gracile Kaup
Aceratherium sp.
Sus erymanthius Roth and Wagner
Helladotherium duvernoyi Gaudry and Lartet

[106] *Oioceros rothii* Wagner from Pikermi had originally been described as *Antilope rothii* Wagner by Wagner (1857, p. 154) and as *Antidorcas? rothii* by Gaudry (1862, p. 297). Malik and Nafiz (1933, p. 91) list *Antidorcas rothii* and *Oioceros rothii* as two separate species of two genera. In this connection, I would like to point out here that they are one and the same species of the same genus.

Tragocerus amaltheus Roth and Wagner
Helicotragus rotundicornis Weithofer
Gazella deperdita Gervais *(G. brevicornis)*
Gazella gaudryi Schlosser (*G. pilgrimi* Bohlin)
Oioceros rothii Wagner.

The fossiliferous deposits of fresh water origin containing these fossils at Gökdere are of Pontian age, [107] that is, lower Pliocene. [108] The Gökdere fauna[109] is similar to and contemporary with the Pontian faunas from İlhançayı, [110] near Ayaş, west of Ankara and Küçükyozgat [111] east of Ankara. Pontian faunas [112] are also known from other sites in Turkey [113] and from the neighboring countries. [114].

[107] For the characteristic Pontian fossils see: Gaudry (1862), De Mecquenem (1924-1925), Zittel (1925, pp. 155 and 209-210), Arambourg and Piveteau (1929), Davies (1934, Vol. II, p. 201), Boule and Piveteau (1935, pp. 654-655, 719 and 723), Romer (1946, p. 567) and Thenius (1949).

[108] Zittel (1925, p. 300), Lewis (1937, p. 194), Romer (1946, Table 4), Thenius (1949) and Papp and Thenius (1949, Table VI) attribute the Pontian to the lower Pliocene.

[109] This new study confirms Ozansoy's (1951, p. 150) statement that there is a Hipparion fauna at this place.

[110] See Kansu, 1937, p. 482. According to Kansu (1937, p. 485) *Hipparion* teeth have also been found in the vicinity of Karakeçili, in the District of Bâlâ. Kansu (1937) had only briefly referred to the presence of *Hipparion gracile* at İlhançayı. But recently a more detailed study on the fossils collected have been made by Thenius, who has determined the presence of a number of Pontian genera and species at this place (see Thenius, 1949).

[111] Tschachtli, 1942, pp. 326-237. See also Table 2, footnote 2, in this report.

[112] It may be noted here that Ozansoy (1951) correctly attributes all the Hipparion faunas of Turkey to the Pontian.

[113] Muğla (Ozansoy, 1951), Eşme (Yalçınlar, 1946), Upper Gediz (Yalçınlar, 1947), Taşkınpaşa (see Table 2, footnote 3, in this report), Karain (Chaput, 1936), and north of Kayseri (İzbırak and Yalçınlar, 1951). As for the mammalian fauna from Küçükçekmece, west of Istanbul, Malik and Nafiz, (1933) had originally attributed it to the Sarmatian, while in a subsequent study Chaput and Nafiz (Chaput and Nafiz, 1934, and Chaput, 1936), were inclined to assign it to the Meotian, that is lower Pontian. In their study Papp and Thenius (1949, Table VI), also consider Küçükçekmece fauna as of Pontian Age.

[114] Veles in Macedonia (Schlosser, 1921), Salonica (Arambourg and Piveteau, 1929) and Pikermi (Gaudry, 1862) in Greece, the island of Samos (Forsyth Major, 1891), Djebel Hamrin and Tauq in Iraq (Piveteau, 1935) and Maragha in Iran (De Mecquenem, 1924-1925).

LITERATURE CITED

ANDREE, J.: *Neue Cavicornier aus dem Pliocän von Samos.* Palaeontographica. Siebenundsechzigster Band, Stuttgart, 1926, pp. 135-175.

ARAMBOURG, C. AND PIVETEAU, J.: *Les vertébrés du Pontien de Salonique.* Annales de Paléontologie, Vol. XVIII, 1929, pp. 57-140.

BOHLIN, B.: *Cavicornier der Hipparion-Fauna Nord-Chinas.* Palaeontologia Sinica, Series C, Vol. IX, Fascicle 4, Peking, 1935 (Cited by Bohlin, 1941).

BOHLIN, B.: *Gazella (Protetraceros) gaudryi (*Schlosser*) and Gazella dorcadoides (*Schlosser*).* Bulletin of the Geological Institution of the University of Upsala, Vol. XXVIII, Upsala, 1941, pp. 79-121

BOULE, M. AND PIVETEAU, J.: *Les fossiles. Eléments de Paléontologie,* Paris, 1935.

CHAPUT, E.: *Voyages d'études géologiques et géomorphogéniques en Turquie.* Mémoires de L'Institut Français D'Archéologie De Stamboul, II, Paris 1936.

CHAPUT, E. AND NAFİZ, H.: *Nouvelles observations sur les terrains Néogènes de l'ouest d'Istanbul.* İstanbul Üniversitesi Geologie Enstitüsü neşriyatından (Publications de l'Institut de Géologie de l'Université de Stamboul), No. 9, İstanbul, 1934.

DAVIES, A. M.: *Tertiary faunas.* 2 vols. London, 1934-1935.

DE MECQUENEM, R.: *Contribution à l'étude des fossiles de Maragha.* Annales de Paléontologie, Vol. XIII, 1924, pp. 133-160 and Vol. XIV, 1925, pp. 1-36.

DEPÉRET, C.: *Recherches sur la succession des faunes de vertébrés Miocènes de la vallée du Rhone.* Archives du Muséum d'Histoire Naturelle de Lyon, Vol. IV, 1887, pp. 45-307.

DUERST, J. U.: *Animal remains from the excavations at Anau and the horse of Anau in its relation to the races of domestic horses.* In Pumpelly, R.: Explorations in Turkestan. Expedition of 1904. Prehistoric civilizations of Anau. Origins, Growth and Influence of Environment, Vol. II, Part VI, Washington, D.C., 1908, pp. 341-399.

EROL, O.: *Ankara güneydoğusundaki Elmadağı ve çevresinin jeoloji ve jeomorfolojisi üzerinde bir araştırma.* Ankara, 1949 (Doctorate dissertation. Not yet published).

EROL, O.: *Elmadağı-Evciler Ağılları memeli fosil yatağı. The mammalian fossil bed of Elmadağı-Evciler Ağılları.* In Şenyürek, 1951, p. 66 and p. 70.

GAUDRY, A.: *Animaux fossiles et Gèologie de L'Attique. D'après les recherches faites en 1855—1856 et en 1860, sous les auspices de l'Academie des Sciences*, Paris, 1862.

GAUDRY, A. : *Animaux fossiles du Mont Léberon (Vaucluse). Étude sur les vertébrés (Étude sur les Invertébrés, par P. Fischer et R Tournouër)*, Paris, 1873.

GERVAIS, P.: *Zoologie et Paléontologie Françaises. Nouvelles recherches sur les animaux vertébrés dont on trouve les ossements enfouis dans le sol de la France et sur leur comparaison avec les espèces propres aux autres régions du Globe.* Deuxième édition, Paris, 1859.

İZBIRAK, R. AND YALÇINLAR, İ.: *Kayserinin kuzeyinde üst Miosene ait omurgalılar. Les vertébrés du Miocène supérieur au nord de Kayseri.* Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. III, No. 1, 1951, pp. 153-154 and 155-157.

KANSU, Ş. A.: *1936 yılında Ankara ve yakınlarında meydana çıkarılan paleontolojik ve prehistorik vesikalar hakkında ilk bir not.* Ülkü, Vol. VIII, No. 48, Ankara, 1937, pp. 482-488.

LEUCHS, K.: *Zur Pikermifauna von Ilhan bei Ankara (Anatolien).* Sitzungsberichten der Österr. Akademie der Wissenschaften. Mathem.-naturw. Kl., Abt.I, 158. Bd., 9. u. 10. Heft, 1949, pp. 655-656.

LEWIS, G. E.: *A new Siwalik correlation.* American Journal of Science, Vol. XXXIII, 1937, pp. 191-204.

MALİK, A. AND NAFİZ, H.: *Küçükçekmece fosil fıkralı hayvanlar mecmuası. Vertébrés fossiles de Küçükçekmece.* Istanbul Darülfünunu Geologie Enstitüsü neşriyatından, No. 8 (Publication de l'Institut de Géologie de l'Université de Istanbul, No. 8), İstanbul, 1933.

MAJOR, C. J. F.: *Considérations nouvelles sur la faune des vertébrés du miocène supérieur dans l'île de Samos.* Comptes rendus des séances de l'Académie des Sciences, Vol. CXIII, No. 18, 1891, pp. 608-610.

MAJOR, C. J. F.: *Le Gisement ossifère de Mitylini.* In Carlo de Stefani, Major, C. J. F. and Barbey, W.: Samos. Étude Géologique, Paléontologique et Botanique. Lausanne, 1891, pp. 85-99.

MOVIUS, H. L.: *Lower Paleolithic Archaeology in Southern Asia and the Far East.* In: Studies in Physical Anthropology. No. 1. Early Man in the Far East. A symposium of the American Association of Physical Anthropologists and the American Anthropological Association. (Editor, W. W. Howells), 1949, pp. 17-77.

OZANSOY, F.: *Preliminary report on a Pontian mammalian fauna from Muğla.* Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. III, No. 1, 1951, pp. 147-151.

PAPP, A. AND THENIUS, E.: *Über die Grundlagen der Gliederung des Jungtertiärs und Quartärs in Niederösterreich, unter besonderer Berücksichtigung der Mio-Pliozän-und Tertiär-Quartär-Grenze.* Sitzungsberichten der Österr. Akademie der Wissenschaften, Mathem.-naturw. Kl., Abt., I, 158. Bd., 9. u. 10. Heft, 1949, pp. 763-787

PILGRIM, G. E. AND HOPWOOD, A. T.: *Catalogue of the Pontian Bovidae of Europe in the Department of Geology.* British Museum (Natural History). London, 1928.

PILGRIM, G. E.: *Siwalik antelopes and oxen in the American Museum of Natural History.* Bulletin of the American Museum of Natural History, Vol. LXXII, Article VII, 1937, pp. 729-874.

PIVETEAU, J.: *Mammifères du Pontien de L'Irak.* Compte rendu sommaire et Bulletin de la Société Géologique de France. Cinquième Série, Tome cinquième, 1935, pp. 468-470.

ROMER, A. S.: *Vertebrate Paleontology.* Chicago, 1946.

ROTH, J. AND WAGNER, A.: *Die fossilen Knochenüberreste von Pikermi in Griechenland.* Abdhandlungen der Mathemat.-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften. Siebenter Band, München, 1854, pp. 373-457.

SCHLOSSER, M.: *Die fossilen Säugetiere Chinas nebst einer Odontographie der rezenten Antilopen.* Abh. Bayer. Akad. Wiss., Bd. XII, 1903 (Cited by Pilgrim, 1937, p. 874; Bohlin, 1941, p. 121; Teilhard de Chardin and Young, 1931, p. 35).

SCHLOSSER, M.: *Die fossilen Cavicornia von Samos.* Beitrage zur Palaeontologie und Geologie Oesterreich-Ungarns und des Orients, Bd. XVII, 1904.

SCHLOSSER, M.: *Die Hipparionenfauna von Veles in Mazedonien.* Abhandlungen der Bayerischen Akademie der Wissenschaften. Mathematisch-physikalische Klasse, XXIX. Band, 4. Abhandlung, 1921, pp. 1-55.

ŞENYÜREK, M. S. : *Gökdere (Elmadağı) Fauna'sına dair bir not. A note on Gökdere (Elmadağı) Fauna.* Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculté de Langue, d'Histoire et de Géographie, Université d'Ankara), Vol. IX, Nos. 1-2, 1951, pp. 63-67 and 68-73.

SIMPSON, G. G.: *The principles of classification and a classification of mammals.* Bulletin of the American Museum of Natural History, Vol. 85, New York, 1950.

TEILHARD DE CHARDIN, P.: *Description de mammifères tertiaires de Chine et de Mongolie.* Annales de Paléontologie, Vol. XV, 1926, pp. 1-52

TEILHARD DE CHARDIN, P. AND PIVETEAU, J.: *Les mammifères fossiles de Nihowan (Chine).* Annales de Paléontologie, Vol. XIX, 1930, pp. 1-134.

TEILHARD DE CHARDIN, P. AND YOUNG, C. C.: *Fossil Mammals from the late Cenozoic of Northern China.* Palaeontologia Sinica, Series C, Vol. IX, Fascicle 1, Peking, 1931.

THENIUS, E.: *Über die Saugetierfauna aus dem Unterpliozän von Ilhan bei Ankara (Türkei).* Sitzungsberichten der Österr. Akademie der Wissenschaften, Mathem.-naturw. Kl., Abt. I, 158. Bd., 9. u. 10. Heft, 1949, pp. 656-661.

TSCHACHTLI, B. C.: *Küçük Yozgat civarında bulunan memeli hayvanat fosilleri.* Fossile saeugetiere aus der Gegend von Küçükyozgat. Östlich Ankara. M. T. A., No. 2/27, Ankara, 1942, pp. 322-324 and 325-327.

WAGNER, A.: *Neue Beiträge zur Kenntniss der fossilen Säugthier-Ueberreste von Pikermi.* Abhandlungen der Mathemat.-Physikalischen Classe der Koeniglich Bayerischen Akademie der Wissenschaften, Achter Band, München, 1857.

YALÇINLAR, İ.: *Eşme civarında Miosen'e ait bir omurgalılar fauna'sı. Une faune de vertébrés miocènes aux environs d'Eşme.* İstanbul Üniversitesi Fen Fakültesi Mecmuası (Revue de la Faculté des Sciences de l'Université d'Istanbul), Series B, Vol. XI, Fascicle 2, 1946, pp. 124-130.

YALÇINLAR, İ: *Yukarı-Gediz vadisinde Miosen'e ait vertebre fosilleri. Les vertébrés fossiles du Miocène dans la vallée du Gediz-supérieur.* Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. I, No. 1, 1947, pp. 164-177.

ZITTEL, VON K. A. (REVISED BY A. S. WOODWARD): *Text-book of Palaeontology*, Vol. III, London, 1925.

EXPLANATION OF THE FIGURES

(Some of the figures are not to scale)

Fig. 1 : The view of Gökdere stream from the vicinity of Gökdere pit.
Fig. 2 : The view of Gökdere stream from the fossiliferous region, further west of Gökdere pit.
Fig. 3 : The view of Gökdere pit from the Gökdere stream.
Fig. 4 : Gökdere pit.
Fig. 5 : Akkırma pit II.
Fig. 6 : Occlusal view of the upper right second molar of *Mastodon pentelici* Gaudry and Lartet from Gökdere.
Fig. 7 : Buccal view of the upper right second molar of *Mastodon pentelici* Gaudry and Lartet from Gökdere.
Fig. 8 : Lower deciduous teeth of *Hipparion gracile* Kaup from Gökdere.
Fig. 9 : Incisors of *Hipparion gracile* Kaup from Gökdere.
Fig. 10 : Right and left upper P^2 of *Hipparion gracile* Kaup from Gökdere.
Fig. 11 : Right P^3 - M^3 of *Hipparion gracile* Kaup from Gökdere.
Fig. 12-13: Upper cheek teeth of *Hipparion gracile* Kaup from Gökdere.
Fig. 14 : Right P_2 - M_3 of *Hipparion gracile* Kaup from Gökdere. These isolated teeth found together have been set in their natural position.
Fig. 15 : Left P_3 - M_3 of *Hipparion gracile* Kaup from Gökdere. These isolated teeth found together have been set in their natural position.
Figs. 16-17: Lower cheek teeth of *Hipparion gracile* Kaup from Gökdere.
Fig. 18 : Right corpus mandibulae and P_2 - M_3 of *Hipparion gracile* Kaup from Küçükyozgat.
Fig. 19 : Dorsal (anterior) view of two astragali of *Hipparion gracile* Kaup from Gökdere.
Fig. 20-23 : Plantar (posterior) views of the astragali of *Hipparion gracile* Kaup from Gökdere.
Fig. 24 : Anterior view of the first phalanx of *Hipparion gracile* Kaup from Gökdere.
Fig. 25 : Posterior view of the first phalanx of *Hipparion gracile* Kaup from Gökdere.
Fig. 26 : Anterior views of the second phalanges of *Hipparion gracile* Kaup from Gökdere.
Fig. 27 : Anterior views of phalanges of Chalicotheriidae from Gökdere.
Fig. 28-29: Buccal views of left lower molars of *Aceratherium* sp. from Gökdere.
Fig. 30: Right and left upper first molars of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 31 : Right lower P_3 - M_3 of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 32 : Right P_3 of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 33 : Occlusal view of Right P_4 of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 34 : Lingual view of right P_4 of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 35 : Right lower first molar of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 36 : Right lower second molar of *Sus erymanthius* Roth and Wagner from Gökdere.

Fig. 37 : Right lower third molar of *Sus erymanthius* Roth and Wagner from Gökdere.
Fig. 38 : Right lower first molar of *Sus erymanthius* Roth and Wagner from Gökdere. This is the isolated first lower molar.
Fig. 39 : Dorsal (anterior) view of the astragalus of *Helladotherium Duvernoyi* Gaudry and Lartet from Gökdere.
Fig. 40 : Plantar (posterior) view of the astragalus of *Helladotherium Duvernoyi* Gaudry and Lartet from Gökdere.
Fig. 41 : Inner view of the astragalus fragment of *Helladotherium Duvernoyi* Gaudry and Lartet from Gökdere.
Fig. 42 : Occlusal view of right P_4 of *Tragocerus amaltheus* Roth and Wagner from Gökdere.
Fig. 43 : Buccal view of the left third lower molar of *Tragocerus amaltheus* Roth and Wagner from Gökdere.
Fig. 44 : Anterior view of the right horn-core of *Helicotragus rotundicornis* Weithofer from Gökdere.
Fig. 45 : Inner view of the right horn-core of *Helicotragus rotundicornis* Weithofer from Gökdere.
Fig. 46 : Anterior view of the left horn-core of *Helicotragus rotundicornis* Weithofer from Gökdere.
Fig. 47 : Inner view of the left horn-core of *Helicotragus rotundicornis* Weithofer from Gökdere.
Fig. 48 : Anterior views of the horn-cores of *Gazella deperdita* Gervais from Gökdere.
Fig. 49 : External views of the two horn-cores of *Gazella deperdita* Gervais *(G.brevicornis)* from Gökdere.
Fig. 50 : Occlusal view of the right lower third molar of *Gazella deperdita* Gervais (*G.brevicornis*) from Gökdere.
Fig. 51 : Buccal view of the right lower third molar of *Gazella deperdita* Gervais *(G.brevicornis)* from Gökdere.
Fig. 52 : Side views of horn-cores (No. 1, 2, 3 and 4) of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Gökdere.
Fig. 53 : Side views of horn-cores (No. 1, 2, 3 and 4) of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Gökdere.
Fig. 54 : Side view of horn-core (No. 2) of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Gökdere.
Fig. 55 : Side views of horn-cores (Nos. 5, 6, 7 and 8) of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Gökdere.
Fig. 56 : Anterior view of the horn-core of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Küçükyozgat.
Fig. 57 : Side view of the horn-core of *Gazella gaudryi* Schlosser (*G. pilgrimi* Bohlin) from Küçükyozgat.
Fig. 58 : Anterior view of the left horn-core of *Oioceros rothii* Wagner from Gökdere.
Fig. 59-60 : External views of the left horn-core of *Oioceros rothii* Wagner (the same horn-core shown in Fig. 58).
Fig. 61 : Anterior view of the right horn-core of *Oioceros rothii* Wagner from Gökdere.
Fig. 62 : Canines of Carnivora from Gökdere.
Fig. 63-64 : Premolars of Carnivora from Gökdere.

TABLE 6

Comparison of the Measurements of First Phalanges of the genera Hipparion and Equus [1]

	Maximum Length	Proximal Width	Distal Width	Prox. Width × 100 / Length	Dist. Width × 100 / Length	Dist. Width × 100 / Prox. Width
Hipparion gracile from Gökdere	67.50	41.00	34.50	60.74	51.11	84.14
Hipparion houfenense from the Upper Pontian? of China (Teilhard de Chardin and Young, 1931)	70.00	43.00	38.00	61.42	54.28	88.37
Equus sanmeniensis from Sanmenian Period of Nihowan, China (Teilhard de Chardin and Piveteau 1930) [2]	86.00	62.00	50.00	72.09	58.13	80.64
Equus stenonis from the Pleistocene of Ceyssaguet near Puy, France (Teilhard de Chardin and Piveteau, 1930)	85.00	64.00	48.00	75.29	56.47	75.00
European Pleistocene Equus from Kesslerloch (Duerst, 1908, after Studer)	70.00	56.00	47.00	80.00	67.14	83.92
Equus przewalskii (Duerst, 1908)	75.00	47.00	39.00	62.66	52.00	82.97
Equus caballus from North Kurgan, Anau (Duerst, 1908). Averages of 14 specimens [3]	78.07 (72.00-87.00)	41.85 (35.00-46.00)	36.14 (32.00-40.00)	53.73 (44.87-62.87)	46.34 (43.58-52.05)	86.58 (76.19-97.14)
Equus caballus (Tarpan). Duerst, 1908, after Tscherski — Anterior Limb	71.50	54.00	45.00	74.26	62.93	83.33
Equus caballus (Tarpan). Duerst, 1908, after Tscherski — Posterior Limb	75.00	52.00	44.50	69.33	59.33	85.57
Equus caballus (From Yana). Duerst, 1908	94.50	64.50	51.00	68.25	53.96	79.06
Equus hemionus (Duerst, 1908)	63.00	43.00	33.00	68.25	52.38	76.74

Muzaffer Süleyman Şenyürek

[1] Indices of the material taken from the literature have been calculated by me from the figures given by various authors.

[2] According to Movius (1949, Table) lower and upper Sanmenian periods correspond respectively to lower Pleistocene and early part of Middle Pleistocene.

[3] Indices and averages have been calculated by me from the figures given by Duerst, 1908.

TABLE 7

Comparison of the Measurements of the Second Phalanges of the Genera Hipparion and Equus [1]

	Maximum Length	Maximum Width	Distal Width	Prox. Width × 100 / Length	Dist. Width × 100 / Length	Dist. Width × 100 / Prox. Width
Hipparion gracile from Gökdere. Average of 8 specimens	38.43 (34.00-42.00)	36.06 (32.00-40.00)	32.68 (27.50-38.50)	93.76 (86.48-100.00)	84.85 (77.33-91.66)	90.65 (82.85-96.96)
Hipparion houfenense from Upper Pontian? of China (Teilhard de Chardin and Young, 1931)	48.00	46.50	41.00	96.87	89.58	88.17
Equus przewalskii (Duerst, 1908)	33.00?	45.00	46.00	136.36??	139.39??	102.22
Equus caballus from North Kurgan in Anau (Duerst, 1908). Average of 11 specimens [2]	40.27 (37.00-44.00)	40.63 (36.00-45.00)	37.27 (34.00-41.00)	100.99 (93.18-115.38)	92.64 (84.09-102.71)	91.74 (87.50-95.23)
Equus hemionus (Duerst, 1908)	35.00	35.00	31.00	100.00	88.57	88.57

[1] Indices have been calculated by me from the figures given by the various authors.

[2] Indices and averages have been calculated by me from the figures given by Duerst, 1908.

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TABLE 8

Measurements of the Permanent Teeth of Genus Sus

			Maximum Length	Maximum Breadth	Robustness Value	Crown Index
M^1	Sus erymanthius from Gökdere	Right	22.70	19.00	431.30	83.70
		Left	22.80	19.00	433.20	83.33
	Sus erymanthius from Pikermi (Gaudry, 1862)		22.00	22.00	484.00	100.00
P_3	Sus erymanthius from Gökdere		20.00	10.90	218.00	54.50
	Sus erymanthius from Pikermi (Gaudry, 1862)		18.00	—	—	—
	Sus erymanthius from Pikermi (Roth and Wagner, 1854)		19.00	—	—	—
	Sus antiquus (Roth and Wagner, 1854)		23.00	—	—	—
	Sus scrofa (Roth and Wagner, 1854)		13.00	—	—	—
P_4	Sus erymanthius from Gökdere		22.50	15.50	348.75	68.88
	Sus erymanthius from Pikermi (Gaudry, 1862)		21.00	—	—	—
	Sus erymanthius from Pikermi (Roth and Wagner, 1854)		19.00	—	—	—
	Sus antiquus (Roth and Wagner, 1854)		22.00	17.00	374.00	77.27
	Sus scrofa (Roth and Wagner, 1854)		14.00	9.00	126.00	64.28
M_1	Sus erymanthius from Gökdere		23.70	16.30	386.31	68.77
	Sus erymanthius from Gökdere [1]		23.00	15.40	354.20	66.95
	Sus erymanthius from Pikermi (Gaudry, 1862)		21.00	—	—	—
	Sus erymanthius from Pikermi (Roth and Wagner, 1854)		19.00	—	—	—
	Sus antiquus (Roth and Wagner, 1854)		23.00	21.00	483.00	91.30
	Sus scrofa (Roth and Wagner, 1854)		15.00	11.00	165.00	73.33
M_2	Sus erymanthius from Gökdere		30.70	22.00	675.40	71.66
	Sus erymanthius from Küçükçekmece (Malik and Nafiz, 1933)		24.00	19.00	456.00	79.16
	Sus erymanthius from Pikermi (Gaudry, 1862)		28.00	—	—	—
	Sus erymanthius from Pikermi (Roth and Wagner, 1854)		25.00	18.00	450.00	72.00
	Sus antiquus (Roth and Wagner, 1854)		30.00	22.00	660.00	73.33
	Sus scrofa (Roth and Wagner, 1854)		21.00	16.00	336.00	76.19
M_3	Sus erymanthius from Gökdere		50.00	25.00	1250.00	50.00
	Sus erymanthius from Pikermi (Gaudry, 1862)		44.00	20.00	880.00	45.45
	Sus erymanthius from Pikermi (Roth and Wagner, 1854)		44.00	21.00	924.00	47.72
	Sus erymanthius from Pikermi (Gaudry, 1873)		45.00	24.00	1080.00	53.33
	Sus major (Gaudry, 1873)		41.00	23.00	943.00	56.09
	Sus major (Gaudry, 1873)		44.00	24.00	1056.00	54.54
	Sus antiquus (Roth and Wagner, 1854)		49.00	23.00	1127.00	46.93
	Sus scrofa (Roth and Wagner, 1854)		38.00	22.00	836.00	57.89

[1] This is the isolated first lower molar found in Gökdere pit.

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TABLE 16

Measurements of the Horn-Cores of the Genus Gazella from the Pontian Period of Western Asia and Europe[1]

	Total Length	Antero-Posterior Diameter (at the base)	Transverse Diameter (at the base)	Robustness Value	Length-Breadth Index
Gazella deperdita from Gökdere. Average	129.00	23.50	21.00	493.50	89.40
Gazella deperdita from Pikermi (Gaudry, 1862)	125.00	—	—	—	—
Gazella deperdita from Pikermi (Gaudry, 1873)	150.00	—	—	—	—
Gazella deperdita from Mont Léberon (Gaudry, 1873)	130.00	—	—	—	—
Average of Gazela deperdita from Pikermi and Mont Léberon (calculated from Gaudry, 1862 and 1873)	135.00	—	—	—	—
Gazella bailloudi from Salonica (Arambourg and Piveteau, 1929)	—	27.00	23.00	621.00	85.18
Gazella gaudryi from Samos (Schlosser, 1904)	125.00?	30.00	24.00	720.00	80.00
Gazella gaudryi from Salonica (Arambourg and Piveteau, 1929)	150.00 approx.	25.00	20.00	500.00	80.00
Gazella gaudryi (Münster specimen). Andree, 1926	135.00?	30.00	22.50	675.00	75.00
Gazella gaudryi (average of 3 specimens measured by Schlosser, 1904, Arambourg and Piveteau, 1929, and Andree, 1926)	136.66	28.33	22.16	631.66	78.33
Gazella gaudryi from Küçükyozgat. 1 specimen[2]	—	30.00	24.00	720.00	80.00
Gazella gaudryi from Gökdere. Average	—	22.43	17.56	394.56	78.33
Gazella longicornis Andree (Andree, 1926)	160.00?	28.00	22.00	616.00	78.57
Gazella mytilini[3] (Wien II. 1). Andree, 1926	133.00	28.00	20.80	582.40	74.28
Gazella mytilini[4] (Schlosser, 1904)	140.00?	33.00	22.00	726.00	66.66
Gazella mytilini (Average of 2 specimens measured by Schlosser, 1904, and Andree, 1926)	136.50	30.50	21.40	654.20	70.47
Gazella (Jugendstadium). Andree, 1926	110.0-120.0?	25.00	21.00	525.00	84.00

[1] Robustness values, length-breadth indices and averages of the horn-cores taken from the literature have been calculated by me.

[2] In this horn-core from Küçükyozgat (figs. 56 and 57), excavated by me, the divergence of the horn-core, in anterior view, is the same as in *Gazella gaudryi* Schlosser (*G. Pilgrimi*) from Samos (see Schlosser, 1904, pl. XIII, fig. 1), but its curvature, in side view, is more than in the Samos specimen (see Schlosser, 1904, pl. XIII, fig. 1b) and also more than that of *Gazella gaudryi* (*G. Pilgrimi*) from Salonica (see Arambourg and Piveteau, 1929, pl. VI, fig. 3). But in its curvature, in side view, this horn-core from Küçükyozgat is very near to that of *Gazella gaudryi* from Maragha in Iran (see De Mecquenem, 1924, pl. III, fig. 4). That is, in this respect it approaches the Maragha form of *Gazella gaudryi* (*G. Pilgrimi*).

[3] This was first described by Andree (Andree, 1926, p. 168) as *Gazella schlosseri* Andree and has been renamed *Gazella mytilini* by Pilgrim (Pilgrim and Hopwood, 1928. P. 13).

[4] This was originally described as *Gazella* sp. by Schlosser (1904, p. 68), then attributed to *Gazella schlosseri* by Andree (Andree, 1926, p. 168) and afterwards renamed *Gazella mytilini* by Pilgrim (Pilgrim and Hopwood, 1928).

TABLE 17

Measurements of the Horn-Cores of Fossil Gazellas from China and India [1]

	Total Length	Antero-Posterior Diameter (at the base)	Transverse Diameter (at the base)	Robustness Value	Length-Breadth Index
Gazella (Protetraceros) gaudryi Schlosser from the Pontian of China. Large type. Bohlin, 1941	—	30.00	22.50	675.00	75.00
Gazella (Protetraceros) gaudryi Schlosser from the Pontian of China. Small type (Bohlin, 1941)	—	21.00	18.00	378.00	85.71
Gazella (Protetraceros) gaudryi Schlosser from the Pontian of China. Small type (Bohlin, 1941)	—	21.00	17.00	357.00	80.95
Gazella (Protetraceros) gaudryi Schlosser from the Pontian of China. Average of large and small types (From Bohlin, 1941)	—	24.00	19.16	470.00	80.55
Gazela dorcadoides Schlosser from the Pontian of China (Bohlin, 1941)	—	22.00	18.00	396.00	81.81
Gazella dorcadoides Schlosser from the Pontian of China (Bohlin, 1941)	—	20.00	16.00	320.00	80.00
Gazella dorcadoides Schlosser from the Pontian of China (Bohlin, 1941, p. 113) [2]	—	21.00	20.00	420.00	95.23
Gazella dorcadoides Schlosser from the Pontian of China. Average (from Bohlin, 1941)	—	21.00	18.00	378.66	85.68
Gazella paotehensis Teilhard and Young from the Pontian of China (Teilhard de Chardin and Young, 1931)	140.00	26.00	23.50	611.00	90.38
Gazella blacki Teilhard and Young from the Pontian of China (Teilhard de Chardin and Young, 1931) [3]	about 88.00?	24.25 (23.0-25.5)	21.25 (20.5-22.0)	515.31	87.62
Gazella lydekkeri Pilgrim from Dhok Pathan formation of Siwalik Hills (Pilgrim, 1937)	100.00 (at back)	26.00	21.00	546.00	80.76
Gazella sinensis Teilhard and Piveteau from Sanmenian of Nihowan (China). Teilhard de Chardin and Piveteau, 1930	150.0-170.0	40.50 [4]	31.75 [4]	1299.75 [4]	78.60 [4]
Gazella prjewalskyi from the Pleistocene of Sjara-Osso-gol (Teilhard de Chardin and Piveteau, 1930)	168.00	33.50	23.00	770.50	68.65
Gazella gutturosa (modern). Teilhard de Chardin and Piveteau, 1930	145.00	30.00	24.00	720.00	80.00

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[1] Robustness values, length-breadth indices and averages of the material taken from the literature have been calculated by me.

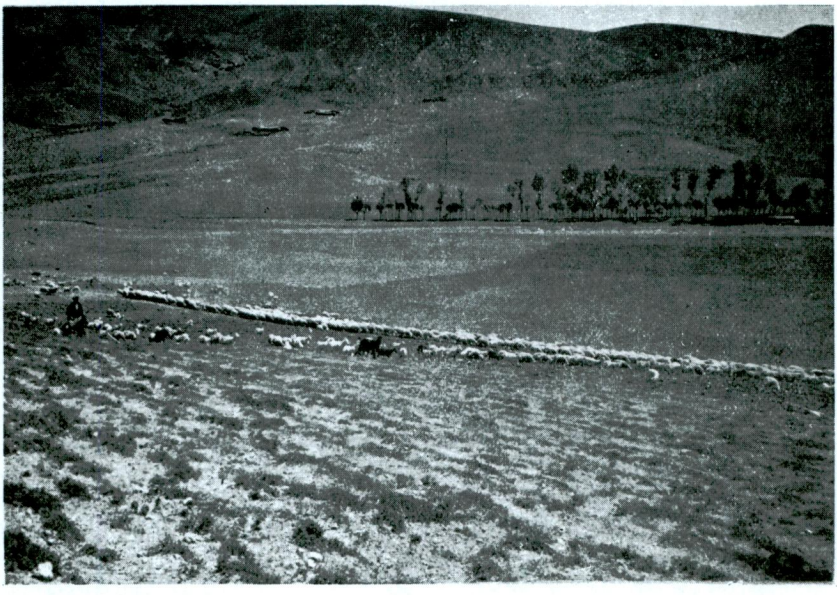
[2] This horn-core is attributed to this species by Bohlin (1941, p. 113).

[3] Figures in brackets show the dimensions of the two specimens measured by Teilhard de Chardin and Young, 1931.

[4] Average of four specimens given by Teilhard de Chardin and Piveteau, 1930,p. 65.

Errata: In the last sentence of footnote 110, the word "have" should be corrected to "has".

In page 480, P_4 of *Tragocerus amaltheus* should be corrected to P^4.



↑ Fig. 1

← Fig. 2

← Fig. 3

Fig. 4

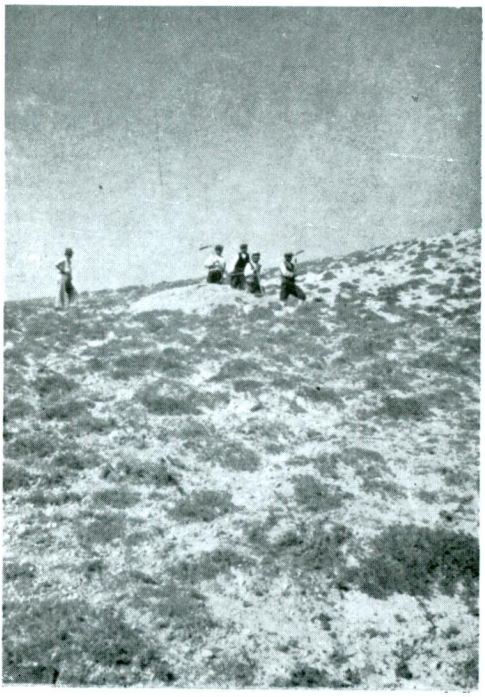


Fig. 5

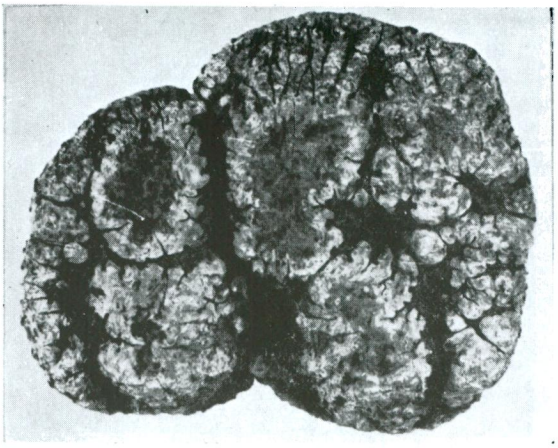


Fig. 6

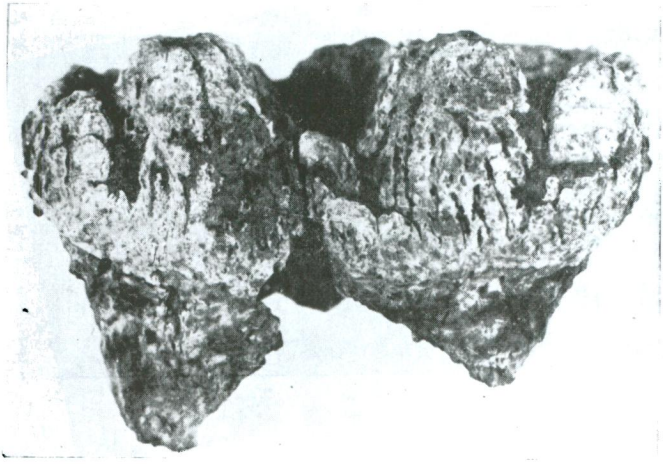


Fig. 7

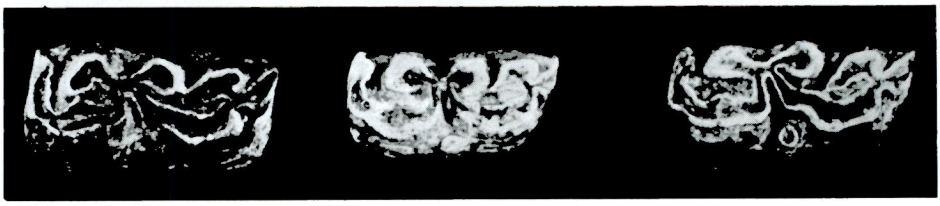


Fig. 8

Fig. 9

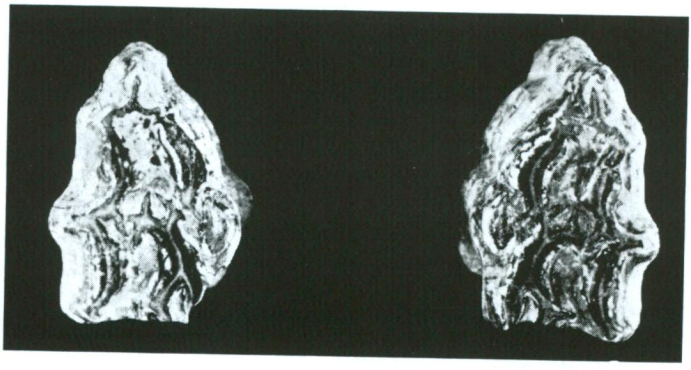


Fig. 10

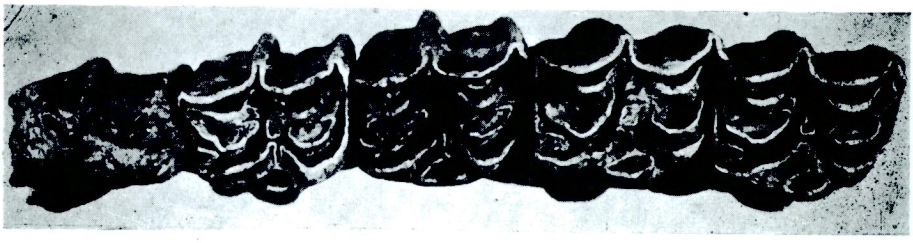


Fig. 11

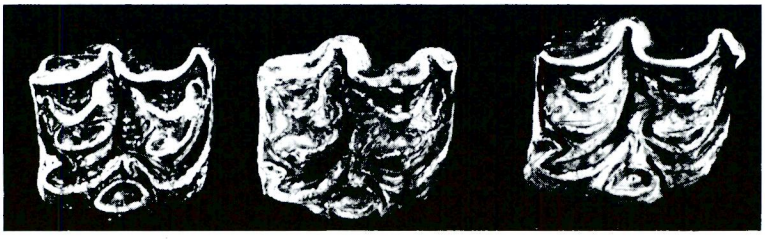


Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17

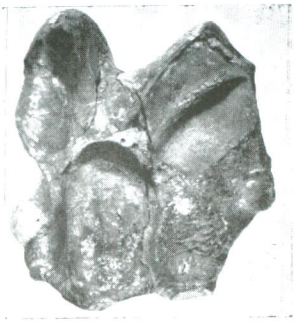
Fig. 18

Fig. 19

Fig. 20

Fig. 21

Fig. 22



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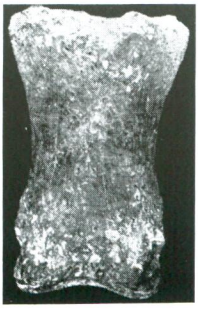


Fig. 24

Fig. 25

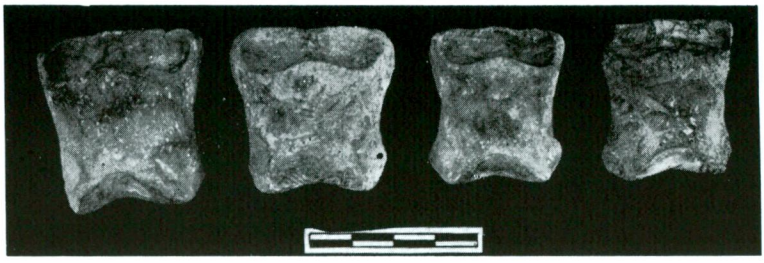
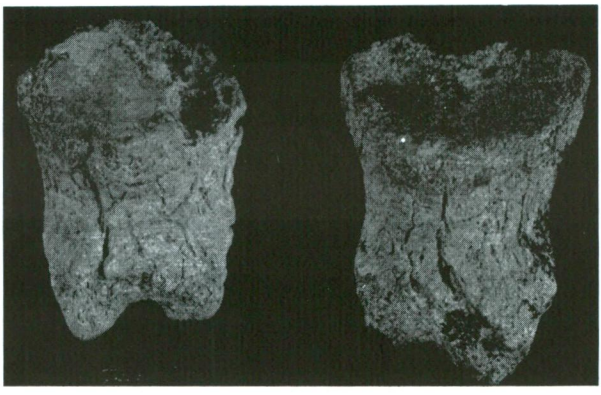


Fig. 26



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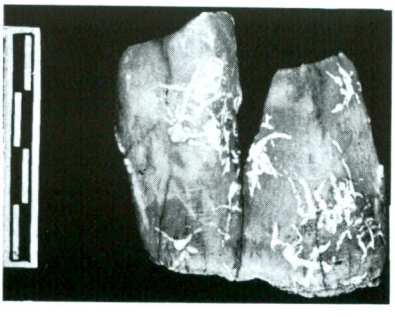


Fig. 28

Fig. 29

Fig. 30

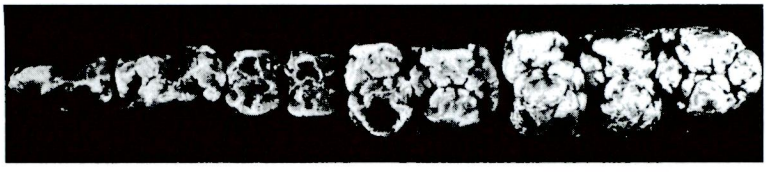


Fig. 31

Fig. 32

Fig. 33

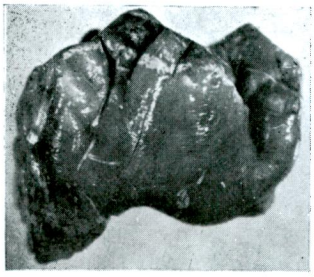
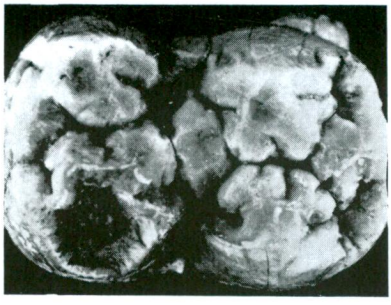


Fig. 34

Fig. 35



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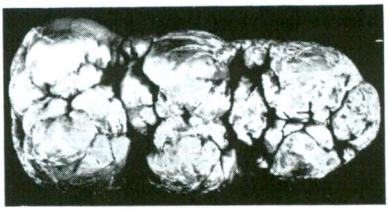

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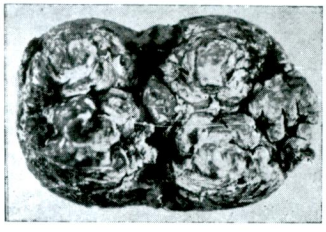
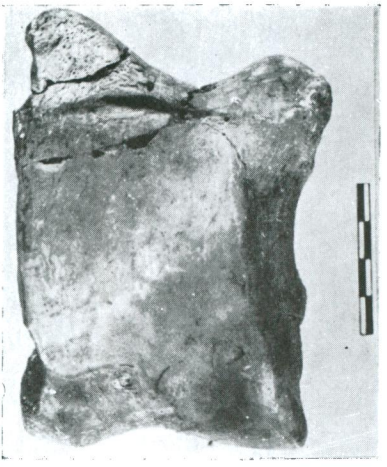


Fig. 38

Fig. 39



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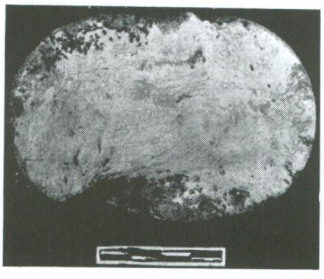


Fig. 41

Fig. 42

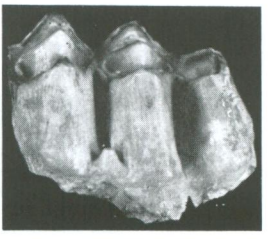
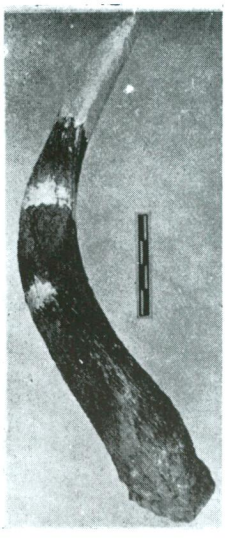


Fig. 43

Fig. 44



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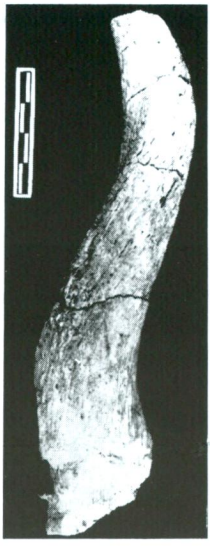

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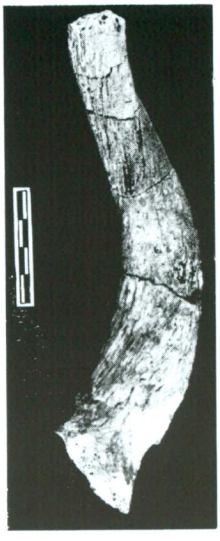

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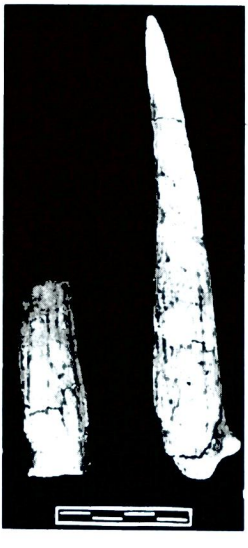


Fig. 48

Fig. 49

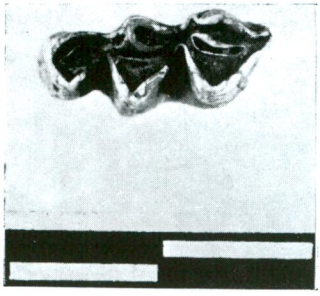


Fig. 50

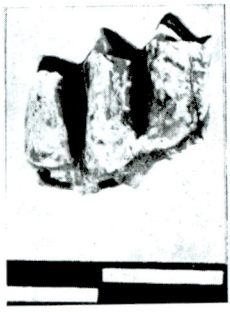
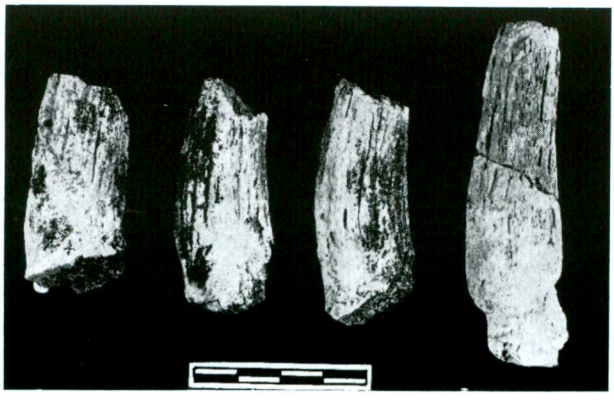


Fig. 51

Fig. 52



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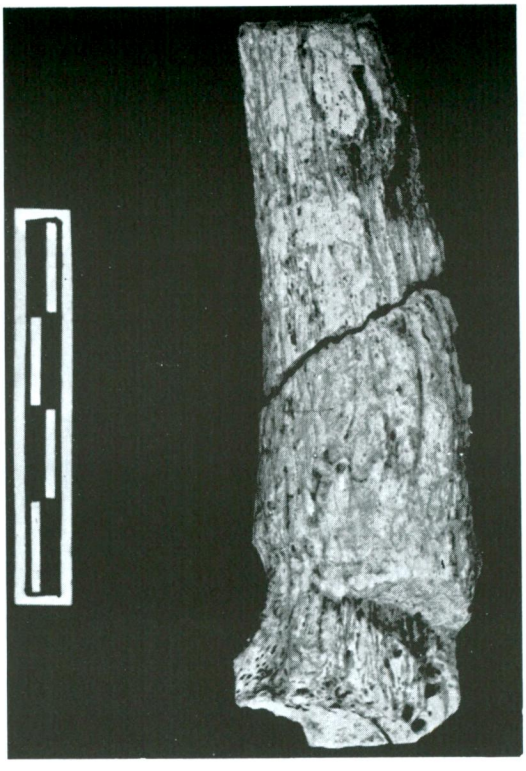

Fig. 54

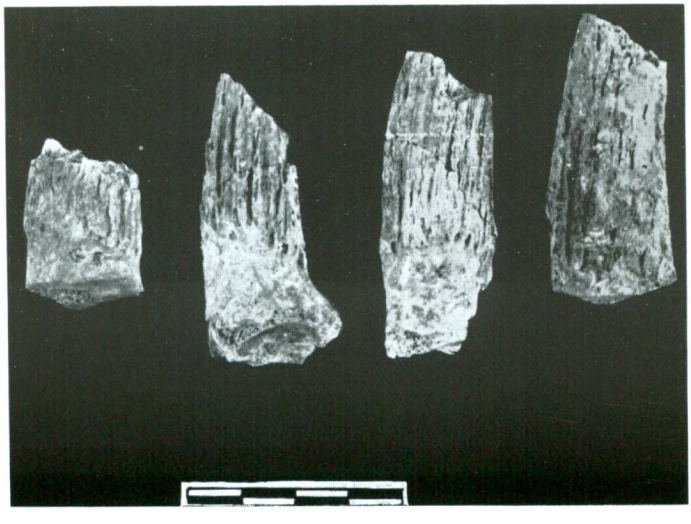

Fig. 55

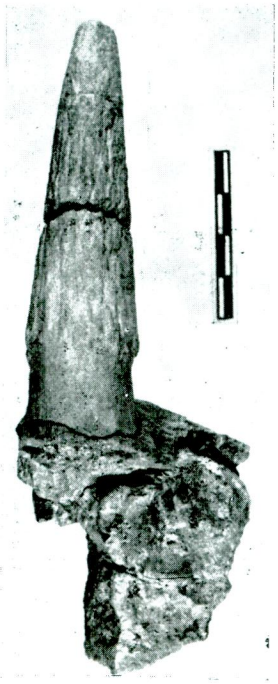

Fig. 56

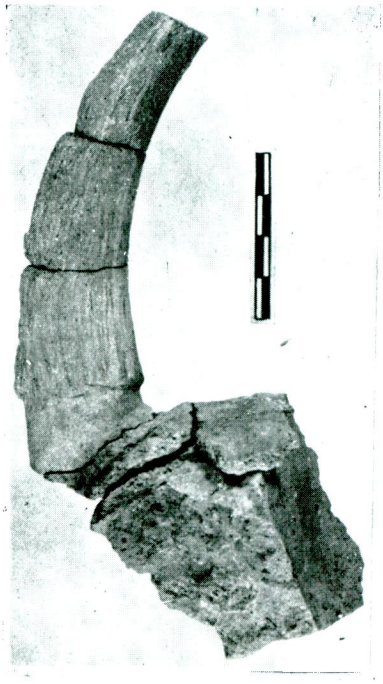

Fig. 57

Fig. 58

Fig. 59

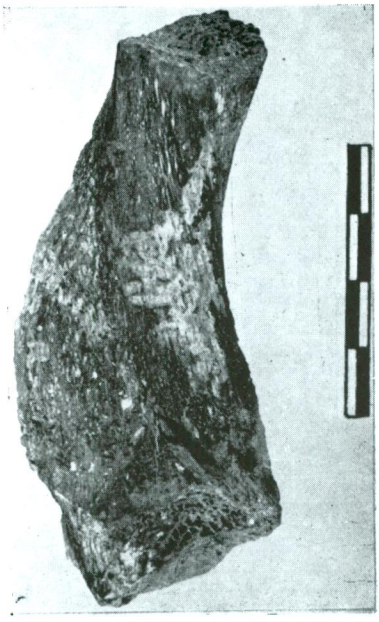

Fig. 60

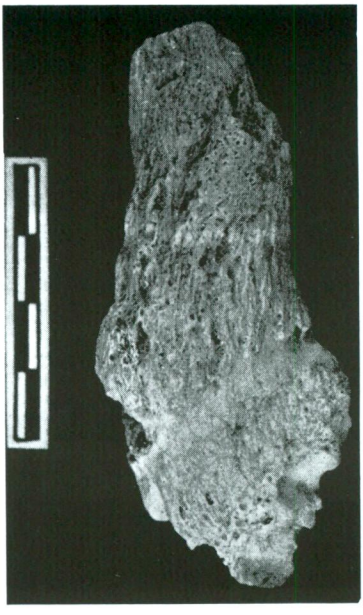

Fig. 61

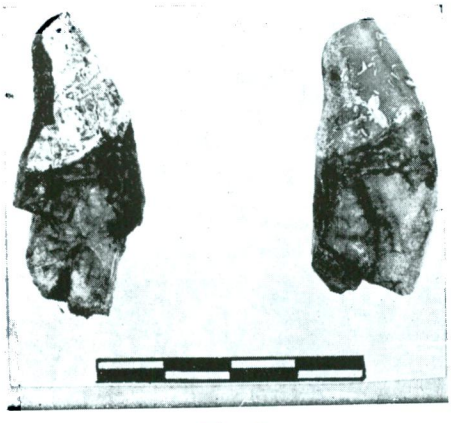

Fig. 62

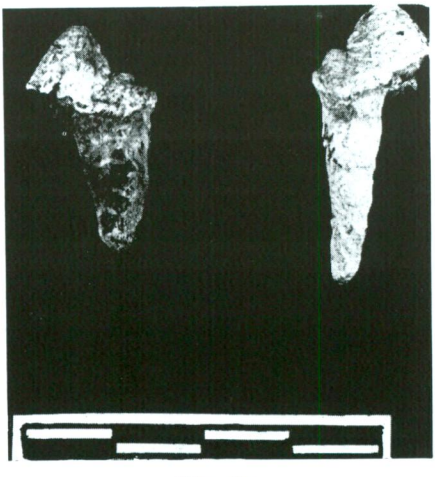

Fig. 63

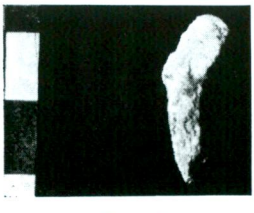

Fig. 64

TABLE 1

Measurements of Upper Second Molars [1] of Mastodon Pentelici Gaudry and Lartet from Pikermi, Salonica and Gökdere [2]

	Maximum Length (Mesio-distal Diameter)	Max. Breadth of Anterior Lobe (Bucco-lingual Diameter)	Max. Breadth of Posterior Lobe (Bucco-lingual Diameter)	Robustness Value [3]	Crown Index [4]	$\frac{\text{Breadth of Anterior Lobe} \times 100}{\text{Breadth of Posterior Lobe}}$
Mastodon pentelici from Pikermi (Gaudry, 1862)	48.00 56.00	30.00 35.00	43.00 43.00	2064 2408	89.58 76.78	69.76 81.39
Mastodon pentelici from Maragha (De Mecquenem, 1924)	47.00 50.00 51.00 57.00	— — — —	38.00 42.00 41.00 49.00	1786 2100 2091 2793	80.85 84.00 80.39 85.96	— — — —
Mastodon pentelici from Gökdere	47.00	31.00	40.00	1880	85.10	77.50

[1] In this report all measurements are in millimeters, including those taken from the literature.

[2] Robustness values and the indices of Pikermi and Maragha specimens have been calculated by me from the measurements given by Gaudry (1862) and De Mecquenem (1924).

[3] Maximum Breadth × Length.

[4] $\frac{\text{Maximum Breadth} \times 100}{\text{Length}}$

TABLE 2

Total Length of lower P_2 - M_3 in Hipparion Gracile Kaup

	Length from P_2 to M_3
Hipparion gracile from Gökdere [1]	142.00
Hipparion gracile from Küçükyozgat [2]	135.00
Hipparion gracile from Taşkınpaşa (near Ürgüp)[3]	159.00
Hipparion gracile from Pikermi (Average [4] and range of twenty specimens measured by Gaudry, 1862)	146.75 (127.00-160.00)
Hipparion gracile from Veles in Macedonia (♀). Schlosser, 1921	143.00
Hipparion gracile from Veles in Macedonia(♂). Schlosser, 1921	143.00?
Hipparion gracile from Mont Léberon (Gaudry, 1873)	132.00-144.00

[1] These six teeth were found isolated but in a row, as the mandible had decayed. I have set them in their natural position and then measured them (see fig. 14).

[2] In the summer of 1951, I conducted excavations at this place, which was investigated by Tschachtli in 1941 (see Tschacthli, 1942) and discovered another new fossiliferous point beside it. I have called the Pontian fauna from these two sites Küçükyozgat Fauna. In addition I found two other fossiliferous points near the village of Karacahasan. I have called the fauna from these latter two places the Karacahasan fauna. I will publish a fuller report on Küçükyozgat and Karacahasan faunas later on.

[3] This is a new Pontian fossiliferous site, beside the village of Taşkınpaşa, south-southeast of Ürgüp, where I collected some Mammalian fossils in September, 1952. The fossil bones and teeth, a large number of which have been burned, were found in beds of tuff containing very small particles (2-3 mm. in diameter) of lava. I intend to carry out extensive excavations at this place during the coming summer.

[4] Average has been calculated by me from the figures given by Gaudry, 1862, p. 226.

TABLE 3

Measurements of Astragali of Hipparion Gracile, Hipparion Houfenense and Equus

	Maximum Length
Hipparion gracile from Gökdere. Average of 5 specimens	55.00 (50.00-60.00)
Hipparion gracile from Pikermi (Gaudry, 1862). Average of 6 specimens [1]	55.83 (50.00-64.00)
Hipparion gracile from Mont Léberon (Gaudry, 1873)	46.00-54.00
Hipparion gracile from Lyon (Depéret, 1887)	55.00
Hipparion houfenense from the Upper Pontian? of China (Teilhard de Chardin and Young, 1931)	60.00
Equus sanmeniensis from the Sanmenian period of China (Teilhard de Chardin and Piveteau, 1930)	70.00
Equus stenonis from the Pleistocene period of Ceyssaguet near Puy in France (Teilhard de Chardin and Piveteau, 1930)	67.00

[1] Average calculated by me from the figures given by Gaudry, 1862.

TABLE 4

Measurements of First Phalanges of Hipparion Gracile Kaup [1]

	Maximum Length	Maximum Width	$\frac{\text{Width} \times 100}{\text{Length}}$
Hipparion gracile from Gökdere (1 specimen)	67.50	41.00	60.74
Hipparion gracile from Pikermi (Gaudry, 1862). Average of 6 specimens [2]	61.83 (55.00-70.00)	41.00 (33.00-47.00)	66.20 (60.00-75.00)
Hipparion gracile from Pikermi (small). Gaudry, 1873	55.00	33.00	60.00
Hipparion gracile from Pikermi (large). Gaudry, 1873	70.00	44.00	62.85
Hipparion gracile from Mont Léberon (small). Gaudry, 1873	55.00	31.00	56.36
Hipparion gracile from Mont Léberon (large). Gaudry, 1873	57.00	34.00	59.64

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

[2] Index and averages have been calculated by me from the figures given by Gaudry, 1862.

TABLE 5

Measurements of the Second Phalanges of Hipparion Gracile Kaup [1]

	Maximum Length	Maximum Width	$\frac{\text{Width} \times 100}{\text{Length}}$
Hipparion gracile from Gökdere. Average of 8 specimens	38.43 (34.00-42.00)	36.06 (32.00-40.00)	93.76 (86.48-100.00)
Hipaprion gracile from Pikermi (Gaudryi, 1862). Average of 6 specimens [2]	38.83 (34.00-44.00)	37.16 (30.00-44.00)	95.26 (88.23-104.76)
Hipparion gracile from Pikermi (small). Gaudry, 1873	34.00	30.00	88.23
Hipparion gracile from Pikermi (large). Gaudry, 1873	44.00	44.00	100.00
Hipparion gracile from Mont Léberon (small). Gaudry, 1873	30.00	29.00	96.66
Hipparion gracile from Mont Léberon (large). Gaudry, 1873	37.00	39.00	105.40

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

[2] Index and averages have been calculated by me from the figures given by Gaudry, 1862.

TABLE 9

Measurements of the Astragali of Helladotherium and other Giraffidae[1]

	Maximum Length	Width (Proximal)	Width (Distal)	Proximal Width × 100 / Max. Length	Distal Width × 100 / Max. Length	Distal Width × 100 / Proximal Width
Helladotherium duvernoyi from Gökdere	105.00	72.00	70.00	68.57	66.66	97.22
Helladotherium duvernoyi from Pikermi (Gaudry, 1862)	104.00	74.00	—	72.11	—	—
Helladotherium cfr. duvernoyi from Veles (Schlosser, 1921)	110.00	75.00	70.00	68.18	63.63	93.33
Samotherium from Samos (large). Schlosser, 1921	100.00	72.00	72.00	72.00	72.00	100.00
Samotherium from Samos (small). Schlosser, 1921	92.00	62.00	62.00	67.39	67.39	100.00
Alicephalus neumayri from Maragha (Schlosser, 1921)	100.00	69.00	68.00	69.00	68.00	98.55
Alicephalus coelophrys from Maragha (Schlosser, 1921)	85.00	54.00	56.00	63.52	65.88	103.70
Giraffa attica from Pikermi (Gaudry, 1862)	86.00[2]	70.00	—	81.39	—	—

[1] Indices of the material taken from Gaudry (1862) and Schlosser (1921) have been calculated by me.

[2] Internal length.

TABLE 10

Measurements of the Upper Last Premolar (P^4) of the Genus Tragocerus [1]

	Maximum Length	Maximum Breadth	Height (Crown)	Robustness Value	Crown Index
Tragocerus amaltheus from Gökdere	13.20	16.10	13.00	212.52	121.96
Tragocerus amaltheus from Pikermi (Gaudry, 1862)	13.00	17.00	—	221.00	130.76
Tragocerus amaltheus from Mont Léberon (Gaudry, 1873)	13.00	16.00	—	208.00	123.07
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	13.00	17.50	—	227.50	134.61
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	13.00	17.00	—	221.00	130.76
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	13.00	18.00	—	234.00	138.46
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	12.00	17.00	—	204.00	141.66
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	13.00	16.00	—	208.00	123.07
Tragocerus amaltheus from Salonica (Arambourg and Piveteau, 1929)	13.00	18.50	—	240.50	142.30
Tragocerus amaltheus from Salonica (Average) [2]	12.83	17.33	—	222.50	135.14
Tragocerus amaltheus var. pàrvidens Schlosser (Schlosser, 1904)	12.80	17.00	—	217.60	132.81
Tragocerus rugosifrons (Schlosser, 1904)	14.00	16.50	15.00	231.00	117.85
Tragocerus sp. (Schlosser, 1904)	13.00	14.00	11.00	182.00	107.69

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

[2] Averages have been calculated by me from the figures given by Arambourg and Piveteau, 1929.

TABLE 11

Measurements of the Lower Third Molar (M_3) of the Genus Tragocerus [1]

	Maximum Length	Maximum Breadth	Height (Crown)	Robustness Value	Crown Index
Tragocerus amaltheus from Gökdere	28.00	12.40	16.00	347.20	44.28
Tragocerus amaltheus from Küçük-yozgat)	26.00	12.00	14.00	312.00	46.15
Tragocerus amaltheus from Pikermi (Gaudry, 1862)	28.00	—	—	—	—
Tragocerus amaltheus from Mont Léberon (Gaudry, 1873)	25.00	—	—	—	—
Tragocerus amaltheus var. parvidens Schlosser (Schlosser, 1904)	25.00	12.00	—	300.00	48.00
Tragocerus rugosifrons (Schlosser, 1904)	—	13.00	17.00	—	—

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

TABLE 12

Measurements of the Horn-Cores of Helicotragus Rotundicornis Weithofer and Helicotragus Fraasii Andree

		Total Length	Antero-Posterior Diameter (at the base)	Transverse Diameter (at the base)	Transverse Diameter (in the middle)
Helicotragus rotundicornis from Gökdere	Right	176.00	30.00	36.00	25.00
	Left	—	29.00	36.00	25.00
Helicotragus rotundicornis from Pikermi (Andree, 1926)		—	—	33.00	25.00
Helicotragus rotundicornis from Pikermi (Andree, 1926)		170.00	—	39.00	26.00
Helicotragus fraasii from Samos (Andree, 1926)		242.00	40.00	Right : 46.50 Left : 51.00	35.00

TABLE 13

Measurements of the Horn-Cores of Gazella Deperdita Gervais from Gökdere

	Total Lenght	Antero-Posterior Diameter (at the base)	Transverse Diameter (at the base)	Robustness Value [1]	Length-Breadth Index [2]
Gökdere specimen: 1	129.00	23.00	21.00	483.00	91.30
Gökdere specimen: 2	—	24.00	21.00	504.00	87.50
Average	129.00	23.50	21.00	493.50	89.40

[1] Robustness Value = Antero-Posterior Diameter × Transverse Diameter.

[2] Length-Breadth Index $= \frac{\text{Transverse Diameter} \times 100}{\text{Antero-Posterior Diameter}}$.

TABLE 14

Measurements of the Third Lower Molars of the Genus Gazella

	Maximum Length	Maximum Breadth	Height (Crown)	Robustness Value	Crown Index
Gazella deperdita from Gökdere	15.00	6.30	10.60	94.50	42.00
Gazella deperdita from Pikermi (Gaudry, 1862)	15.00	—	—	—	—
Gazella gaudryi from Küçükçekmece (Malik and Nafiz, 1933)	17.00	—	—	—	—
Gazella gaudryi from Samos (Schlosser, 1904)	15.00	6.00	13.00	90.00	40.00
Gazella lydekkeri from the Dhok Pathan formation of Siwalik Hills (Pilgrim, 1937)	17.50	7.00	—	122.50	40.00
Gazella sp. (Schlosser, 1904)	15.50	7.20	11.00	111.60	46.45

TABLE 15

Measurements of the Horn-Cores of Gazella Gaudryi Schlosser (G. Pilgrimi) from Gökdere

	Total Length	Antero-Posterior Diameter (at the base)	Transverse Diameter (at the base)	Robustness Value	Length-Breadth Index
Gökdere specimen: 1	—	23.00	17.50	402.50	76.08
Gökdere specimen: 2	—	24.00	18.00	432.00	75.00
Gökdere specimen: 3	—	22.50	18.00	405.00	80.00
Gökdere specimen: 4	—	23.00	18.00	414.00	78.26
Gökdere specimen: 5	—	23.00	18.00	413.00	78.26
Gökdere specimen: 6	—	22.00	17.00	374.00	77.27
Gökdere specimen: 7	—	20.00	16.00	320.00	80.00
Gökdere specimen: 8	—	22.00	18.00	396.00	81.81
Average	—	22.43	17.56	394.56	78.33