A STUDY OF THE REMAINS OF CROCUTA FROM THE KÜÇÜKYOZGAT DISTRICT

MUZAFFER SÜLEYMAN ŞENYÜREK, Ph.D.

Professor of Anthrppology and Chairman of the Division of Palaeoanthropology
University of Ankara

During the course of the excavations[1] I carried out in the fossiliferous beds of the Küçükyozgat (Elmadağ)[2] district in the summer of 1954, was found a fragment of an upper jaw and a fragment of a lower jaw belonging to the genus *Crocuta*[3]. These fossil remains were found in a deposit of hard, heterogeneous calcareous clay of light brown color at the Kuyularla locality (Locus 2),[4] which I had discovered during the course of field work and excavations in the Küçükyozgat region in 1-951.[5]

In my previous studies,[6] I had designated the fauna of whitish calcareous marls of lacustrine origin, occurring to the south of Sarıkaya Ağılı (the corral of Sarıkaya), "Küçükyozgat fauna" to distinguish it from the fauna of the heterogeneous calcareous elays of light brovvn color[7] from Kuyu tarla and Örücebağ,[8] which I had called "Karacahasan - fauna".

[1] I wish to extend my thanks at this time to the Office of the Dean, the Professors' Council and the Central Anatolian Research Station of the Faculty of Language, History and Geography of the University of Ankara for the grant to carry out excavations in this region in the summer of 1954. Gn this occasion I also wish to thank Prof. Hamit Nafiz Pamir, Geaeral Director of Maden Tetkik ve Arama Enstitüsü (Institute for Mineralogical Research) of Ankara, for providing me a jeep in the last phase of my field work in the "Küçükyozgat district.

[2] For the location of this fossiliferous region see Tschachtli, 1942, p. 323; Şenyürek, 1953 a, p. 1; Erol, 1954, fig. 1.

[3] During the course of the 1954 exeavations in this region fragmentary remains of a.hyaenid were also found in whitish calcareous marls of lacustrine origin at Küçükyozgat, at the new fosilliferous locus (for this see Şenyürek, 1953a, fig. 3), I had located in 1951, which is just to the southeast of the locus first visited by Tschachtli (Tschachtli, 1942, p. 325) in 1941 (for Tschachtli's locus see Şenyürek, 1953a, fig. 2). I have deferred the study of these remains from this locus until further material from this whitish calcareous marl series is obtained.

[4] I have called the Kuyutarla site shown in fig. 1, Locus 1, and the plaee where the remains *of Crocuta* have been found (figs. 2-3), occuring just to the west of Locus 1 and toward Örücebağ, Locus 2. There are also fragmentary remains of a couple of carnivores from Locus 1, which are stili indetermined (see. Şenyürek, 1953a, p. 2).

[5] For the history of researches made at this fossiliferous region, first visited by Tschachtli in 1941, see Şenyürek, 1953 a, pp. 1-2, and Şenyürek, 1953 d, pp. 459-460.

[6] Şenyürek, 1953a, p. 2; Şenyürek, 1953b, p. 142; Şenyürek, 1953 d, pp. 459-460

[7] Erolcalls these of pinkish color. See Erol, 1954, p. 93

[8] Örücebağ is just west of Kuyutarla and is nearer the village of Karacahasan.

As the remains of *Crocuta* found at Kuyutarla have a bearing on the age of the Karacahasan beds, which occur to the southwest[9] of the whitish calcareous marls of Küçükyozgat, and as these remains show some interesting morphological variations, I have decided to describe them separately and in detail.

FAMILY HYAENIDAE GRAY, 1869 [10]

SUBFAMILY HYAENINAE MIVART, 1882[11]

GENUS CROCUTA KAUP, 1828[12]

CROCUTA EXIMIA (ROTH AND WAGNER)[13]

The species *Crocuta eximia* (Roth and Wagner),[14] which had originally been described as *Hyaena eximia* by Roth and Wagner[15] is represented by a fragment, including the left premaxilla and a large part of the left maxilla (figs. 4-6) and a fragment of right corpus mandibulae (figs. 7-11), found in a deposit of hard, heterogeneous calcareous clay at Locus 2 at Kuyutarla.

In the fragment of the upper jaw are preserved the three incisors, the canine and the four premolars. The palate behind a point corresponding to the middle of the third lobe of the fourth upper premolar is broken and the first upper molar is not preserved. In the right corpus mandibulae the incisors, the canine, the root of $P_{1,}$ the crowns of second, third and fourth premolars and most of tbe crown of the first molar are preserved. The second and third incisors are retained intact. On the other hand, only a part of the crown of the first incisor (figs. 12-13) is preserved, and, as its basal part is missing, it could not be fitted to the preserved root of this tooth. This corpus mandibulae was not found in association with the fragment of the upper jaw, although very close to it. In boththe upper and lower jaw the teeth are only very slightly worn.

Among the Pontian localities of Anatolia, the existence of the species *Crocuta eximia* (Roth and Wagner) has so far been reported from only Muğla and Eşme in western Anatolia[16] and Kayseri in central Ana-

[9] For the location of fossiliferous loci see Erol, 1954, fig. 2.

[10] Simpson, 1950, p. 117.

[11] Ibid., p. 118.

[12] Ibid., p. 118.

[13] Pilgrim, 1931, p. 116.

[14] Ibid.

[15] Wagner, 1860, p. 120; Gaudry, 1862, pp. 80-81; Pilgrim, 1931, p. 116.

[16] See Ozansoy (1951, p. 148), and Yalçınlar (1946, p. 126). In addition, in his study of the Pontian beds of the upper Gediz region, in western Anatolia, Yalçınlar (1947, P. 174) states: *"Parmi les fossiles Carnivores, il y a une mandibule gauche avec trois*

tolia.[17] In the preliminary reports on these other Pontian localities, only the name of this species has been recorded, without any description of the morphological features of the specimens, and no photographs have been published. For this reason it has not been possible for me to compare the remains from Kuyutarla with these other Anatolian specimens.

The Upper Faw : In the fragment of the upper jaw from Kuyutarla the incisors increase in height and size from the first toward the third incisor (see Table 1). The buccal surfaces of all three incisors, in mesial and distal views, are seen to curve conspicuously in the lingual direction. The first and second upper incisors are nearly bicuspid with two tubercles at the bottom of the lingual surface, of which the medial one is larger. In the first incisor the distal basal tubercle is less conspicuous than that of the second upper incisor. In the form of the basal tubercles these two teeth of the Kuyutarla specimen do not differ much from those of *Crocuta eximia* (Roth and Wagner) from Pikermi[18] and those of *Crocuta variabilis* (Zdansky) from the Pontian of China.[19] The first and second upper incisors exhibit a small marginal tubercle on the distal surface of the crown, which is larger in the second than in the first incisor.

The third upper incisor is a large and caniniform tooth that projects far below the level of the second incisor, as is characteristic of the genus *Crocuta.*[20] The morphology of the third upper incisor of the specimen from Kuyutarla resembles that of *Crocuta eximia* (Roth and Wagner) from Pikermi[21] and also that of *Crocuta variabilis* (Zdansky) from China.[22] Zdansky describes the upper third incisor *of Crocuta variabilis* ((Zdansky) as follows: I^3 *ist sehr Krâftig, Eckzahn-artig, mit je einer Kante an der Vorder-innen- und Hinter-aussenseite, die durch einen Basalwulst verbunden sind."*[23] This description also fits the I^3 of the Kuyutarla specimen (fig. 5) and that of *Crocuta eximia* (Roth and Wagner) from Pikermi.[24]

A comparison of the meâsurements of the specimen from Kuyutarla

premolaires et une canine rappelant un Hyemde et un autre fragment de mandibule gauche portant une premolaire." However, as no photographs are given, it is not possible to assess the identity of the fossil form represented.

[17] See İzbırak and Yalçınlar, 1951, p. 156 (according to their statement the specific determinations were made by Yalçınlar). Regarding the attribution of these remains to *Crocuta eximia,* İzbırak and Yalçınlar (1951, p. 156), however, state that this is a *"determination provisoire."*

[18] See Gaudry, 1862, pl. XIV, fig. 1.

[19] See Zdansky, 1924, pl. XX, fig. 2.

[20] See Gaudry, 1862, pl. XIII, fig. 1; Zdansky, 1924, p. 95 and pl. XX. fig. 1 and pl. XXI, fig. 3; Pilgrim, 1931, p. 114 and pl. I, figs. 1 and 3.

[21] See Gaudry, 1862, pl. XIV, fig. 1.

[22] See Zdansky, 1924, pl. XX, fig. 2 and pl. XXI, fig. 4.

[23] Zdansky, 1924, p. 95.

[24] See Gaudry, ,1862, pl. XIV, fig. 1.

(see Table 1) with the figures given by Gaudry, shows that the upper incisors of the Kuyutarla specimen are only slightly smaller than those :of *Crocuta enmia* (Roth and Wagner) from Pikermi.[25] JRobustness values of the upper incisors of *Crocuta variabilis* (Zdansky),*Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser) from the Pontian of China, calculated from the figures given by Zdansky[26] and Schlosser[27], are as follows :

		Number of Specimens	Average	Range
Crocuta variabilis (Zdansky)	I^1	6[28]	42.85	33.12-48.14
[from Zdansky,	I^2	6[29]	65.90	61.38- 77.00
1924> P- 97]	I^3	8[30]	149.21	131.25-174.00
Crocuta honanensis (Zdansky)	I^1	1[31]	39.42	—
[from Zdansky,	I^2	1[32]	61.10	—
1924 and Schlosser, 1903]	I^3	2[33]	119.90	90.00-149.80
Crocuta gigantea (Schlosser)				
[from Schlosser, 1903]	I^3	1	143.00	—

From these figures it is seen that the upper incisors of the Kuyutarla specimen (see Table 1) are, in size, in the range of *Crocuta variabilis* (Zdansky) and are larger than those of *Crocuta honanensis* (Zdansky). The third upper incisor of the Kuyutarla specimen also exceeds that of *Crocuta gigantea* (Schlosser) from China whose other teeth are extremely large (see the tables).

The upper canine of the Kuyutarla specimen is separated from the third upper incisor by a diastema whichis about 7.0 mm. wideat thebase. In norma lateralis the tip of the third upper incisor comes almost to the level of the tip of the canine. However, when the canine is examined carefully, it is seen that the enamel margin of the buccal surface is stili considerably above the alveolar margin (fig. 4), indicating that the canine had not yet completed its eruption, although all the other upper permanent teeth had fully erupted. It is thus evident that when the canine had

[25] Gaudry (1862, p. 86) gives the following figures as *"diametre principal" o*f the the upper incisors of *Crocuta eximia* (Roth and Wagner) from Pikermi: I1 9.0.mm.,1^2 10.0 mm., I^3 15.00 mm.

[26] Zdansky, 1924, p. 97.

[27] Schlosser, 1903, p. 34 and p. 36.

[28] Specimens 1, 8, 10, 19, 20 and 24.

[29] Specimens 1, 8, g, 1g, 20 and 24.

[30] Specimens *I,* 2, 3, 8, g, 18, 19 and 24.

[31] One specimen given by Zdansky, 1924.

[32] One specimen given by Zdansky, 1924.

[33] One specimen given by Zdansky (1924) and one by Schlosser (1903).

fully erupted, its tip would project considerably beyond that of I^3, as is the case in *Crocuta eximia* (Roth and and Wagner) from Pikermi [34] and *Crocuta variabilis* (Zdansky) from China. [35]

The upper canine from Kuyutarla presents a well developed anterior and an equally well developed posterior edge. Zdansky has described the upper canine of *Crocuta variabilis* as follows: *"Der Canin hat zwei Lângskanten, welche die flache Innenseite von der stark konvexen Aussenflache trennen."* [36] This description also fits the specimen from Kuyutarla and that also of *Crocuta eximia* (Roth and Wagner) from Pikermi. [37]

As the basal part of the crown is stili embedded in the alveolus, its length and breadth measurements could not be taken. The buccal height, however, could be measured, owing to a fracture in the middle part of the external wall of the alveolus (see Table 1). Arambourg and Piveteau have published the picture, stated to be natural size, of the upper jaw of a specimen of *Crocuta eximia* (Roth and Wagner) from the Pontian of Salonika, which is in a younger stage of development than our specimen.[38] As far as can be judged from the photograph, the height of this upper canine from Salonika appears to be shorter than that ofthe Kuyutarla specimen. In Specimen 8 of *Crocuta variabilis* (Zdansky) from China, depicted by Zdansky, [39] the upper canine is well preserved. In this specimen of *Crocuta variabilis* (Zdansky), as far as can be judged from the photograph, the height ofthe upper canine comes close to that ofthe Kuyutarla specimen.

The upper first premolar of the Kuyutarla specimen is separated from the upper canine by a diastema which is about 6.0 mm. wide at the base. As it is, the specimen from Kuyutarla differs considerably from the specimens of *Crocuta eximia* (Roth and Wagner) from Pikermi [40] and Samos H and from *Crocuta variabilis* (Zdansky) from China, [42] in all of vvhich the space separating P^1 from C1 is much shorter. However, as was stated before, the canine of the upper jaw from Kuyutarla had not yet completed its eruption. Thus when the canine had fully erupted this diastema would probably become much shorter and approach in width those of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky), which resemble each other in having a short diastema between P^1 and C 1.

[34] See Wagner, 1860, pl. 3, fig. 9 and Gaudry, 1862, pl. XIII, fig. 1.
[35] Zdansky, 1924, pl. XX, fig. 1 and pl. XXI, fig. 3.
[36] Ibid., p. 95.
[37] See Gaudry, 1862, pl. XIV, fig. 1.
[38] See Arambourg and Piveteau, 1929, pl. X, fig. 2. in this picture the buccal surface of this upper canine from Salonika is clearly visible
[39] See Zdansky, 1924, pl. XX, fig. 1.
[40] See Wagner, 1860, pl. 3, fig. 9 and Gaudry, 1862, pl. XIII, fig. 1 and pl. XIV, fig- 1.
[41] Pilgrim, 1931, pl. 1, fig. 1.
[42] Zdansky, 1924, p. 95, pl. XX, figs. 1-2 and pl. XXI, figs. 1-4.

As far as can be judged from the drawing published by Gaudry, the first upper premolar of the specimen from Kuyu tarla seems to be less displaced lingualwards than in the specimen of *Crocuta eximia* (Roth and Wagner) from Pikermi.[43] In this feature, *Crocuta variabilis* (Zdansky) from China comes closer to the Anatolian specimen.[44]

The first upper premolar of the Kuyutarla specimen has a single cusp and a single root and in its general morphology it does not differ nluch from that of *Crocuta eximia* (Roth and Wagner) from Pikermi[45] and *Crocuta variabilis* (Zdansky) from China.[46] Zdansky describes the first upper premolar of *Crocuta variabilis* (Zdansky) as followsc *"Seine Krone ist im Umriss fast Kreisrund. Von der stumpfen Spitze zieht eine Kante nach hinten und nach vorne, welche die konvexe Aussenflache von der in vertikaler Richtung konkaven Innenflache trennt."* [47] This description would almost fit the specimens of *Crocuta eximia* (Roth and Wagner) from Kuyutarlâ (fig. 5), and also, as far as can be judged from the picture published by Gaudry,[48] that from Pikermi.

From Table 3 it is seen that in size, as expressed by the robustness value, the first upper premolar of Kuyutarlâ specimen falls within the range of variation of *Crocuta eximia* (Roth and Wagner) from Europe, but exceeds the maximum of *Crocuta variabilis* (Zdansky), which on the average has a smaller first upper premolar than *Crocuta eximia* (Roth and Wagner). On the other hand, P^1 of the Kuyutarlâ specimen is smaller than that *of Crocuta honanensis* (Zdansky) and is far exceeded by that *of Crocuta gigantea* (Schlosser). It is of interest to note that the first upper premolar of *Lycyaena dubia* Zdansky is smaller than the minima of all the Pontian species of *Crocuta* listed.

The crown index of the first upper premolar from Kuyutarlâ is lower than those of all the available specimens of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). The crown index of the first upper premolar from Kuyutarlâ is very near that of a specimen from China, originally described as *Hyaena sp.* by Schlosser,[49] which was subsequently attributed to *Crocuta honanensis* by Zdansky,[50] but is lower than that of the type specimen of the latter species and than that *of Crocuta gigantea* (Schlosser). *Lycyaena dubia* Zdansky is characterized by a relatively low crown index, which is considerably below that of the Kuyutarlâ specimen.

[43] Gaudry, 1862, pl. -XIV, fig. 1.
[44] Zdansky, 1924, pl. XX, fig. 2, and pl. XXI, figs. 2 and 4.
[45] Gaudry, 1862, pl. XIV, fig. 1.
[46] Zdansky, 1924, pl. XX, fig. 2 and pl. XXI, figs. 2 and 4.
[47] Ibid,. p. 95.
[48] Gaudry, 1862, pl. XIV, fig. 1.
[49] Schlosser, 1903, p. 34.
[50] Zdansky, 1924, pp. 103 and 105.

The second upper premolar of the Kuyutarla specimen, separated from P^1 by a very short diastema, possesses a main middle cusp a small posterior tubercle, followed by a talon behind, and a relatively speaking well developed anterior tubercle which is located on the mesio-lingual corner of the crown (figs. 5-6).

In size the second upper premolar from Kuyutarla falls within the range of variation of *Crocuta eximia* (Roth and Wagner) from Europe and *Crocuta variabilis* (Zdansky) of China (Table 4). P^2 from Kuyutarla is, like the other Pontian species of *Crocuta,* greatly exceeded in size by that of *Crocuta gigantea* (Schlosser), but surpasses that of *Crocuta honanensis* (Zdansky) which, however, falls within the range of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). In size the second upper premolars of *Lycyaena chaeretis* (Gaudry) and *Lycyaena dubia* (Zdansky) fall far below the minimum of the Pontian species of *Crocuta* listed. In crown index P^2 from Kuyutarla is within the range of variation of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). P^2 from Kuyutarla exhibits a higher crown index than that of *Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser). It is seen that *Lycyaena chaeretis* (Gaudry) and *Lycyaena dubia* Zdansky are distinguished from all the Pontian specimens of *Crocuta* listed in having a relatively narrower second upper premolar.

The third upper premolar of the Kuyutarla specimen is in contact with the second upper premolar and possesses a main cusp, a well developed anterior tubercle and a posterior tubercle (fig. 5) .)This tooth differs from the second upper premolar mainly in being larger and in possessing a larger and higher posterior tubercle and in having a moderately developed anterior cingulum which is in front of the anterior tubercle.

In possessing a relatively well developed anterior tubercle the second and third upper premolars of the Kuyutarla specimen resemble the corresponding teeth of *Crocuta eximia* (Roth and Wagner) from Pikermi.[51] Pilgrim states that in the second and third upper premolars of *Crocuta eximia* (Roth and Wagner) from Pikermi an anterior tubercle *"is invariably present".* [52] Kittl has published the picture of a third upper premolar of *Crocuta eximia* (Roth and Wagner) from Maragha, which also shows a well developed anterior tubercle. [53] On the other hand, in the second and third upper premolars of *Crocuta variabilis* (Zdansky) from China, as stated by Zdansky, an anterior tubercle is completely lacking in some specimens while it is present in others. [54] Thus the second and third upper premo-

[51] See Gaudry, 1862, pl. XIV, fig. 1.

[52] Pilgrim, 1931, p. 117. From the photograph of the upper jaw of *Crocuta eximia* (Roth and Wagner) from Salonika, published by Arambourg and Piveteau (1929, pl. X, fig. 2), it can be seen also that the third upper premolar possesses a large anterior tubetcle.

[53] See Kittl, 1887, pl. XVII, fig. 2.

[54] Zdansky, 1924, p. 95, See also Pilgrim, 1931, p. 117.

lars of Kuyutarla specimen approach those forms of *Crocuta variabilis* (Zdansky) exhibiting an anterior tubercle, and differ from specimens of this form from China which are devoid of such a tubercle. Zdansky states that the second upper premolar of *Crocuta honanensis* (Zdansky) possesses an anterior tubercle. [55] In the photograph of a third upper premolar from the Pontian of China, published by Schlosser and described by him as *Hyaena sp.,* which may belong to *Crocuta honanensis* (Zdansky) is also seen a well developed anterior tubercle. [56] Thus in this feature the Kuyutarla specimen also does not seem to differ from *Crocuta honanensis* (Zdansky). A small anterior tubercle is observed also in the second and third upper premolars of *Crocuta gigantea* (Schlosser). [57]

As can be seen from Table 5, in size the specimen from Kuyutarla is within the range of variation of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). This tooth of the Kuyutarla specimen is slightly larger than the corresponding tooth of *Crocuta honanensis* (Zdansky), which is withir the range of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky) but is greatly surpassed by that of *Crocuta gigantea* (Schlosser). The robustness values of the third upper premolars *of Lycyaena chaeretis* (Gaudry) and *Lycyaena dubia* Zdansky again fall far short of the minima of the Pontian species of *Crocuta. I*n crown index the third upper premolar from Kuyutarla falls again in the range ofvariation of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). The crown index of the Kuyutarla specimen is lower than those of *Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser) which exceed the maximum value of *Crocuta eximia* (Roth and Wagner) and fall within the upper part of the range of *Crocuta variabilis* (Zdansky) in this index. The crown index of the third upper premolar of *Lycyaena chaeretis* (Gaudry) is lower than the minimum of *Crocuta variabilis* (Zdansky) and is near that of *Crocuta eximia* (Roth and Wagner), being only very slightly higher than the minimum of this species. On the other hand, the crown index of the third upper premolar of *Lycyaena dubia* Zdansky falls short of the minima of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky).

The fourth upper premolar of the Kuyutarla specimen shows an anterior, a middle and a posterior lobe, which, as can be seen from figs. 4-5, increase in length from before backwards. The third lobe is relatively long, amounting to 40.81% of the total length of the crown. [58] In this

[55] Zdansky, 1924, p. 104.

[56] See Schlosser, 1903, pl. III, fig. 5.

[57] Ibid., p. 36 and pl. II, figs. 3-4.

[58] As calculated from the figures given by Gaudry, the third lobe of P^4 represents 42.50% of the crown length in *Crocuta eximia* (Roth and Wagner) from Pikermi and 38.23% in P^4 of *Lycyaena chaeretis* (Gaudry) again from Pikermi (For the measurements of these forms see Gaudry, 1862, p. 86 and p. 94). As calculated from the figures given by Pei (1934 ,p. 107) the third lobe of P^4 amounts to 35.14% of the crown length in specimen

feature this fourth upper premolar differs from that of genus *Hyaena,* in which the third lobe is relatively short, [59] and agrees with genus *Crocuta,* in which this lobe is lengthened. [60] In this tooth from Kuyutarla the protocone, or the mesio-lingual cusp, is strongly reduced (figs. 5-6).

The fourth upper premolar from Kuyutarla, in having a strongly reduced protocone, differs conspicuously from the fourth upper premolars of genus *Lycyaena,* [61] *Crocuta salonicae* (Andrews), [62] *Crocuta honanensis* (Zdansky), [63] later, post-Pontian forms of genus *Crocuta,* [64] and members of genus *Hyaena,* [65] in all of which the protocone is well developed. *Crocuta gigantea* (Schlosser) from the Pontian of China has a relatively small protocone in its fourth upper premolar, [66] but stili a comparison with the photograph published by Schlosser [67] shows that the protocone of P^4 of the Anatolian specimen is less distinct than that of *Crocuta gigantea* (Schlosser).

In having a strongly reduced protocone, P^4 of the Anatolian specimen resembles that of some forms of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). Regarding the development of protocone in the fourth upper premolar of *Crocuta eximia* (Roth and Wagner) from Pikermi, Gaudry makes the following statement: *"....le talon interne de la carnassiere superieure de l'Hyaena eximia, au lieu d'etre bien developpe comme dans les autres hyenes, est aussi mdimentaire que dans le genre chat. Wagner a dejâ constate cette particularite ; elle est tres frappante sur le crâne que j'ai recueilli."* [68] A comparison with the drawing published by Gaudry, [69] shows that the protocone of the fourth upper premolar of the Anatolian specimen is as much reduced as in this Pikermi specimen. [70] Pilgrim, on the other hand,

C C
and to 36.58% in specimen — of *Crocuta crocuta sinensis* (described as *Hyaena sinensis*
C.794 C.750
Zdansky by Pei) from the lower Pleistocene of China.

[59] Gaudry, 1862, p. 88 and Arambourg and Piveteau, 1929, p. 124.

[60] Gaudry, 1862, p. 82 and Arambourg and Piveteau. 1929, p. 124.

[61] Pilgrim, 1931, p. 103. See also Gaudry, 1862, p. 93 and Del Campana, 1914, pl. XI [1], fig. 2.

[62] Pilgrim, 1931, p. 115 and p. 123.

[63] Zdansky, 1924, p. 104.

[64] Gaudry, 1862, p. 88; Pilgrim, 1931, pp. 115-116; Pei, 1934, pl. XIV, fig. ıc and pl. XVII, fig. ıb; Hooijer, 1952, fig. 3.

[65] Gaudry, 1862, p. 88.

[66] Schlosser, 1903, p. 36 and Pilgrim, 1931, p. 115.

[67] Schlosser, 1903, pl. II, fig. 2a.

[68] Gaudry, 1862, p. 82.

[69] Ibid., pl. XIV, fig. 1.

[70] Regarding the protocone of P^4 of *Crocuta eximia* (Roth and Wagner) from Mont Leberon Gaudry (1873, p. 17) states: *"Elle est de meme depourvue de denticule interne."* For the protocone of P^4 in *Crocuta eximia* from the Pontian of Salonika, Arambourg and Piveteau (1929, p. 123) make the following statement: *"Le denticule interne (deuterocone), place a la partie anterieure de la dent, est mdimentaire; la carnassiere presente par suile un aspect tres coupant."*

makes the following statement regarding the protocone of P^4 in *Crocuta eximia* (Roth and Wagner) from Pikermi: *"The material of the Pikermi species which I have examined shows a distinct variation in the size of the protocone."* [71] Regarding the size of protocone in the fourth upper premolar of the species *Crocuta eximia* (Roth and Wagner) Arambourg and Piveteau also state: *". . . .mais il est facile d'observer, sur l'ensemble des pieces de Pikermi, de Maragha, etc, de grandes variations dans la taille de ce tubercule."* [72] Zdansky states with regard to the protocone of *Crocuta variabilis* (Zdansky): *"Auch* P^4 *variiert, vor Allem durch die Ausbildung seines Innenhöckers recht betrâchüich. Dieser ist stets schwach entwickelt, am schwachsten bei Ex. ı (Taf. XXI, Figg. 3&4) und Ex. 20, wo er nicht stârker als bei* H. eximia *von Pikemi ist, am stârksten bei den Ex. 8 (Taf. XX, Figg. 1&.2) und 21."* [73] In the size of the protocone, P^4 of the Kuyutarla specimen resembles that of Specimen 1 of *Crocuta variabilis* [74] in which the protocone is strongly reduced, and differs noticeably from that of Specimen 8 of this form from China [75] in which this cusp is considerably stronger than in our specimen. In short, it is seen that P^4 of the Kuyutarla specimen agrees only with the specimens of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky) with strongly reduced protocone, that is with the advanced forms of these.[76]

In size the fourth upper premolar from Kuyutarla falls in the range of *Crocuta eximia* (Roth and Wagner) ard *Crocuta variabilis* (see Table 6). This tooth of the Anatolian specimen is slightly larger than that of *Crocuta honanensis* (Zdansky), but is greatly exceeded by that of *Crocuta gigantea* (Schlosser) in size. P^4 of *Lycyaena chaeretis* (Gaudry) and *Lycyaena dubia* Zdansky is exceeded in size by that of the Pontian species of *Crocuta,* excepting a specimen from Taraklia.[77] In crown index the Kuyutarla specimen falls within the range of variation of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky), but falls short of *Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser), which in this index, exceed the maxima *of Crocuta eximia* and *Crocuta variabilis. Lycyaena chaeretis* (Gaudry) and *Lycyaena dubia* Zdansky exceed the averages of *Crocuta eximia* and *Crocuta variabilis*[78] but fail short of *Crocuta honanenesis* (Zdansky) and *Crocuta gigantea* (Schlosser).

[71] Pilgrim, 1931, p. 117.

[72] Arambourg and Piveteau, 1929, p. 124.

[73] Zdansky, 1924, p. 96.

[74] Ibid., pl. XXI, fig. 4.

[75] Ibid., pl. XX, fig. 2.

[76] According to Pilgrim (1931, p. 115 and pp. 117-118) the protocone is also relatively small in the fourth upper premolar of *Crocuta carnifex* and *Crocuta mordax,* respectively from the Chinji and Dhok Pathan stages of the Siwalik Hills.

[77] The measurements of this Taraklia specimen have been taken from Zdansky (1924, p. 97). As the original paper of Khomenko (1914) is inaccessible to me, it "will not be possible to say anything definite, as it stands, on the very narrow breadth measurement.

[78] *Lycyaena chaeretis* (Gaudry) very slightly exceeds the maxima of *Crocuta eximia* and *Crocuta variabilis.*

*The Lower Jaw: I*n the mandibular fragment from Kuyutarla there are two large foramina mentalia, arranged one behind the other, of which the anterior one, located below the mesial root of P_2, is larger than the posterior one, which is situated under the interalveolar septum between P_2 and P_3 (see figs. 7-8). In having two foramina mentalia the Anatolian specimen resembles the majority of *Crocuta eximia* (Roth and Wagner) from Baltavar, Pikermi and Maragha, which usually have two foramina.[79] The locations and the relative sizes of the foramina mentalia of the Kuyutarla mandible are the same as those of the mandibles of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl[80] and De Mecquenem.[81] Regarding the foramen mentale of *Crocuta variabilis,* Zdansky states: *"Betrâchtliche Unterschiede sind mit Bezug auf die For, mentalia zu Konstatieren. Zuweilen ist nur ein solckes vorhanden und liegt dann hinter der vorderen oder unter der hinteren Wurzel des* P_2. I*n derselben Lage können sich zwei getrennte öder oberflâchlich vereinigte Foramina bejinden. Hâufig tritt auch, manchmal nur einseitig, eine Gruppe von drei Foramina mentalia auf."*[82] As Zdansky, has published the photographs of only two adult mandibles of *Crocuta variabilis,*[83] which, as far as can be seen, show only one large foramen mentale, a direct comparison of the location and relative sizes of the foramina between my material and those specimens of *Crocuta variabilis,* described as having two foramina, has not been possible.[84]

The Anatolian specimen, in having two foramina mentalia, differs from *Lycyaenachaeretis* (Gaudry) from Pikermi, which usually has one foramen.[85] However, in the specimens of *Lycyaena chaeretis* . (Gaudry), from the Lower Plioeene of the Vienna Basin, described by Zapfe, there are more than one orifice, two of which are under the premolars.[86] Regard-

[79] Gaudry, 1862, p. 84; Kittl, 1887, p. 333; De Mecquenem, 1925, p. 23. Regarding the variation in the number of foramina mentalia in *Crocuta eximia* (Roth and Wagner) Gaudry (1862, p. 84) states: *"Wagner a dit que toutes les hyenes ont un seul trou mentonnier, tandis que l'Hyaena eximia de Grece en a deux. M. Suess, dans l'Hyaena eximia de Baltavar, a aussi remaraue deux trous. f'ai fait une semblable observation sur deux mâchoires que j'ai recueillies a Pikermi; mais sur une troisieme, on ne trouve qu'un trou mentonnier."*

[80] Kittl, 1887, pl. XVII, fig. 1.

[81] De Mecquenem, 1925, pl. IX, fig. 7.

[82] Zdansky, 1924, p. 98.

[83] Ibid., pl. XVIII, fig. 3 and pl. XX, fig. 3. Zdansky (1924, pl. XXII, fig. 4) has also published the lateral view of a juvenile mandible, described by him as *Hyaena? variabilis,* in which the nurhber of foramina is not clearly seen.

[84] *Crocuta honanensis* (Zdansky) possesses one large orifice (see Zdansky, 1924, pl. XXIII, fig. 4), which is located under the mesial root of P_2. However, regarding the mentale foramen of this Chinese fossil, Zdansky (1924, p. 104) states: *"Auf der rechten Seite befindet sich ein grosses For. mentale unter der Mitte des* P_2. *Ob weiter hinten ein zweites vorhanden war, lâsst eine Beschâdigung nicht entscheiden. Rechts ist eine Gruppe von drei Foramina vorhanden."*

[85] Gaudry, 1862 p. 93;. Pilgrim, 1931, p. 110.

[86] Zapfe, 1948, p. 256 and figs. 3a and b. Regarding a third orifice in mandible [A] Zapfe (1948, p. 256) states: *"Unter* I_3 *befindet sich ein Foramen mentale."*

ing these in mandible [A] Zapfe states: *"Unter der Mitte von P_2 befindet sich ein grosses Foramen mentale, ein Kleines dahinter unter der Vorderıvurzel des* P_3." [87] For mandible [B] he states: *"Unter der Hinterwurzel des P_2 befindet sich ein grosses, unterhalb P_3 ein kleines Foramen mentole."* [88] It is seen that in the location of foramina mentalia the Anatolian specimen differs from *Lycyaena chaeretis* (Gaudry) from the Vienna Basin.

In the Anatolian specimen the lower border of corpus mandibulae is nearly straight under P_4 and P_3 and begins to curve slightly downward under the distal root of P_2. The height measurements of this corpus mandibulae are as follows :

Height under P_2=42.50 mm.
Height under P_3=40.00 mm.

According to Gaudry[89] in *Crocuta eximia* from Pikermi the height of corpus mandibulae under P_2 is 33.00 mm., which is smaller than that of the Anatolian specimen. As far as can be judged from the drawing published by Gaudry[90] the height under P_3 also is smaller in the Pikermi specimen than in the Anatolian mandible. On the other hand, as far as can be judged from the photographs published, provided the scales are correct, in corpus height the Anatolian mandible comes closer to specimens of *Crocuta eximia* (Roth and Wagner) from Salonika [91] and Samos.[92] Thus it appears that the corpus height of the mandibks of *Crocuta eximia* (Roth and Wagner) is quite variable and that the greater height seen in the Anatolian specimen does not bar it from inclusion. in this species.[93]

As far as can be judged from the photographs published by Zdansky, [94] the- corpus mandibulae of the Anatolian specimen is considerably deeper than that of *Crocuta variabilis* (Zdansky). It appears, thus, that in corpus height the Anatolian mandible comes nearer to those of some forms of *Crocuta eximia* than to that of *Crocuta variabilis.*

The lower incisors of the Kuyutarla specimen increase in size from the first toward the third incisor (see Table 2). The lower incisors possess a marginal tubercle, on the distal surface, which also increases from

[87] Zapfe, 1948, p. 256.
[88] Ibid., p. 260.
[89] Gaudry, 1862, p. 86.
[90] Ibid., pl. XIII, fig. 2.
[91] Arambourg and Piveteau, 1929, pl. X, fig. 3.
[92] Pilgrim, 1931, pl. I, fig. 1.
[93] The same result also comes from the comparison of the corpus height under M_1. In the specimen of *Crocuta eximia* (Roth and Wagner), studied by Gaudry, this height is 45.00 mm. (Gaudry, 1862, p. 86). On the other hand, in three adult specimens of this species from Pikermi (Nos. 49673, M 8970 and M 8971), measured by Pilgrim, this dimension is 50.00 mm., while in one from Samos (No. M4164), studied by the same author, it is 42.00 mm. (see Pilgrim, 1931, pp. 119-123).
[94] Zdansky, 1924, pl. XVIII, fig. 3 and pl. XX, fig. 3.

the first toward the third incisor.In the first and second lower incisors of this specimen the bucco-lingual diameter exceeds their mesio-distal diameter, while the reverse is the case in the third lower incisor, owing to the relatively larger size of the distal marginal tubercle of this tooth.

In Kuyutarla mandible, in norma lateralis, the incisors are implanted in front of the lower canine to the same extent as that seen in *Crocuta eximia* (Roth and Wagner) from Salonika and Samos, depicted respectively by Arambourg and Piveteau[95] and Pilgrim[96] and those of the mandibles of *Crocuta variabilis,* published by Zdansky.[97] Regarding the location of I_2 in *Crocuta variabilis,* Zdansky states: "I_2 *steht etwas hinter* I_1 *und* I_3."[98] The same feature is also seen in the Kuyutarla specimen. As far as can be judged from the photograph published by Arambourg and Piveteau,[99] in *Crocuta eximia* from Salonika also the distal surface of I_3 seems to be slightly more forward than that of I_2.

The measuremehts of the lower incisors of *Crocuta* from Kuyutarla are listed in Table 2. As'for the comparable material, our information on the dimensions of the lower incisors of Pontian species of *Crocuta* is limited to the lower incisors of *Crocuta variablis* (Zdansky), and to I_3 of *Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser). Robustness values of these calculated from the figures given by Zdansky[100] and Schlosser[101] are as follows :

		Number of Specimens	Average	Range
Crocuta variabilis (Zdansky)	I_1	9.[102]	20.48	19.20-23.56
[from Zdansky,	I_2	8 [103]	42.25	37.23-50.02
1924, p. 99]	I_3	6 [104]	69.76	62.56-77.18
Crocuta honanensis (Zdansky) [from Schlosser, I903, P. 34]	I_3	1	72.00	—
Crocuta gigantea (Schlosser) [from Schlosser, 1903, P. 36]	I_3	1	95.00	—

[95] Arambourg and Piveteau, 1929, pl. X, fîg. 3.
[96] Pilgrim, 1931,-pl. I, fig. 1.
[97] Zdansky, 1924, pl. XVIII, fig. 3, pl. XX, fig. 3 and p. 98.
[98] Ibid, p. 98.
[99] Arambourg and Piveteau, 1929, pl. X, fig. 3a.
[100] Zdansky, 1924, p. 99.
[101] Schlosser, 1903, p. 34 and p. 36.
[102] Specimens 1, 6, 8, 9, 10, 11, 12, 13 and 15.
[103] Specimens 1, 6, 8, 9, 11, 12, 13 and 15.
[104] Specimens 1, 6, 8, II, 12 and 15.

It is seen from these figures that in size, I_1 and I_3 of the Kuyutarla specimen exceed the maxima of *Crocuta variabilis,* while its I_2 falls within the range of this Chinese form. In size I_3 of the Anatolian *Crocuta* exceeds that of *Crocuta honanensis,* but is greatly surpassed by that of *Crocuta gigantea* (Schlosser).

The lower canine of the Kuyutarla specimen is a well preserved and large tooth. Zdansky describes the lower canine of *Crocuta variabilis* as follows: *"Zwei Langskanten begrenzen an der Innenseite ein schmales, fast ebenes Feld."* [105] This description fits exactly the lower canine of the Kuyutarla specimen (figs. 9-11). In the Kuyutarla lower canine the two vertical ridges, or keels, on the lingual surface are well formed.

From Table 8 it is seen that in the length of the lower canine the Kuyutarla specimen falls in the range *of Crocuta eximia* (Roth and Wagner) from Europe, and surpasses slightly the maximum of *Crocuta variabilis* (Zdansky) from China. The Anatolian specimen, in this measurement, also surpasses one specimen of *Crocuta honanensis* (Zdansky) and the maximum of *Lycyaena chaeretis* (Gaudry) which, on the average, tends to have a smaller lower canine than the Pontian forms of *Crocuta.*

In the Kuyutarla mandible only the alveolus of the first lower premolar is preserved, showing that this tooth had one root. As can be seen from fig. 10, in the Kuyutarla specimen the alveolus of P_1 is separated from the lower canine by a very short diastema, the anterior border of the alveolus of P1 being about 3.5 mm. away from the exposed distal surface of the iroot of the canine at this level. In this feature the Anatolian mandible differs from the specimens of *Crocuta eximia* (Roth and Wagner)from Pikermi [106] and that from Maragha, depicted by Kittl [107] and De Mecquenem, [108] in which this diastema is wider. On the other hand, in having a short diastema the Anatolian mandible comes nearer to that of *Crocuta eximia* (Roth and Wagner) from Salonika, which is described by Arambourg and Piveteau as follows: *"Le diasteme separant la premıere premolaire de la canine est a peu pres nul."* [109] As far as can be judged from the photograph published by Arambourg and Piveteau, [110] the diastema of the Salonika specimen seems to be even more reduced than in the Kuyutarla mandible. Thus, the short diastema of the Anatolian specimen is stili within the range of variation of *Crocuta eximia* (Roth and Wagner), which is variable in this feature. In having a short diastema the Anatolian mandible differs from specimens of *Crocuta variabilis,* stili retaining a P_1, in

[105] Zdansky, 1924, p. 98.
[106] Gaudry, 1862, p. 82 and pl. XIII, fig. 2.
[107] Kittl, 1887, pl. XVII, fig. 1.
[108] De Mecquenem, 1925, pl. IX, fig. 7.
[109] Arambourg and Piveteau, 1929, p. 123. See also De Mecquenem, 1925, p. 24.
[110] Arambourg and Piveteau, 1929, pl. X, figs. 3 and 3a.

which, according to Zdansky, the width of this diastema ranges from 5.0 to 8.0 mm.[111] As far as can be judged from the photograph of the mandible in norma lateralis, published by Zdansky,[112] this diastema seems to be also relatively wide in *Crocuta honanensis* (Zdansky).

The second lower premolar of the Kuyutarla specimen (figs. 7-9) possesses a main middle cusp, a very small anterior tubercle. and a slightly larger posterior basal tubercle, behind which there is a talon. In having a small anterior tubercle, P_2 of *Crocuta* from Kuyutarla differs from the second lower premolars of the specimens of *Crocuta eximid* (Roth and Wagner) from Pikermi,[113] Salonika[114] and Maragha, depicted by De Mecquenem,[115] which are devoid of an anterior tubercle.[116] In this feature P_2 of the Anatolian specimen resembles that of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl,[117] which shows a tiny anterior tubercle. It also resembles that of *Crocuta variabilis,* which, according to Zdansky, although variable, often exhibits a small anterior tubercle.[118] In having an anterior tubercle P_2 of the Anatolian specimen differs from that of *Crocuta honanensis* (Zdansky) in which, according to Zdansky, *"ein Vorderhöcker fehlt",* [119] which is also true for *Crocuta gigantea* (Schlosser).[120]

As can be seen from Table 10, in size, P_2 from Kuyutarla falls within the range of variation of *Crocuta exîmia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). It is larger than P_2 of *Crocuta honanensis* (Zdansky), but falls far short of that of *Crocuta gigantea* (Schlosser). In size of P_2, the maximum of *Lycyaena chaeretis* (Gaudry) falls far short of the minimum of the Pontian species of *Crocuta. I*n crown index P_2 of the Kuyutarla specimen falls slightly below the minimum of the available specimens of *Crocuta eximia* (Roth and Wagner) and comes very near to the minimum of *Crocuta variabilis* (Zdansky). It is exceeded in this index by *Crocuta honanensis* (Zdansky) and *Crocuta gigantea* (Schlosser), but far surpasşes the maximum of *Lycyaena chaeretis* (Gaudry). *Lycyaena chaeretis* (Gaudry), which possesses a

[111] Zdansky, 1924, p. 98. For the specimens of *Crocuta variabilis* lacking a P_1, Zdansky (1924, p. 98) states: *"Dieser Zahn fehlt bei Ex. 1 und 12 und gleichzeitig ist das Diastema so kurz, dass er wohl kaum ursprünglich vorhanden war und dann verloren ging, sondern angenommen werden muss, dass er sehon in der Entwicklung ausgeblieben ist."*

[112] Zdansky, 1924, pl. XXIII, fig. 4.

[113] Gaudry, 1862, p. 83 and pl. XIII, fig. 2.

[114] Arambourg and Piveteau, 1929, p. 123 and pl. X, fig. 3.

[115] De Mecquenem, 1925, pl. IX, fig. 7.

[116] Regarding the anterior tubercle in the lower premolars of *Crocuta eximia* (Roth and Wagner) Pilgrim (1931, p. 116) states: "P_2 *and* P_3 *practically without anterior cusps."*

[117] Kittl, 1887, pl. XVII, fig. 1.

[118] Zdansky, 1924, p. 98 and pl. XX, fig. 3.

[119] Ibid., p. 105.

[120] See Schlosser, 1903, p. .35.

relatively narrow P_2, in crown index falls far below the minimum of the Pontian species of *Crocuta*.

The third lower premolar of the Kuyutarla specimen possesses a main middle cusp, a small anterior tubercle and a larger posterior tubercle with a talon behind it (figs. 7-9). This tooth differs from the second lower premolar mainly in being larger and in having a more rectangular contour and a somewhat larger posterior tubercle. In this tooth, as well as in P_2, the anterior cingulum, on the mesio-buccal corner of the crown, has been reduced. In having a small anterior tubercle, this tooth differs from that of *Crocuta eximia* (Roth and Wagner) from Pikermi and Maragha, depicted respectively by Gaudry[121] and De Mecquenem.[122] In this feature P_3 of the Anatolian mandible resembles that of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl[123], and also *Crocuta variabilis* (Zdansky), some specimens of which show a small anterior tubercle.[124] P_3 of the Anatolian specimen differs from that of *Crocuta honanensis* (Zdansky), in which the anterior tubercle is negligible[125] and that of *Crocuta gigantea* (Schlosser), which is, according to Schlosser, devoid of this tubercle.[126]

It is seen from Table 11 that in robustness value P_3 of the Kuyutarla specimen is within the range of variation of *Crocuta eximia* (Roth and Wagner) and *Crocuta variabilis* (Zdansky). It exceeds P_3 of *Crocuta honanensis* (Zdansky) in size, but falls far short of that of *Crocuta gigantea* (Schlosser). Again, in size of P_3, the maximum of *Lycyaena chaeretis* (Gaudry) is exceeded by the minimum of the Pontian species of *Crocuta*. In crown index P_3 of the Kuyutarla specimen falls within the range of *Crocuta escimia* (Roth and Wagner), *Crocuta variabilis* (Zdansky) and *Crocuta honanensis* (Zdansky). In this index P_3 of the Anatolian specimen is also very near that of *Crocuta gigantea* (Schlosser). In crown index, P_3 of *Lycyaena chaeretis* (Gaudry) falls far short of the minimum of the Pontian *Crocuta*.

In the fourth lower premolar of the Kuyutarla specimen both the anterior and posterior tubercles are strongly developed. In this tooth the anterior tubercle exceeds the posterior tubercle in size and also in elevation. Directly behind the posterior tubercle there is a tiny accessory

[121] Gaudry, 1862, pl. XIII, fig. 2.

[122] De Mecquenem, 1925, pl. IX, fig. 7.

[123] Kittl, 1887, pl. XVII, fig. 1. Regarding P_3 *of Crocuta eximia* from Salonika Arambourg nad Piveteau (1929, p. 123) state: *"P_3 et P_4 possedent deux tubercules bien developpes."*

[124] Zdansky, 1924, p. 98 and pl. XX, figs. 3-4. Zdansky (1924, p. 98), regarding this, states: *"Auch hier wiederholt sich der Fall, dass der Vorderhöcker nur durch eine basale Anschmellung der Vorderkante des Haupthöckers ersetzt sein kann, z-B. bei Ex. 1 und 12. Bei Ex. 6 ist er unter dem vorhandenen Materiale am Kraftigsten entmickelt."*

[125] Zdansky, 1924, pl. XXIII, figs. 3-4. Zdansky (1924, p. 105) states regarding the anterior tubercle of P_3 in *Crocuta honanensis : "Ein Basalhöcker an der Basis der Vorderkante is kaum angedeutet."*

[126] Schlosser, 1903, p. 35 and pl. II, figs. 8 and 8a.

tubercle (figs. 7 and 11) on top of the talon, which forms a rather sharp edge on the disto-lingual comer of the crown (figs. 9-11). The anterior cingulum, on the mesio-buccal corner of the crown, is reduced.

In having an anterior tubercle larger than a posterior tubercle, P_4 of the Anatolian specimen differs from that of *Crocuta eximia* (Roth and Wagner) from Pikermi and Maragha, depicted respectively by Gaudry[127] and De Mecquenem,[128] in which, as can be seen from the pictures published by these authors, the anterior tubercle is smaller and also lower in height than the posterior tubercle. On the other hand, P_4 of the Anatolian specimen resembles closely a specimen of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl,[129] in which also the anterior tubercle is both larger and higher than the posterior tubercle. In this feature P_4 of the Kuyutarla specimen resembles also that *of Crocuta variabilis* (Zdansky)[130] and, as far as can be judged from the photograph published by Zdansky,[131] *Crocuta honanensis* (Zdansky).

In having a small accessory tubercle behind the posterior tubercle, P_4 of the Anatolian mandible, comes closer, among the Pontian forms of *Crocuta,* to a specimen of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl,[132] in which also an accessory tubercle is seen behind the main posterior tubercle.

Regarding P_4 of a specimen of *Crocuta eximia* from Salonika, De Mecquenem states: *"Le talon de la derniere premolaire presente un denticule interne qui reppelle la 4e premolaire* de l'*Ictitherium hipparionum; ce denticule mangue sur les echantillons de Maragha."*[133] This tubercle is also seen in the specimen of *Crocuta eximia* from Salonika, depicted by Arambourg and Piveteau [134] and in the specimen of this species from Maragha, depicted by Kittl.[135] In P_4 of the Kuyutarla mandible there is no accessory tubercle

[127] Gaudry, 1862, pl. XIII, fig. 2.

[128] De Mecquenem, 1925, pl. IX, fig. 7.

[129] Kitti, 1887, pl. XVII, fig. 1. In the specimen of *Crocuta exiinia* from Salonika, depicted by Arambourg and Piveteau (1929, pl. X, fig. 3 and 3a) the anterior tubercle is worn but stili larger than the posterior tubercle. It is possifble that in its fresh condition the anterior tubercle might also have been higher than the posterior tubercle, as in the Anatolian specimen.

[130] Zdansky, 1924, p. 100, pl. XVIII, fig. 3 and pl. XX, fig. 3. Regarding the relative size of the anterior and posterior tubercles in P_4 of *Crocuta variabilis,* Zdansky(1924, p. 100) states: *" In derselben Linie stehen dann auch Vorder-und Hinterhöcker, jener Krâftiger als dieser."*

[131] Zdansky, 1924, pl. XXIII, fig. 4. In P_4 of *Crocuta gigantea* (Schlosser), depicted by Schlosser (1903, pl. II, figs. 7 and 7a) the anterior tubercle is worn, but it is possible that in its fresh state it was higher than the posterior tubercle.

[132] Kittl, 1887, pl. XVII, fig. 1.

[133] De Mecquenem, 1925, p. 24.

[134] Arambourg and Piveteau, 1929, pl. X, figs. 3 and 3a.

[135] Kittl, 1887, pl. **XVII,** fig. **1.**

on the inner side of the talon, which, on this side, forms a rather sharp and angular edge, as in the specimen of *Crocuta eximia* from Maragha, depicted by De Mecquenem[136] and as in some specimens of *Crocuta variabilis* (Zdansky).[137]

The robustness value of P_4 of the Kuyutarla mandible exceeds the maximum of the hitherto available specimens of *Crocuta eximia* (Roth and Wagner) and falls in the range of *Crocuta variabilis* (Zdansky), being near the upper limit of the range of this form (see Table 12). In size, P_4 of the Kuyutarla specimen stili falls far short of *that of Crocuta gigantea* (Schlosser). The robustness values of P_4 of the Pontian species of *Lycyaena* fall below the minimum of Pontian *Crocuta. In* crown index P_4 *of Crocuta* from Kuyutarla is in the range of variation of *Crocuta eximia* and *Crocuta variabilis* and somewhat exceeds that of *Crocuta gigantea* (Schlosser). The crown indices of the Pontian species of *Lycyaena* are, on the average, lower than those of the Pontian *Crocuta.* The maximum crown index of Pontian *Lycyaena* somewhat exceeds the minimum of *Crocuta,* but falls far short of the maximum of *Crocuta* from this period.

In the first lower molar of the Kuyutarla mandible, the talonid is broken and missing, the tooth being broken behind the second lobe where it joins the talonid. In this tooth, the first lobe(L=12.7 mm.) is longer than the second (or posterior) lobe (L=10.5 mm.). In the lower part of the distal margin of the second lobe there is no indication whatsoever of a metaconid. [138] A section of the lower part of the buccal surface of the first lobe is damaged, so it is not possible to determine with certainty whether there was a cingulum in this part or not.

In lacking a metaconid the first lower molar of *Crocuta* from Kuyutarla resembles those *ot Crocuta eximia* (Roth and Wagner) from Pikermi[139] and Salon ika [140] and *Crocuta variabilis* (Zdansky) [141] and *Crocuta gigantea* (Schlosser) [142] from China. In this feature the Anatolian specimen differs from the specimens of *Crocuta eximia* from Maragha, described by De Mecquenem, in which there is a metaconid [143] and also from *Crocuta honanensis*

[136] De Mecquenem, 1925, pl. IX, fig. 7.

[137] Zdansky, 1924, p. 100 and pl. XX, fig. 4. Regarding this feature of P_4 of *Crocuta variabilis,* Zdansky (1924, p. 100) states: *"Auf den Hinterhöcker folgt ein Basalwulst, der an seinem (Innenrande meistens eine ziemlich scharfe Kante bildet, die nur bei-Ex. 1 ganz fehlt."*

[138] In the first lower molar of the hyaenid from the whitish calcareous marls of Küçükyozgat a small metaconid is observed at this place.

[139] Gaudry, 1862, p. 83.

[140] Arambourg and Piveteau, 1929, p. 123. However, regarding the occurrence of a metaconid in the first lower molar of a specimen from Salonika, De Mecquenem (1925, p. 23) states: "*. . .nous l'avons distingue sur une carnassiire inferieure provenant de Salonigue (Coll. Puyhaubert) . "*

[141] Zdansky, 1924, p. 100.

[142] Schlosser, 1903, p. 36.

[143] De Mecquenem, 1925, p. 23.

(Zdansky), which, according to Zdansky, also posscsses this cusp.[144] However, it should be noted here that in the specimen of *Crocuta eximia* (Roth and Wagner) from Maragha, depicted by Kittl, [145] there is no indication of a metaconid, showing that *Crocuta eximia* from this locality was quite variable in this feature.

The length of the first and second lobes of M1 *of Crocuta* from Kuyutarla is 23.20 mm. The total crown lengths and talonid lengths of the first loyyer molars *of Crocuta eximia* (Roth and Wagner) and *Lycyaena chaeretis* (Gaudry) from Pikermi, given by Gaudry,[146] are listed below.

	Crocuta eximia (Roth and Wagner)	*Lycyaena chaeretis* (Gaudry)
Crown length	28.00	24.00
Talonid length	5.00	6.00
Length of first and second lobes[147]	23.00	18.00

From these figures it is seen that the length of the first and second lobes of the first lower molar of *Crocuta* from Kuyutarla is very near that of *Crocuta eximia* (Roth and Wagner) from Pikermi and exceeds that of *Lycyaena chaeretis* (Gaudry).

DISCUSSION

The foregoing account shows that in most of its diagnostic features *Crocuta* from Kuyutarla falls within the range of variation of *Crocuta eximia* (Roth and Wagner). Thus the remains from Kuyutarla, consisting of a fragmentary upper jaw and a fragment of a lower jaw, belong to *Crocuta eximia* (Roth and Wagner) which is a characteristic Pontian species.[148]

It is observed also that in a lârge number of features *Crocuta eximia* from Kuyutarla resembles *Crocuta variabilis* (Zdansky) from the Pontian of China, at least, some specirnens of this form, further bridging the gap between this Chinese form and *Crocuta eximia* (Roth and Wagner). Regarding the affinities of *Crocuta variabilis*, Zdansky states: *"Bedeutende Âhnlichkeit besteht dagegen mit* H. eximia, *deren Verbreitungsgebiet sich pon Südfankreich über Süddeutschlahd, Ungarn, Griechenland, Südrussland bis Persien erstreckte.*

[144] Zdansky, 1924, p. 106. According to Pilgrim (1931, p. 118) this cusp also occurs in the first lower molar of *Crocuta mordax* Pilgrim from the Siwalik Hills.

[145] Kittl, 1887, pl. XVII, fig. 1.

[146] Gaudry, 1862, p. 87 and p. 94.

[147] Obtained by subtracting the talonid length from the crown length.

[148] Arambourg and Piveteau, 1929, p. 124; Pilgrim, 1931, p. 115;Boule and Piveteau, 1935, p. 786.

Unzweifelhaft steht H. eximia *der chinesischen Form sehr nahe. Leider ist jedoch trotz der ziemlich grossen Zahl der bekannten Exemplare nichts veröffentlicht worden, mas über die Variationsbreite der Art befriedigenden Aufschluss gibt. Aus den vorliegenden Arbeiten gewinnt man aber den Eindruck, dass Z.B. der Innenhöcker des* P^4 *niemals so gross wird wie an einigen Exemplaren von* H. variabilis. *Die spârlichen Massangâben über* H. eximia, *die ich in den vergleichenden Tabellen gesammelt habe, zeigen, dass die Dimensibnen der beiden Formen fast die gleichen sind. Höchstens könnte* M_1 *bei* H. eximia *etwas lânger sein. Das von Suess (1861) aus Baltavâr beschriebene Fossil besitzt einen ungewöhnlich grossen* M^1, *weiters zeigt* M_1 *seine grösste Breite am Vorderlobus und ein sehr schmales Talonid."*[149] It must be rioted in this connection that when Zdansky published his excellent monograph,[150] there were relatively only a few publications on the morphology of *Crocuta eximia* (Roth and Wagner) and that the important studies of De Mecquenem,[151] Arambourg and Piveteau,[152] and Pilgrim[153] had not yet been published. We can now take up the discussion of the points raised by Zdansky.

It is now known that, as has already been stated by Arambourg and Piveteau[154] and Pilgrim[155], the size of the protocone of the fourth upper premolar of *Crocuta eximia* is quite variable, which thus further bridges the gap between *Crocuta eximia* and some specimens of *Crocuta variabilis.* As for the metric features discussed by Zdansky, the measurements of the upper and lower teeth of *Crocuta eximia* and *Crocuta variabilis* are contrasted with those of the Pontian species of *Crocuta* and *Lycyaena* in Tables 3-13. From these tables it is seen that in size the ranges of *Crocuta eximia* and *Crocuta variabilis* greatly overlap and that, on the average, in some teeth *Crocuta eximia* and in some *Crocuta variabilis* exceeds the other, while in a few cases the averages of the two forms are very near each other. In regard to the difference in size of M_1 mentioned by Zdansky, according to the figures given in Table 13, the average robustness value of *Crocuta variabilis* is greater than that of *Crocuta eximia.* A careful scrutiny, however, of this table shows that the relatively small average of *Crocuta eximia* is caused by an M_1 from Samos (No. M4166), given by Pilgrim,[156] with abnormally small dimensions. As the picture of this isolated tooth is not published by Pilgrim, it is not possible to say whether there has been a recording error or whether this tooth really belongs to *Crocuta eximia* (Roth and Wagner). Discounting this tooth from Samos, with abnormally small

[149] Zdansky, 1924, p. 101.
[150] Ibid.
[151] De Mecquenem, 1925.
[152] Arambourg and Piveteau, 1929.
[153] Pilgrim, 1931.
[154] Arambourg and Piveteau, 1929, p. 124.
[155] Pilgrim, 1931, p. 117.
[156] Ibid., p. 123.

measurements, the average measurements and indices of the first lower molars of *Crocuta eximia* listed in Table 13 are as follows[157] :

Length	=(8)	27.76 mm.
Breadth	=(5)	12.88 mm.
Robustness value	=(4)	349.77 mm.
Crown index	=(4)	45-5[1] mm.

It is seen, then, that these figures are very near the average measurements of *Crocuta variabilis.*

It is true that the size of M^1 of the specimen of *Crocuta eximia* from Baltavâr far exceeds the maximum of *Crocuta variabilis* in robustness value (Table 7). However, a scrutiny of the figures listed in Table 7 shows that this exceptionally large robustness value is a peculiarity of M^1 of the Baltavâr form that is not common to the forms of *Crocuta eximia* from Pikermi and Taraklia. Indeed, the difference in robustness value between the M^1 of the Baltavâr form and the maximum of *Crocuta variabilis* is less **than** the distance separating the Baltavâr specimen from the maximum of *Crocuta eximia* from Pikermi. Thus the Baltavâr fossil in having a large M^1, which must be regarded as an individual or local variation, is farther removed from *Crocuta eximia* from other European localities than from some specimens of *Crocuta variabilis.* The average measurements and indices of the first upper molars of *Crocuta eximia* from Pikermi and Taraklia are listed below :

Length	=(4)	6.12 mm.
Breadth	=(4)	13-50 mm.
Robustness value	=(4)	82.50 mm.
Crown index	=(4)	222.56 mm.

It is seen that these average figures come near to those of *Crocuta variabilis.*

It may be pointed out regarding the talonid of the first lower molar that the size of the talonid in the specimens of *Crocuta variabilis,* depicted by Zdansky, [158] does not differ much from the specimens of *Crocuta eximia* from Pikermi, Salonika and Maragha, depicted by various authors. [159]

To the points raised by Zdansky, it may also be added that in exhibiting a small anterior tubercle in the second and third lower premolars, some (not all) specimens of *Crocuta variabilis* differ from the European forms of *Crocuta eximia.* But in this feature, the corresponding teeth of the mandible of *Crocuta eximia* from Maragha, depicted by Kittl [160] and

[157] The figures in brackets show the number of specimens.
[158] Zdansky, 1924, pl. XVIII, figs. 3-4 and pl. XX, figs. 3-4.
[159] Gaudry, 1862, pl. XIII, fig. 2; Arambourg and Piveteau, 1929, pl. X, figs. 3-3a; Kittl, 1887, pl. XVII, fig. 1; De Mecquenem, 1925, pl. IX, fig.. 7.
[160] Kittl, 1887, pl. XVII, fig. 1.

those of the Kuyutarla mandible resemble specimens of *Crocuta variabilis* exhibiting an anterior tubercle in P_2-P_3. *Crocuta variabilis* differs also from the Pikermi form of *Crocuta eximia* in having an anterior tubercle larger and higher than the posterior tubercle in its fourth lower premolar. In this feature also the fourth lower premolar of the specimen of *Crocuta eximia* from Maragha, studied by Kittl[161] and that of the Kuyutarla specimen resemble closely that of *Crocuta variabilis.*[162] It is observed that in the features under consideration the same variations occur in both *Crocuta eximia* and *Crocuta variabilis.*

The account given above clearly shows that *Crocuta variabilis* from the Pontian of China, described as *Hyaena variabilis* by Zdansky,[163] in most of its features agrees with *Crocuta eximia.* That is, as has already been suggested by Arambourg and Piveteau[164] and Pilgrim,[165] *Crocuta variabilis* is only a form of the earlier established species *Crocuta eximia* (Roth and Wagner). *Crocuta variabilis* (Zdansky) differs from *Crocuta eximia* mainly in showing a greater variation in the anterior tubercle of the second and third upper premolars, which, as has been stated by Zdansky[166] and Pilgrim,[167] is absent in some and present in other specimens. However, these differences are not at all incompatible with a variety rank within the species *Crocuta eximia* (Roth and Wagner), as has been remarked by Pilgrim.[168]

Considering *Crocuta variabilis* and *Crocuta eximia* as one species, the upper and lovver jaws from Kuyutarla differ from the known specimens of *Crocuta eximia* (Roth and Wagner), only in having a lower crown index in P^1 and P_2, which must, however, be regarded as individual variations.

In this connection a few words should also be said regarding the geological age of the Karacahasan beds. In a recent study, Oğuz Erol has

[161] Ibid.

[162] It may be pointed out here that considerable variation occurs in the anterior tubercles of the lower premolars in the Maragha form of *Crocuta eximia. I*n the specimen depicted by De Mecquenem (1925, pl. IX, fig. 7) the second and third lower premolars are devoid of an anterior tubercle and in its fourth lower premolar the anterior tubercle is smaller than the posterior tubercle, as in the Pikermi form of *Crocuta eximia.* On the other hand, in the specimen depicted by Kittl (1887, pl. XVII, fig. 1) P_2 and P_3 exhibit a small anterior tubercle and in P_4 the anterior tubercle is larger than the posterior tubercle, as in *Crocuta variabilis.* Thus in the range of variation occurring in its lower premolars the Maragha form of *Crocuta eximia* connects the European forms of *Crocuta eximia* with *Crocuta variabilis.*

[163] Zdansky, 1924, p. 93.

[164] Arambourg and Piveteau, 1929, pp. 124-125.

[165] Pilgrim, 1931, p. 117. Regarding the affinities of *Crocuta variabilis,* Pilgrim (1931, p. 117) states: "Hyaena variabilis *Zdansky is so closely allied to* Crocuta eximia *as possibly to represent a Chinese race of this species."*

[166] Zdansky, 1924, p. 95.

[167] Pilgrim, 1931, p. 117.

[168] Ibid., p. 117.

concluded that the whitish calcareous marls of lacustrine origin at Küçükyozgat antedate the heterogeneous calcareous clays of running water origin at Kuyutarla and Örücebağ.[169] The fauna[170] from the whitish calcareous marls, determined to date, clearly shows that these belong to the Pontian Age,[171] that is to the lower Pliocene.[172] The presence of *Crocuta eximia* (Roth and Wagner) at Kuyutarla Locus 2, where it occurs with *Hipparion gracile* Kaup, shows that these stream deposits are also of Pontian Age, representing a later horizon of the Pontian than the whitish calcareous marls of lacustrine origin.

CONCLUSION

1. The remains of *Crocuta* found at Kuyutarla Locus 2 belong to *Crocuta eximia* (Roth and Wagner), which is a variable species that extended in the Pontian Age all the way from France to China.

2. The presence of *Crocuta eximia* (Roth and Wagner), which is a characteristic Pontian species, shows that the deposits of running water origin at Kuyutarla and Örücebağ belong to the Pontian, that is to the Lower Pliocene, representing a horizon of the Pontian at the Küçükyozgat district later than the whitish calcareous marls of lacustrine origin.

REFERENCES

ARAMBOURG, C. and PIVETEAU, J. 1929. *Les Vertebres du Pontien de Saloniaue.* Annales de Paleontologie, Vol. XVIII, pp. 57-140.

BOULE, M. and PIVETEAU, J. 1935. *Les fossiles. Elements de Paleontologie.* Paris.

CHAPUT, E. 1936. *Voyages d'e'tudes geologiaues et geomorphogenigues en Turguie.* Memoires de I'lnstitut Français d'Archeologie de Stamboul, 11, Paris.

DEL CAMPANA, D. 1914. *La Lycyaena Lunensis N. Sp. Dell'Ossario Pliocenico di Olivola (Val di Magra).* Palaeontographia Italica, Vol. XX, pp. 87-103.

D E MECQUENEM, R. 1924—1925. *Contributions â l'etüde des fossiles de Maragha.* Annales de Paleontologie, Vol. XIII, 1924, pp. 133-160 and Vol. XIV, 1925, pp. 1-36.

[169] Erol, 1954, pp. 93-95-

[170] Tschachtli, 1942, p. 326; Şenyürek, 1953a, p. 2; Şenyürek, 1953b, p. 142; Şenyürek, 1953d, p. 460; Şenyürek, 1954 b.

[171] Tschachtli, 1942, p. 327; Şenyürek, 1953a, p. 2; Şenyürek, 1953b, p. 142; Şenyürek, 1953d, P- 460; Şenyürek, 1954 b.

[172] As is known, Zittel (1925, p. 300), Abel (in Weber, 1928, p. XVIII), Lewis (1937, p. 194), Romer (1946, Table 4), Thenius (1949), Papp and Thenius (1949, Table VI) and Şenyürek (1951, p. 70; 1952, p. 474; 1953a, P- 2; 1953 c, p. 174; 1953d, p. 460; 1954a, p. 2) attribute the Pontian Age to the Lower Pliocene period, instead of the upper Miocene.

EROL, O. 1954. *Elma Dağı'nın Küçükyozgat-Karacahasan memeli hayvan fosil yatakları.* Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculte de Langue, d'Histoire et de Geographie, Üniversite d'Ankara), Vol. XII, Nos. 1-2, pp. 91-97.

GAUDRY, A. 1862. *Animaux fossiles et Geologie de l'Attiaue.* D'apres les recherches faites en 1855—-1856 et en 1860, sous les auspices de l'Academie des Sciences, Paris.

GAUDRY, A. 1873. *Animaux fossiles du Mont Leberon (Vaucluse).* Etude sur les vertebres (Etude sur les invertebres, par P. Fischer et R. Tournouer), Paris.

HOOIJER, D.A. 1952. *The Cave Hyaena, Crocuta Crocuta Spelaea (Goldfuss), new to the Pleistocene fauna of the Netherlands.* Geologie en Mijnbouw, Nw. Serie, No. II, pp. 385-388.

İZBIRAK, R. and YALÇINLAR, I. 1951. *Kayseri'nin kuzeyinde üst Miosene ait omurgalılar.* Les vertebres du Miocene superieure au Nord de Kayseri (Turquie) .Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. **III,** No. 1, pp. 153-54 and 155-157.

KITTL, E. 1887. *Beitrdge zur Kenntniss der fossilen Sâugethiere von Maragha in Persien. 1. Carnivoren.* Annal. d. K.K. Naturhist. Hofmuseums, Band 11, pp. 317-338.

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

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

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

PAPP, A. and THENIUS, E. 1949. *Über die Grundlagen der Gliederung des Fung-tertiârs und Ouartârs in Niederösterreich, unter besonderer Berücksichtigung der Mio-Pliozân-und Tertiâr-Ojıartâr-Grenze.* Sitzungsberichten der Österr. Akademie der Wissenschaften. Mathm.-naturw. KI., Abt. I, 158. Bd., 9. u. 10. Heft, pp. 763-787.

PEI, W. C. 1934. *On the carnivora from locality 1 of Choukoutien.* Palaeontologia Sinica, Series C, Vol. **VIII,** Fascicle 1, Peking.

PILGRIM, G. E. 1931. *Catalogue of the Pontian Carnivora of Europe in the Department of Geology.* British Museum (Natural History), London.

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

SGHLOSSER, M. 1903. *Die fossilen Sdugetiere Chinas nebst einer Odontographie der rezenten Antilopen.* Abhandlungen der K. Bayer. Akad. Wiss., XII. Band, pp. 1-221.

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

ŞENYÜREK, M. S. 1952. *A study of the Pontian fauna of Gökdere (Elmadağı) , south-east of Ankara.* Belleten, Vol. XVI, No. 64, pp. 449-492.

ŞENYÜREK, M. S. 1953(a). *A note on a new species of Gazella from the Pontian of Küçükyozgat.* Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculte de Langue, d'Histoire et de Geographie, Universite d'Ankara), Vol. XI, No. 1, pp. 1-14.

ŞENYÜREK, M. S. 1953 (b). *Küçükyozgat'da bulunan Gazella capricornis Rodler ve Weithofer'e ait bir boynuz. A horn-core of Gazella capricornis Rodler and Weithofer found at Küçükyozgat.* Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. IV, No. 2, pp. 141-146.

ŞENYÜREK, M. S.[173] 1953(0). *List of localities of mammalian fossils of Pontian Age in the Vilâyet of Kayseri.* Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculte de Langue, d'Histoire et de Geographie, Universite d'Ankara) Vol. XI, Nos. 2-4, pp, 171-175.

ŞENYÜREK, M. S. 1953(d). *Hom-cores of Oioceros from the Pontian of Küçükyozgat.* Belleten, Vol. XVII, No. 68, pp. 459-473.

ŞENYÜREK, M. S. 1954) (a) *study of the remains of Samotherium found at Taşkınpaşa.* Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi (Revue de la Faculte de Langue, d'Histoire et de Geographie, Universite d'Ankara), Vol XII, Nos. 1-2, pp. 1-32,

ŞENYÜREK, M.S. 1954(b). *A study of a skull of Promephitis from the pontian of Küçükyozgat.* Belleten, Vol XVIII, No. 71 (In the press).

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

[173] Since the above paper was published, the District of Ürgüp has been transferred to the new Vilâyet of Nevşehir. Thus, the Pontian localities of Karain (Chaput, 1936), Ayvalı, Boyalı, Paşabağı and Taşkınpaşa (Şenyürek, 1953c) are in the District of Ürgüp of the Vilâyet of Nevşehir, while Erkilet (Akdere), to the north of the city of Kayseri (Izbırak and Yalçınlar, 1951) and Dadasun and Mancusun (Yalçınlar, 1950), to the northeast of this city, which must be added to this list, are the Pontian localities of mammalian fossils in the Vilâyet of Kayseri, In the District of Ürgüp the mammalian fossils of Pontian Age are embedded in tuff (Şenyürek, 19530), in marly sandstone and tuff at Erkilet (İzbırak and Yalçınlar, 1951), in limestone and marls at Dadasun and in limestone and sandstone at Mancusun (Yalçınlar, 1950).

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

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

WAGNER, A. 1860 (1857). N*eue Beitrâge zur Kenntniss der fossilen Sâugthier-Ueberreste von Pikermi.* Abhandlungen der Mathemat.-Physikalischen Classe der Koeniglich Bayerischen Akademie der Wissenschaften, Achter Band, München.

WEBER, M. (with O. Abel). 1928. *Die Sâugetiere. Einführung in die Anatomie und Systematik der recenten und fossilen Mammalia.* Zweite Auflage, Band II, Jena.

YALÇINLAR, İ. 1946. *Eşme civarında Miosen'e ait bir omurgalılar fauna'sı. Une faune de vertebres miocenes aux environs d' Eşme (Turquie, vallee du Meandre Superieur).* İstanbul Üniversitesi Fen Fakültesi Mecmuası (Revue de la Faculte des Sciences de 1'Universite d'İstanbul), Serie B, Tome XI, fascicule 2, pp. 124-130.

YALÇINLAR, İ. 1947. *Yukarı-Cediz vadisinde Miosen'e ait vertebre fosilleri. Les vertebres fossiles du Miocene dans la vallee du Gediz-Superieur.* Türkiye Jeoloji Kurumu Bülteni (Bulletin of the Geological Society of Turkey), Vol. I, pp. 165-177.

YALÇINLAR, İ. 1950. *Kayserinin doğusunda üst Miosene ait omurgalılar. Les vertebres du Miocene superieur a l'Est de Kayseri (Turquie).* İstanbul Üniversitesi Fen Fakültesi Mecmuası (Revue de la Faculte des Sciences de l'Universite d'İstanbul), Serie B, Tome XV, fascicule 3, pp. 264-268.

ZAPFE, H. 1948. *Neue Funde von Raubtieren aus dem Unterpliozdn des Wiener Beckens.* Sitzungsberichten der Österr. Akademie der Wissenschaften. Mathem.-naturvv. KI., Abt. I, 157. Bd., 6. bis 10. Heft, pp. 243-262.

ZITTEL, VON K. A. (Revised by A. S. Woodward). 1925- *Text-book of Palaeontology,* Vol. III, London.

ZDANSKY, O. 1924. *Jungtertiâre Carnivoren Chinas.* Palaeontologia Sinica, Series C, Vol. II, Fascicle 1, Peking.

ZDANSKY, O. 1927. *Weitere Bemerkungen über fossile Carnivoren aus China.* Palaeontologia Sinica, Series C, Vol. IV, Fascicle 4, Peking.

EXPLANATION OF THE FIGURES[174]

Fig. 1. Kuyutarla Locus 1, seen from above and west.
Fig. 2. Kuyutarla Locus 2, seen from the south.
Fig. 3. A closer view of Kuyutarla Locus 2.
Fig. 4. The upper jaw of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from the external side.
Fig. 5. The upper jaw of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from below.
Fig. 6. The upper jaw of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from front and below.
Fig. 7. The mandible of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from the external side.
Fig. 8. The mandible of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from the external side.
Fig. 9. The mandible of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from the internal side.
Fig. 10. The mandible of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from above.
Fig. 11. The mandible of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, seen from above.
Fig. 12. First right lower incisor of *Crocuta eximia* (Roth and Wagner) from Kuyutarla, in buccal view.
Fig. 13. First right lower incisor of *Crocuta eximia* (Roth and Wagner) from Kuyutarla. in occlusal view.

[174] Figs. 4-5 are approximately natural size and figs. 12-13 are enlarged. All the other figures are reduced in varying degrees.

TABLE I

Measurements of the Upper Teeth of *Crocuta eximia* (Roth and Wagner) from Kuyutarla [1]

	Maximum Length [2]	Maximum Breadth [3]	Buccal Height [4]	Robustness Value [5]	Crown Index [6]
I_1	6.10	7.60	8.70	46 36	124.59
I^2	7.20	9.5°	11.50	68.40	131-94
p	11.60	13.90	19.00	161.24	119.81
C^1	—	—	32. 80	-	—
P^1	8.20	7.70	-	63.14	93.90
P^2	18 20	13.10	13.00	238.42	71.97
P^3	23 60	16.00	16.80	377.60	67.75
P4	39. 20	19.00	23 00	744. 80	48 49

[1] In this paper all the dental measurements given are in millimeters.

[2] The lengths of the teeth are the maximum mesio-distal dimensions of the crown.

[3] The breadth measurements of the teeth are the maximum bucco-lingual dimensions of the crown.

[4] The height measurement is taken on the buccal side of the crown. In case of the incisors, canines, P^1-P^3, P_2-P_4, this dimension is measured along the middle of the buccal surface of the crown, while in the upper and lower carnasial teeth it is that of the highest cusp.

[5] Robustness Value = Maximum length x maximum breadth.

[6] Crown Index = $\frac{\text{Maximum breadth X 100}}{\text{Maximum length}}$

TABLE 2

Measurements of the Lower Teeth of *Crocuta eximia* (Roth and Wagner) from Kuyutarla

	Maximum Length	Maximum Breadth	Buccal Height	Robustness Value	Crown Index
I_1	4.00	6 30	—	25.20	157-50
I_2	6.20	7 60	8 30	47.12	122.58
I_3	9.10	8 50	12.00	77 35	93.49
C_1	18 30	—	31 00	—	—
p_2	17 70	11 .10	11.30	196 47	62.71
p_3	20.70	14.10	16. 30	291.87	68. 11
P4	24.00	13 80	17.60	331.20	57.50
M_1	—	13.40	19.00		

TABLE 3

Measurements of the First Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*[1]

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner] from Mont Leberon. Gaudry, 1873.	6.00	7.00[2]	42.00	116.66
Crocuta eximia (Roth and Wagner) from Pikermi. Gaurdry, 1862, 1873.	7.00	—		—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 8969. Pilgrim, 1931.	8.00	8.00	64.00	100.00
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	7.00		—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla,	8.20	7.70	63.14	93.90
Crocuta eximia (Roth and Wagner). Average.	7.24	7-56	56.38	103.52
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	7.40	7.40	54-76	100.00
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	7.40	7.50	55-50	101.35
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	6.70	7.80	52.26	116.41
Crocuta variablilis (Zdansky) from China. Specimen 18. Zdansky, 1924.	7.20	7.60	55.72	105.55
Crocuta variabilis (Zdansky) from China. Specimen 20. Zdansky, 1924.	6.80	6.70	45.56	98.52
Crocuta variabilis (Zdansky). Average.	7.10	7.40	52.76	104.36
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	8.10	8.20	66.42	101.23
Crocuta honanensis (Hyaena sp. Schlosser, 1903) from China. Schlosser, 1903.	8.50	8.00	68.00	94.11
Crocuta honanensis (Zdansky). Average.	8.30	8.10	67.21	97.67
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	9.00	10.50	94.50	116.66
Lycyaena dubia Zdansky from China. Zdanskv, 1924.	6.70	5.80	38.86 '	86.56

[1] In this and in all the following tables robustness values and crown indices of the material taken from the literature and the averages of the species listed have been calcu - lated by me.

[2] From Zdansky, 1924, p. 97.

TABLE 4

Measurements of the Second Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycvaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Mont Leberon. Gaudry, 1873.	18.00	—	—	—
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	19-50	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862, 1873.	20.00	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	17.00	15.00	255.00	88.23
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8967. Pilgrim, 1931.	17.00	12.00	204.00	70.58
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8968. Pilgrim, 1931.	19.00	14.00	266.00	73.68
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8969. Pilgrim, 1931.	18.00	12.00	216.00	66.66
Crocuta eximia (Roth and Wagner) from Pikermi. No. M9041. Pilgrim, 1931.	19.00	13.00	247.00	68.42
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	18.00	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	17.00	—	—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla.	18.20	13.10	238.42	71.97
Crocuta eximia (Roth and Wagner). Average.	18.24	13.18	237.73	73.25
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	17.70	12.30	217.71	69.49
Crocuta variabilis (Zdansky) from China. Specimen 2. Zdansky, 1924.	16.40	11 .60	180.24	70.73

TABLE 4 (Continued)

Measurements of the Second Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen 3. Zdansky, 1924.	16.40	12.20	200.08	74.39
Crocuta variabilis (Zdansky) from China. Specimen 4. Zdansky, 1924.	17.90	12.20	218.38	68.15
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	17.50	11.40	199-50	65.14
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	19.70	13.40	263.98	68.02
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	17-50	12.70	222.25	72.57
Crocuta variabilis (Zdansky) from China. Specimen 18. Zdansky, 1924.	18.80	13.10	246.28	69.68
Crocuta variabilis (Zdansky) from China. Specimen 19. Zdansky, 1924.	19.40	13-30	258.02	68.55
Crocuta variabilis (Zdansky) from China. Specimen 20. Zdansky, 1924.	20.40	12.50	255.00	61.27
Crocuta variabilis (Zdansky) from China. Specimen 21. Zdansky, 1924.	16.90	12.10	204.49	71.59
Crocuta variabilis (Zdansky) from China. Specimen 24. Zdansky, 1924.	18.90	13-30	251.37	70.37
Crocuta variabilis (Zdansky). Average.	18.12	12.50	226.44	69.16
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	18.10	11.90	215-39	65.74
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	28.00	19.50	546.00	69.64
Lvcyaena chaeretis (Gaudry) from Pikermi. Pilgrim, 1931.	16.70	9.00	150.30	53.89
Lycyaena dubia (Zdansky) from China. Zdansky, 1924.	16.40	8.60	141.04	52.43

TABLE 5

Measurements of the Third Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximûm Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Mont Leberon. Gaudry, 1873	24.OO		—	—
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	26.OO?	-	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862, 1873.	24.OO	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	22.0O	16.00	352.OO	72.72
Crocuta eximia (Roth and Wagner) from Pikermi. No. 8966. Pilgrim, 1931.	25.OO	15.00	375.00	60.00
Crocuta eximıa (Roth and Wagner) from Pikermi. No. M8967. Pilgrim, 1931	22.00	15.00	330.00	68.18
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8968. Pilgrim, 1931.	25.OO	16.00	400.00	64.00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8969. Pilgrim, 1931.	22.00	16.00	352.00	72.72
Crocuta eximia (Roth and Wagner) from Pikermi. No. M9041. Pilgrim, 1931	21.00	15.00	315.00	71.42
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	22.00	—	-	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	21 .40	—	—	
Crocuta eximia (Roth and Wagner) from Grossulowo. Zdansky, 1924 [after Sinzow].	22.00	14.00	308.00	63.63
Crocuta eximia (Roth and Wagner) from Kuyutarla.	23.60	16.00	377.60	67.75
Crocuta eximia (Roth and Wagner). Average.	23.07	15-37	351.20	67-55
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	21.50	15.10	324.65	70.23
Crocuta variabilis . (Zdansky) from China. Specimen 2. Zdansky, 1924.	19.80	15.10	298.98	76.26

TABLE 5 (Continued)

Measuremcnts of the Third Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen 3. Zdansky, 1924.	21.50	16.40	352.60	76.27
Crocuta variabilis (Zdansky) from China. Specimen 4. Zdansky, 1924.	22.50	I4.4O	324.OO	64.00
Crocuta variabilis (Zdansky) from China. Specimen 3. Zdansky, 1924.	21.50	I5-30	328.95	71.20
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	25-30	17.00	430.10	67.19
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	19.90?	15.60	310.44	78.39
Crocuta variabilis (Zdansky) from China. Specimen 18. Zdansky, 1924.	21 .60	16.30	352.08	75-46
Crocuta variabilis (Zdansky) from China. Specimen 19. Zdansky, 1924.	23.OO	15.70	361.10	68.26
Crocuta variabilis (Zdansky) from China. Specimen 20. Zdansky, 1924.	24.50	16.40	401.80	66.93
Crocuta variabilis (Zdansky) from China. Specimen 21. Zdansky, 1924.	22.70	16.20	367.74	71.36
Crocuta variabilis (Zdansky) from China. Specimen 22. Zdansky, 1924.	24.30	17.30	420.39	71.19
Crocuta variabilis (Zdansky) from China. Specimen 23. Zdansky, 1924.	24.10	17.70	426.57	73.44
Crocuta variabilis (Zdansky) from China. Specimen 24. Zdansky, 1924.	23-30	16.00	372.80	68.66
Crocuta variabilis (Zdansky). Average.	22.53	16.03	362.30	71.34
Crocuta honanensis (Hyaena sp. Schlosser, 1903). Schlosser, 1903.	22.00	16.50	363.00	75.00
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	30.00?	23.50	705.00	78.33
Lycyaena chaeretis (Gaudry) from Pikermi. Pilgrim, 1931.	19.80	I2.00	237.60	60.60
Lycyaena dubia Zdansky from China. Zdansky, 1924.	19.80	IO.80	213.84	54.54

TABLE 6

Measurements ofthe Fourth Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robusmess Value	Grown Index
Crocuta eximia (Roth and Wagner) from Mont Leberon. Gaudry, 1873.	37.OO	—	—	—
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	36-50	17.50	638.75	47.94
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862 and 1873.	40.00			
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	40.00	21 .00	840.00	52.50
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8966. Pilgrim, 1931.	38.OO	19.00	722.00	50.00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8967. Pilgrim, 1931.	38.OO	17.00	646.00	44.73
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8968. Pilgrim, 1931.	37.OO	19.00	703.00	51.35
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8969. Pilgrim, 1931.	36.OO	18.00	648.00	50.00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M9041. Pilgrim, 1931.	38.OO	18.00	684.00	47.36
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	41.00	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	36.OO	13.70	493.20	38.05
Crocuta eximia (Roth and Wagner) from Kuyutarla.	39.20	19.00	744.80	48.49
Crocuta eximia (Roth and Wagner). Average.	38.05	18.02	679.97	47.82
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	35.50	18.00?	639.00	50.70
Crocuta variabilis (Zdansky) from China. Specimen 3. Zdansky, 1924.	—	19.80	—	—
Crocuta variabilis (Zdansky) from China. Specimen 4. Zdansky, 1924.	36.00?	17.80	640.80	49.44

TABLE 6 (Continued)

Measurements of the Fourth Permanent Upper Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Letıgth	Maximum Breadth	Robustness Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	37.50	18.90	708.75	50.40
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	42.20	—	-	—
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	41.50?	18.70	776.05	45.06
Crocuta variabilis (Zdansky) from China. Specimen 18. Zdansky, 1924.	37.80	I9-50	737.10	51-58
Crocuta variabilis (Zdansky) from China. Specimen 19. Zdansky, 1924.	38.20?	—	—	—
Crocuta variabilis (Zdansky) from China. Specimen 20. Zdansky, 1924.	40.30	19.40	781.82	48.13
Crocuta variabilis (Zdansky) from China. Specimen 21. Zdansky, 1924.	37.30	18.80	701.24	50.40
Crocuta variabilis (Zdansky) from China. Specimen 22. Zdansky, 1924.	37.80	20.00	756.00	52.91
Crocuta variabilis (Zdansky) from China. Specimen 24. Zdansky, 1924.	—	18.80	—	
Crocuta variabilis (Zdansky). Average.	38.40	18.97	7I7-59	49.82
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	35.40	20.50	725.70	57.90
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	44.00?	25.OO	1100.00	56.81
Lycyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862.	34.00	—	—	
Lycyaena chaeretis (Gaudry) from Pikermi. Pilgrim, 1931.	31-50	17.00	535.50	53.96
Lycyaena dubia Zdansky from China. Zdansky, **1924.**	31.10	16.30	526.93	**52.41**

TABLE 7

Measurements of the First Permanent Upper Molar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Lenglh	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	8.00	17-50	140.00	218.75
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	6.00	14.00	84.OO	233.33
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	7.00	13.00	91.00	185.71
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8968. **Pilgrim, 1931.**	6.00	13.00	78.OO	216.66
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	5.50	14.00	77.00	254.54
Crocuta eximia (Roth and Wagner). Avefage.	6.50	14.30	94.00	221.79
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	6 50	13.00	84.50	200.00
Crocuta variabilis (Zdansky) from China. Specimen 4. Zdansky, 1924.	—	I2.20?	—	—
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	6.40?	14.70	94.08	229.68
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	5-70	II.80	67.26	207.01
Crocuta variabilis (Zdansky) from China. Specimen 18. Zdansky, 1924.	—	13-90	—	—
Crocuta variabilis (Zdansky) from China. Specimen 19. Zdansky, 1924.	5.40	14.00	75.60	259-25
Crocuta variabilis (Zdansky) from China. Specimen 20. Zdansky, 1924.	**6.60**	15.60	I02 .96	236.36
Crocuta variabilis (Zdansky) from China. Specimen 21. Zdansky, 1924.	6.50	14.50	94-25	223.07
Crocuta variabilis (Zdansky) from China. Specimen 22. Zdansky, 1924.	5.40	12.80	69.12	237.03
Crocuta variabilis (Zdansky). Average.	6.07	13.61	83-96	227.48
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	6.00?	10.60	63.60	176.66
Lycyaena chaeretis (Gaudry) from Pikermi. Pilgrim, 1931.	7.00	14.00	98.00	200.00
Lycyaena dubia Zdansky from China. Zdansky, 1924.	8.10	16.30	132.03	201.23

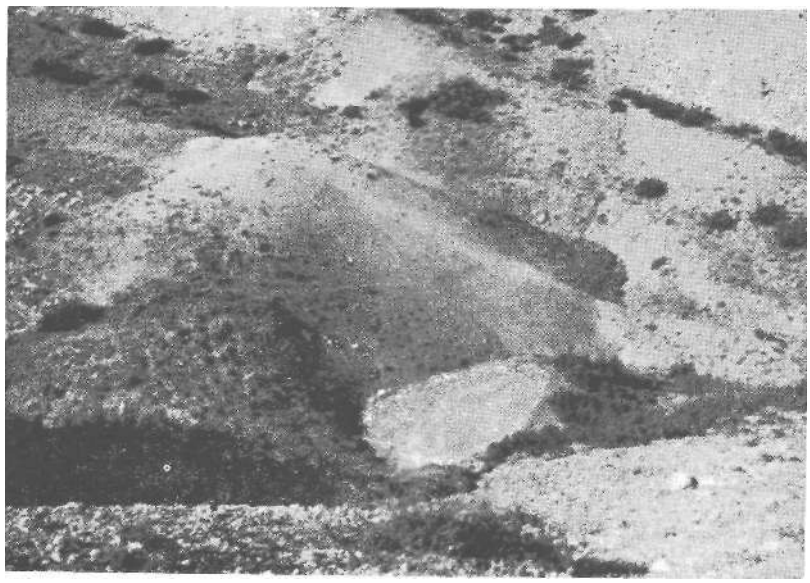

Fig. I

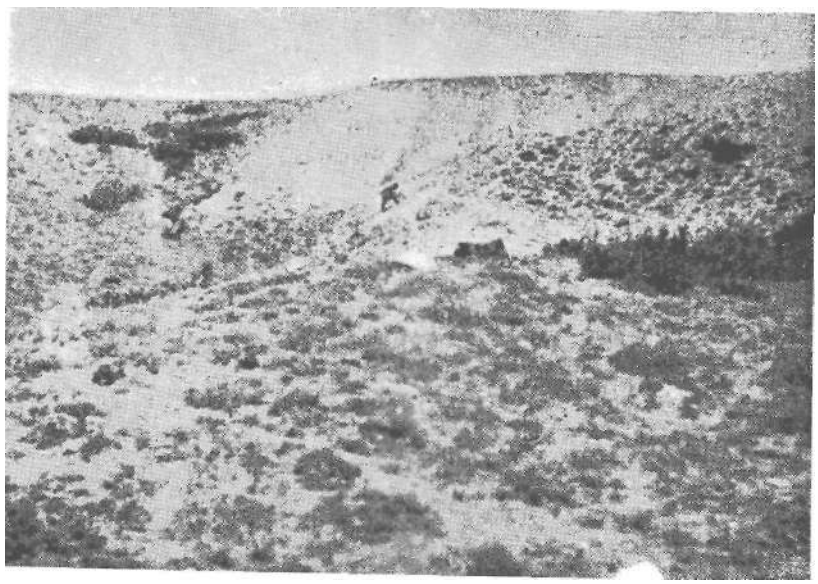

Fig. 2

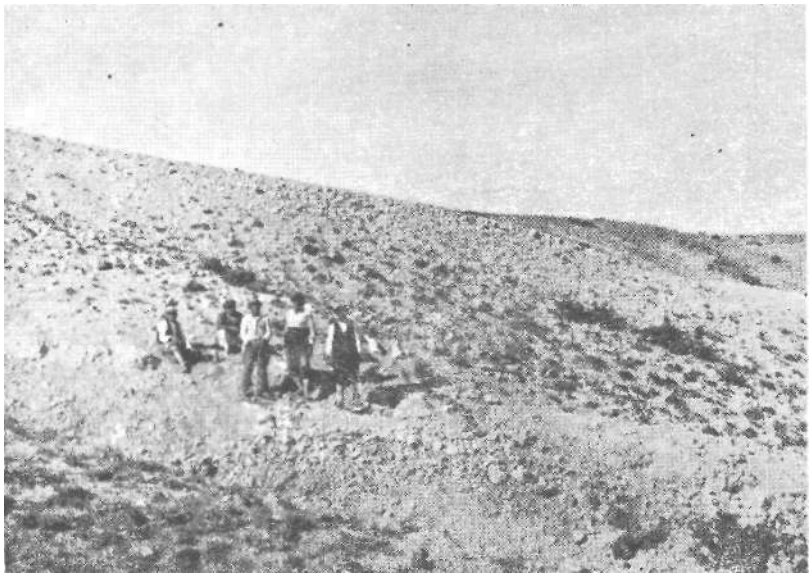

Fig. *3*

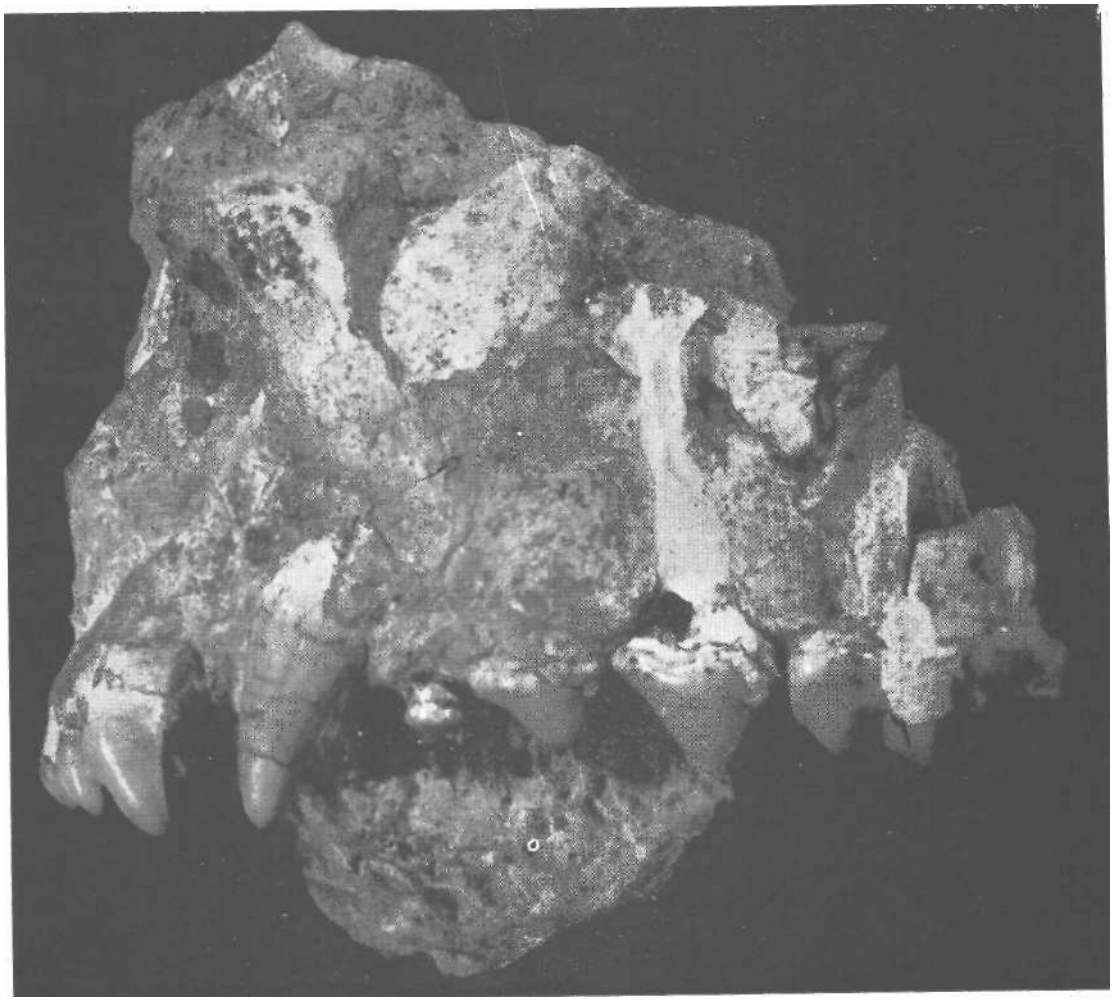

Fig. 4

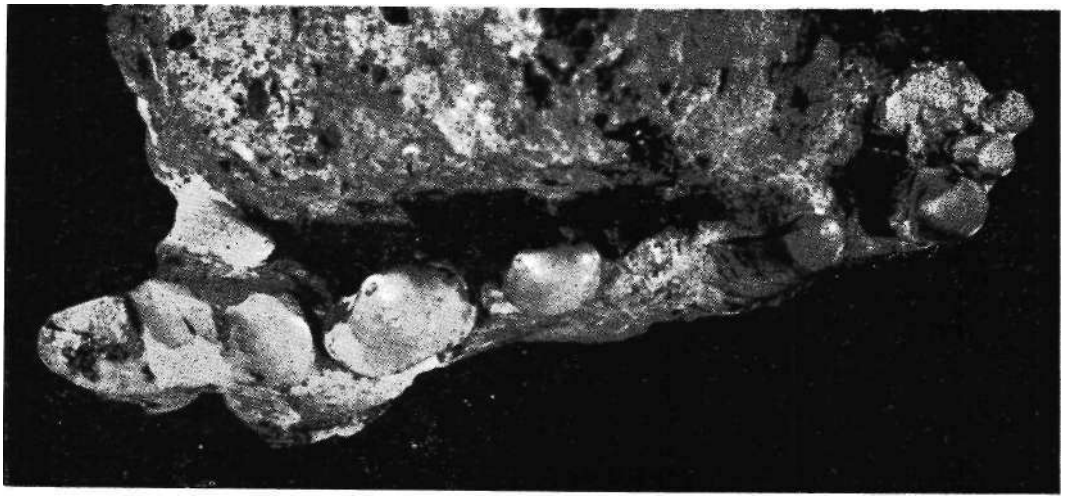

Fig. 5

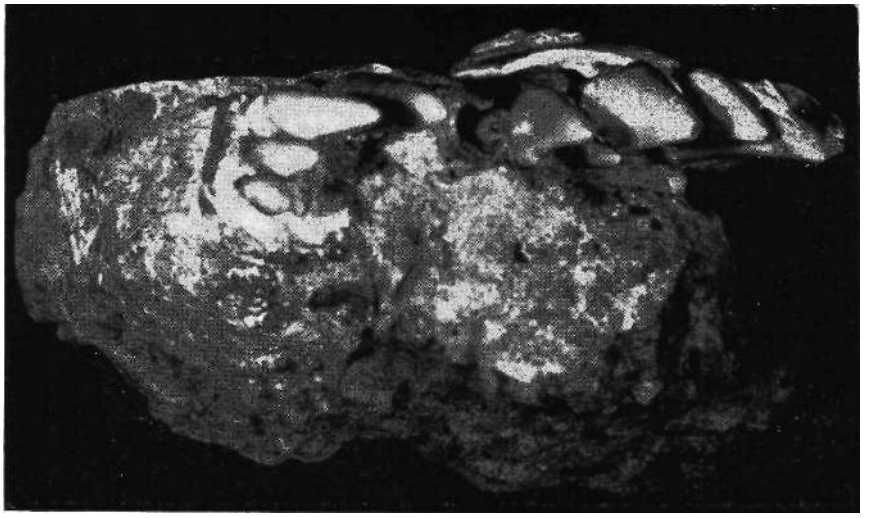

Fig. 6

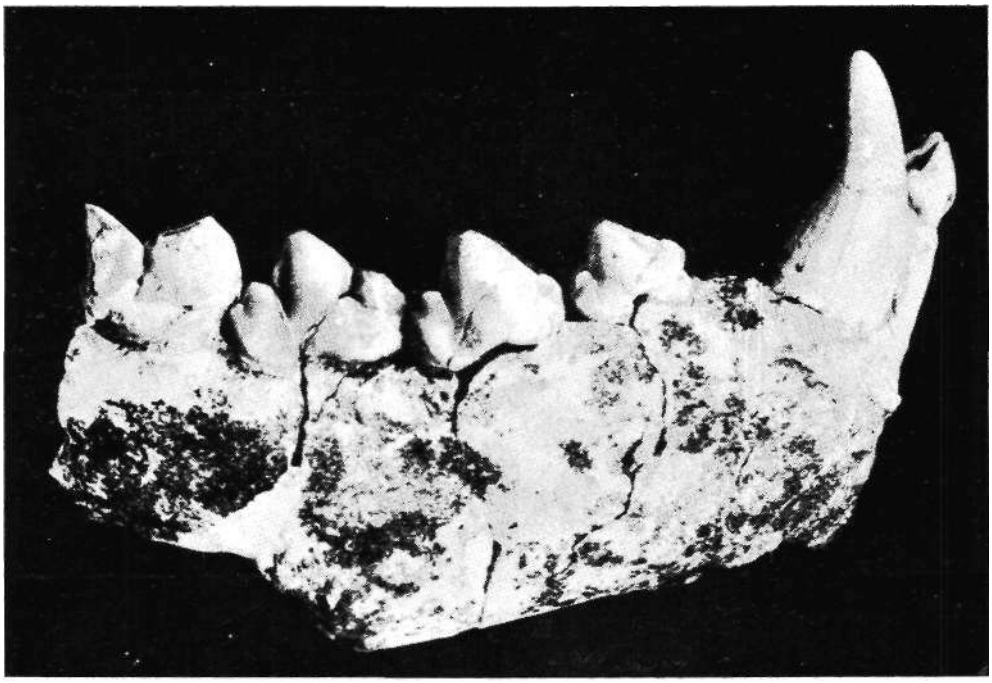

Fig. 7

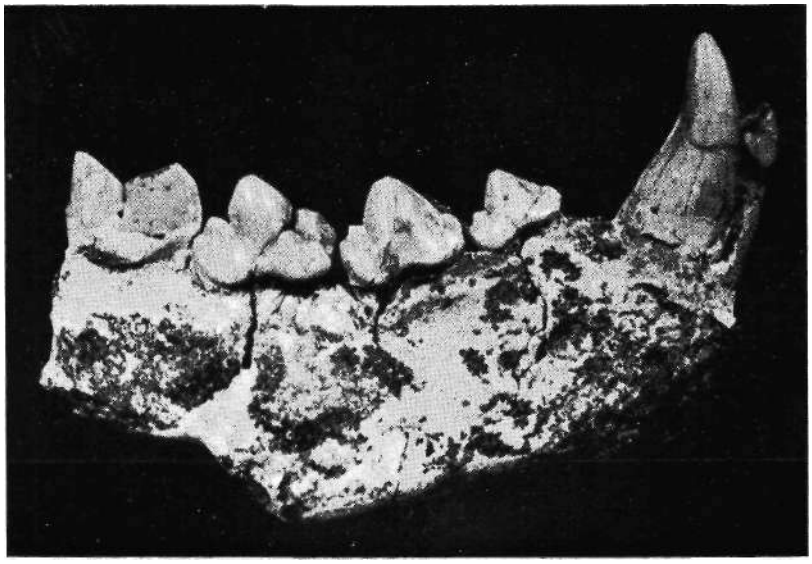

Fig. 8

Fig- 9

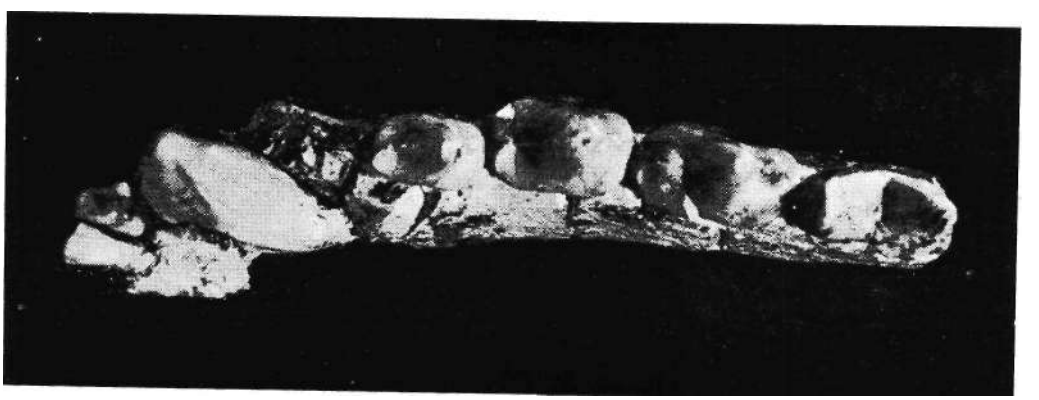

Fig. 10

Fig. II

Fİg. 12

Fig- 13

Note: During the course of printing Figs. 4 and 5 have been slightly reduced. They are now slightly smaller than natural size.

TABLE 8

Length Measurements of the Lower Canine in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	16 00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8971. Pilgrim, 1931.	18.00
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931-	14 00
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko],	20.00
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	17-50
Crocuta eximia (Roth and Wagner) from Kuyutarla.	18.30
Crocuta eximia (Roth and Wagner). Average.	17.30
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	17.10
Crocuta variabilis (Zdansky) from China. Specimen 5. Zdansky, 1924.	16.90
Crocuta variabilis (Zdansky) from China. Specimen 6. Zdansky, 1924.	16.20
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	14 70
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	17 30?
Crocuta variabilis (Zdansky) from China. Specimen 11. Zdansky, 1924.	16 60
Crocuta variabilis (Zdansky) from China. Specimen 13. Zdansky, 1924.	16.40
Crocuta variabilis (Zdansky) from China. Specimen 14. Zdansky, 1924.	18 00
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	17.60
Crocuta variabilis (Zdansky) from China. Specimen 16. Zdansky, 1924.	15 90
Crocuta variabilis (Zdansky). Average.	16 67
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	17.00?
Lycyaena chaeretis (Gaudry) from Vienna Basin [A]. Zapfe, 1948.	15 00
Lycyaena chaeretis (Gaudry) from Vienna Basin [B]. Zapfe, 1948.	15 00
Lycyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862.	16 00
Lvcyaena chaeretis (Gaudry) from Pikermi. No. M8979. Pilgrim, 1931.	17.00
Lvcyaena chaeretis (Gaudry). Average.	15.75

TABLE 9

Measurements of the First Permanent Lower Premolar in the Pontian Species of the Genera *Crocuta* and *Lyeyaena*

	Maximum Length	Maxîmum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	6.00	—	-	
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	6.00	7.OO	42.00	116.66
Crocuta eximia (Roth and Wagner) from Pikermi. No. 8970. Pilgrim, 1931.	5.50	5.00	27.50	90.90
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	4.00	—	—	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4164. Pilgrim, 1931.	6.00	5.00	30.00	83 .33
Crocuta eximia (Roth and Wagner) from Maragha. Kittl, 1887.	5.00	—		
Crocuta eximia (Roth and Wagner). Averaçe.	5.41	5.66	33.16	96.96
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	5.10	5-50	28.05	107.84
Crocuta variabilis (Zdansky) from China. Specimen g. Zdansky, 1924.	5.10	5.70	29.07	111.76
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	4.60	6.10	28.06	132.60
Crocuta variabilis (Zdansky) from China. Specimen 11. Zdansky, 1924.	6.00	6.10	36.60	101.66
Crocuta variabilis (Zdansky) , from China. Specimen 13. Zdansky, 1924.	5.80	6.20	35.96	106.89
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	5.00	5.50	27.50	110.00
Crocuta variabilis (Zdansky) Average.	5.26	5-85	30.87	111.79
Crocuta honanensis (Zdansky) from China. Zdansky), 1924.	6.26	6.90	42.78	111-29
Lyeyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862.	6.00	—	—	—

TABLE 10

Measurements of the Second Lower Permanent Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	16.OO	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	16.00	I2.00	192.00	75.00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8970. Pilgrim, 1931.	15.00	11.00	165.OO	73.33
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8971. Pilgrim, 1931.	17.OO	12.50	212.50	73.52
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8972. Pilgrim, 1931.	17.00	—	—	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	13.00	—	—	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4163. Pilgrim, 1931.	15.00	9.50	142.50	63.33
Crocuta eximia (Roth and Wagner) from Samos. No. M4164. Pilgrim, 1931.	15.00	9.50	142.50	63.33
Crocuta eximia. (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	17-50	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	17.00	—	—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla.	17.70	II . 10	196.47	62.71
Crocuta eximia (Roth and Wagner) from Maragha. KittI, 1887.	16.00	—	—	—
Crocuta eximia (Roth and Wagner). Average.	16.01	10.93	175.16	68.53
Crocuta variabilis (Zdansky) from china. Specimen 1. Zdansky, 1924.	16.00	11.90	190.40	74.37
Crocuta variabilis (Zdansky) from China. Specimen 5. Zdansky, 1924.	—	12.60?	—	—
Crocuta variabilis (Zdansky) from China. Specimen 6. Zdansky, 1924.	16.20	12.20	197.64	75.30

TABLE 10 (Continued)

Measurements of the Second Lower Permanent Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Lengıh	Maximum Brcadth	Robustness Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen 8, Zdansky, 1924.	15.40	IO.70	164.78	69.48
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	17.90	12. 10	216.59	67.59
Crocuta variabilis (Zdansky) from China. Specimen 10 Zdansky, 1924.	16.80	12 .40	208.32	73.80
Crocuta variabilis (Zdansky) from China. Specimen 11. Zdansky, 1924.	17.OO	IO.70	181 .90	62.94
Crocuta variabilis (Zdansky) from China. Specimen 12. Zdansky, 1924.	16.10	II.80	189.98	73.29
Crocuta variabilis (Zdansky) from China. Specimen 13. Zdansky, 1924.	16.50	11.80	194.70	71.51
Crocuta variabilis (Zdansky) from China. Specimen 14. Zdansky, 1924.	16.80	12.30	206.64	73.21
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	17.30	13.40?	231.82	77-45
Crocuta variabilis (Zdansky) from China. Specimen 16. Zdansky, 1924.	15.60	10.50	163.80	67.30
Crocuta variabilis (Zdansky) from China. Specimen 17. Zdansky, 1924.	14.80	10.50	155.40	70.94
Crocuta variabilis (Zdansky). Average.	16.36	11.76	191.83	71-43
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	16.60	II .20?	185.92	67.46
Crocuta honanensis (Hyaena sp. Schlosser, 1903) from China. Schlosser, 1903.	16.50	11 .00	181.50	66.66
Crocuta honanensis (Zdansky). Average.	16-55	II . 10	183.71	67.06
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	24.00	17.50	42O.OO	72.91
Lycyaena chaeretis (Gaudry) from Vienna basin [A]. Zapfe, 1948.	15.00	**8.00**	120.00	53.33
Lycyaena chaeretis (Gaudry) from Vienna basin [B]. Zaofe, 1948,	15.00	—	—	—
Lycyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862.	16.00	—	—	—
Lycyaena chaeretis (Gaudry) from Pikermi. No. M8979. Pilgrim, 1931.	15.40	7.10	109.34	**46.10**
Lycyaena chaeretis (Gaudry) from Samos. Lausanne Museum, N0.273. Pilgrim, 1931.	15.10	7.70	116.27	50.99
Lycyaena chaeretis (Gaudry). Average.	15.30	7.60	111.87	**50.14**

TABLE II

Measurements of the Third Permanent Lower Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess],	17.90	I3.4O	239.86	74.86
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	19.00	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim 1931.	20.00	I4.00	280.OO	70.00
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8g70. Pilgrim, 1931.	19.00	I4.00	266.OO	73.68
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8971. Pilgrim, 1931.	22.OO	I4.OO	308.OO	63.63
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	19.00	—	-	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4163. Pilgrim, 1931.	18.00	I2.50	225.OO	69.44
Crocuta eximia (Roth and Wagner) from Samos. No. M4164. Pilgrim, 1931.	18.00	12.00	216.00	66.66
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	2 I .00	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko],	21 .00	—	—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla.	20.70	14.10	291.87	68.11
Crocuta eximia (Roth and Wagner) from Maragha. Kittl, 1887.	20.00	—	—	—
Crocuta eximia (Roth and Wagner). Average.	19-63	13.42	260.97	69.48
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	18.90	13.70	258-93	72.48
Crocuta variabilis (Zdansky) from China. Specimen 5. Zdansky, 1924.	18.90	14.60	275-94	77.24
Crocuta variabilis (Zdansky) from China. Specimen 6. Zdansky, 1924.	20. 10	14.00	281.40	69-65
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	I9.4O	13.60	263.84	70.10
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	2I.50	15.60	335.40	72.55

TABLE II (Continued)

Measurements of the Third Permanent Lower Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen II. Zdansky, 1924.	19.60	12.90	252.84	65.81
Crocuta variabilis (Zdansky) from China. Specimen 12. Zdansky, 1924.	19-50	14.10	274.95	72.30
Crocuta variabilis (Zdansky) from China. Specimen 13. Zdansky, 1924.	19.00	14.70	279.30	77-36
Crocuta variabilis (Zdansky) from China. Specimen 14. Zdansky, 1924.	20.00	15.10	302.00	75-50
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	20 .50	I5.20	311.60	74.14
Crocuta variabilis (Zdansky) from China. Specimen 17. Zdansky, 1924.	18.5O	13.20	244.20	71-35
Crocuta variabilis (Zdansky) from China. Specimen 24. Zdansky, 1924.	2O.4O	13.70	279.48	67-I5
Crocuta variabilis (Zdansky). Average.	I9.69	14.20	279.99	72.13
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	19.70	13.80	269.86	70.05
Crocuta honanensis (Hyaena sp. Schlosser, 1903) from China. Schlosser. 1903.	20.OO	I3.00	260.00	65.00
Crocuta honanensis (Zdansky). Average.	19.85	I3.4O	264.93	67.52
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	28.OO	19.00	532.00	67.85
Lycyaena chaeretis (Gaudry) from Vienna Basin [A]. Zapfe, 1948.	18.5O	10.00	185.00	54.05
Lycyaena chaeretis (Gaudry) from Vienna Basin [B]. Zapfe, 1948.	18.5O	IO.5O	194.25	56.75
Lycyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862.	20.00	—	—	—
Lycyaena chaeretis (Gaudry) from Pikermi. No. M8979. Pilgrim, 1931.	18.10	9.50	171.95	52.48
Lycyaena chaeretis (Gaudry) from Samos. Lausanne Museum, N0.273. Pilgrim, 1931.	17.20	9.60	165.12	55.81
Lycyaena chaeretis (Gaudry). Average.	18.46	9.90	179.08	54.77

TABLE 12

Measurements of the Fourth Permanent Lower Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maxîmum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	20.3O?	13.40	272.02	66.00
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862.	21 .00	—	—	—
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673. Pilgrim, 1931.	22.00	I4.00	308.OO	63.63
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8970. Pilgrim, 1931.	21 .00	I3.OO	273.00	61.90
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8971. Pilgrim, 1931.	24.00	13.00	312.00	54.16
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8972. Pilgrim, 1931.	23.00	—	—	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4162. Pilgrim, 1931.	21 .00	—	—	—
Crocuta eximia (Roth and Wagner) from Samos. No. M4163. Pilgrim, 1931.	22.00	12.50	275.OO	56.81
Crocuta eximia .(Roth and Wagner) from Samos. No. M4164. Pilgrim, 1931.	22.00	12.00	264.00	54.54
*Crocuta eximia (*Roth and Wagner) from Taraklia. Zdansky. 1924 [after Khomenko].	23.50	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	23-50	—	—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla.	24.OO	13.80	331.20	57.50
Crocuta eximia (Roth and Wagner) from Maragha. Kittl, 1887.	23.OO		—	—
Crocuta eximia (Roth and Wagner). Average.	22-33	13.10	290.74	59.22
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	21.50	14.20	305-30	66.04
Crocuta variabilis (Zdansky) from China. Specimen 5. Zdansky, 1924.	21.30	13.60	289.68	63.84
Crocuta variabilis (Zdansky) from China. Specimen 6. Zdansky, 1924.	23.IO	I4.00	323-40	60.60
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	21 .80	13.70	298.66	62.84
Crocuta variabilis (Zdansky) from China. Specimen g. Zdansky, 1924,	22.30	15-30	341.19	68.60

TABLE 12 (Continued)

Measurements of the Fourth Permanent Lower Premolar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robusmess Value	Crown Index
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	22.50	I4.OO?	315.00	62.22
Crocuta variabilis (Zdansky) from China. Specimen 11. Zdansky, 1924.	22.50	12. 60	283.50	56.OO
Crocuta variabilis (Zdansky) from China. Specimen 12. Zdansky, 1924..	22.20	13.70	304.14	61 .71
Crocuta variabilis (Zdansky) from China. Specimen 13. Zdansky, 1924.	21 .00	13.60	285.60	64.76
Crocuta variabilis (Zdansky) from China. Specimen 14. Zdansky, 1924.	22.20	14.90	320.78	67.11
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	22.70	14.80	335.96	65.19
Crocuta variabilis (Zdansky) from China. Specimen 16. Zdansky, 1924.	22.20	12.60	279.72	56-75
Crocuta variabilis (Zdansky) from China. Specimen 17. Zdansky, 1924.	21 .80	12.80	279.04	58.71
Crocuta variabilis (Zdansky) from China. Specimen 24. Zdansky, 1924.	23.IO	13-50	311.85	58.44
Crocuta variabilis (Zdansky). Average.	22.15	13.80	305-27	62.34
Crocuta honanensis (Zdansky) from China. Zdansky, 1924.	23.20	—	—	—
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	34.OO	19.00	646.00	55.88
Lycyaena chaeretis (Gaudry) from Vienna Basin[A].Zapfe, 1948.	20.00	11 .00	220.00	55.00
Lycyaena chaeretis (Gaudry) from Vienna Basin [B]. Zapfe, 1948.	19.50	11.50	224.25	58.97
Lycyaena chaeretis (Gaudry) from Pikrmi. Gaudry, 1862.	22.00	11.60	242.00	50.00
Lycyaena chaeretis (Gaudry) from Pikermi. No. M8979. Pilgrim, 1931.	21 .80	10.10	220.18	46.33
Lycyaena chaeretis (Gaudry) from Samos. Lausanne Museum, No. 273. Pilgrim, 1931	20.20	10.40	210.08	51.48
Lycyaena chaeretis (Gaudry). Average.	20.70	10.80	223.30	52.35
Lycyaena parva Khomenko. Pilgrim, 1931 [after Alexejew].	18.60	9.70	180.42	52.15

TABLE 13

Measurements of the First Permanent Lower Molar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	Crown Index
Crocuta eximia (Roth and Wagner) from Mont Leberon. Gaudry, 1873.	26.00	—	—	—
Crocuta eximia (Roth and Wagner) from Baltavâr. Zdansky, 1924 [after Suess].	28.60	13.50	386.10	47.20
Crocuta eximia (Roth and Wagner) from Pikermi. Gaudry, 1862 and 1873.	28.00	—	—	
Crocuta eximia (Roth and Wagner) from Pikermi. No. 49673.. Pilgrim, 1931.	27.00	13.00	351.00	44.07
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8970. Pilgrim, 1931.	28.00	12.50	350.00	44.64
Crocuta eximia (Roth and Wagner) from Pikermi. No. M8973. Pilgrim, 1931.	26.00	12.00	312.00	46.15
Crocuta eximia (Roth and Wagner) from Samos. No. M4166. Pilgrim, 1931.	17.00	11.50	195.00	67.64
Crocuta eximia (Roth and Wagner) from Taraklia. Zdansky, 1924 [after Khomenko].	29.00	—	—	—
Crocuta eximia (Roth and Wagner) from Taraklia. Zdznsky, 1924 [after Khomenko].	29.50	—	—	—
Crocuta eximia (Roth and Wagner) from Kuyutarla.	—	13.40	—	—
Crocuta eximia (Roth and Wagner). Average.	26.56	12.65	318.82	49.94
Crocuta variabilis (Zdansky) from China. Specimen 1. Zdansky, 1924.	26.80	13.40	359.12	50.00
Crocuta variabilis (Zdansky) from China. Specimen 5. Zdansky, 1924.	—	12.90?	—	—
Crocuta variabilis (Zdansky) from China. Specimen 6. Zdansky, 1924.	—	13.00?	—	—
Crocuta variabilis (Zdansky) from China. Specimen 7. Zdansky, 1924.	27.70	13.70?	379.49	49.45
Crocuta variabilis (Zdansky) from China. Specimen 8. Zdansky, 1924.	27.50	12.90	354.75	46.90

TABLE 13 (Continued)

Measurements of the First Permanent Lower Molar in the Pontian Species of the Genera *Crocuta* and *Lycyaena*

	Maximum Length	Maximum Breadth	Robustness Value	**Crown Index**
Crocuta variabilis (Zdansky) from China. Specimen 9. Zdansky, 1924.	28.40	—		—
Crocuta variabilis (Zdansky) from China. Specimen 10. Zdansky, 1924.	28.20	13.80	389.16	48.93
Crocuta variabilis (Zdansky) from China. Specimen II. Zdansky, 1924.	26.70	12.60	336.42	47.19
Crocuta variabilis (Zdansky) from China. Specimen 12. Zdansky, 1924.	26.00	13.10	340.60	50.38
Crocuta variabilis (Zdansky) from China. Specimen 13. Zdansky, 1924.	28.30	12.70	359.41	44 87
Crocuta variabilis (Zdansky) from China. Specimen 15. Zdansky, 1924.	28.20	13.40	377.88	47.51
Crocuta variabilis (Zdansky) from China. Specimen 16. Zdansky, 1924.	27.60	12.40	342.24	44-92
Crocuta variabilis (Zdansky) from China. Specimen 17. Zdansky, 1924.	26.90?	—	—	—
Crocuta variabilis (Zdansky) Average.	27.30	13.08	359.89	47.79
Crocuta honanensis (Zdansky) from China. Zdansky 1924.	30.00?	—	—	—
Crocuta honanensis (Hyaena sp. Schlosser, 1903). Schlosser, 1903.	30.00	12.00	360.00	46.00
Crocuta gigantea (Schlosser) from China. Schlosser, 1903.	37.50	17.50	656.25	46.66
Lycyaena chaeretis (Gaudry) from Vienna Basin [A], Zapfe, 1948.	23.00	10.00	230.00	43-47
Lycyaena chaeretis (Gaudry) from Pikermi. Gaudry, 1862,	24.00	—	—	—
Lycyaena chaeretis (Gaudry) from Pikermi. No. M8979. Pilgrim, 1931.	21.60	10.00	216.00	**46.29**
Lycyaena chaeretis (Gaudry) from Samos. Lausanne Museum, No. 273. Pilgrim, 1931.	21.80	9-70	211.46	**44.49**
Lycyaena chaeretis (Gaudry). Average.	22.60	9.90	219-15	**44-75**
Lycyaena parva Khomenko. Pilgrim, 1931 [after Alexejew].	23.30	9.60	223.68	41.20