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Plesiogulo crassa from the Upper Miocene (Lower Turolian) of Northern Greece

George D. Koufos

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Part of the mandible of the wolverine *Plesiogulo crassa* from the Lower Turolian continental deposits of the lower Axios valley (Thessaloniki, Greece) is described. *Plesiogulo* is well known from China, India and Central Europe but is now identified with certainty for the first time from southern Europe. It was previously possibly known from some isolated teeth from Spain and some pieces of bone from Pikermi. *Plesiogulo crassa* is a medium to large member of the *Plesiogulo* family, with a protrusion from the cingulum at the posterior end of P_3 and P_4, a large talonid, and a metaconid on M_1. It lived in Eurasia during the Turolian—Ruscinian.

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1. Introduction

The genus *Plesiogulo* is well known from China, from where Zdansky (1924) first studied some skulls and mandibles. He placed them all under the name *Plesiogulo brachygnathus,* regarding *"Lutra" brachygnathus* of Schlosser (1903) as the type specimen. Later this material and other new finds from China were divided into three forms, because of an observed variability in some morphological characters and dimensions, regarded as polymorphism (Teilhard 1945). These three forms are: a) *Plesiogulo brachygnathus* forma *minor* (Teilhard 1945; fig. 8,10C), b) *Plesiogulo brachygnathus* forma *crassa* (Teilhard 1945; fig. 9, 10B) and c) *Plesiogulo brachygnathus* forma *major* (Teilhard 1945; fig. 10C). A further specimen from the Dhok Pathan zone (Siwalik) is referred to by Lewis (1934) as *Plesiogulo brachygnathus.* Orlov (1941) described some specimens from Pavlodar (Siberia) and identified these as *P. brachygnathus.* A new species, *P. monspessulanus,* from Montpellier (France) was described by Viret (1939). Recently, all the known material of *Plesiogulo* was reviewed again and divided into six species (Kurtén 1970). Some other specimens (isolated teeth, pieces of bone) are known from Hungary (Kadic-Kretzoi 1930), Spain (Alberdi 1974), Greece (Symeonidis 1974) and Turkey (Schmidt-Kittler 1976).

The specimen of *Plesiogulo* studied here was found in the Neogene continental deposits of the lower Axios valley (Fig. 1) in 1972 and it is described as *Plesiogulo* cf. *brachygnathus* in a preliminary report about the excavations in the valley (Bonis et al. 1973). This specimen is now identified as *Plesiogulo crassa,* which is previously known from Asia and now for the first time from southern Europe. The find also confirms the presence of the genus *Plesiogulo* in Southern Europe; the genus was previously known only from some uncertain material.

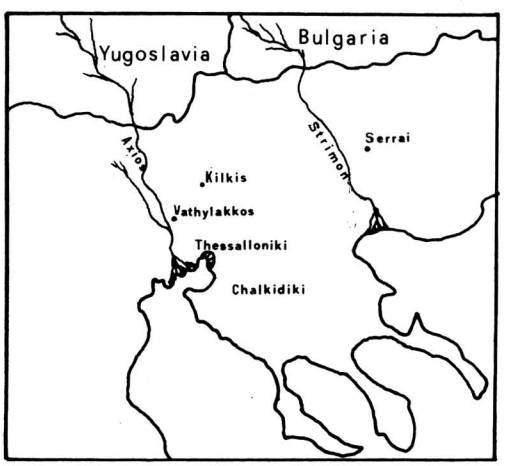

Fig. 1. Sketch map showing the geographical position of the locality.

2. Locality

The specimen was found in a locality denoted VAT or Vathylakkos-3 (Koufos 1980), which is possibly the same as the locality 'Ravin du Vatilük' mentioned by Arambourg-Piveteau (1929). The locality belongs to a group of three (Vathylakkos-1, 2, 3 or VLO, VTK, VAT) which are on the eastern bank of the Axios river, near the village of Vathylakkos (Fig. 1).

The Upper Miocene continental deposits of the lower Axios valley consist of the following series, listed in ascending order (Koufos 1980):

— the Nea Mesimvria series, consisting of red-beds and yellow marls dating from the Upper Vallesian — Lower Turolian.
— the Vathylakkos series, consisting of Lower Turolian sands, gravels, white-yellow marls and sandy marls.
— the Dytiko series (in the western bank of the Axios river), consisting of Upper Turolian sands, gravels, yellow sandy marls and limestones.

VAT belongs to the second series and consists of the following beds in ascending order:

— conglomerate in the basin of the ravine.
— sand and gravels.
— sandy marl (fossiliferous).
— brown sand and gravels.
— soil.

The age of the locality is Lower Turolian as indicated by the species *Ictitherium hipparionum*, *Hipparion dietrichi* and *Dorcatherium puyhauberti*. The Vathylakkos deposits are considered older than those of Pikermi, because of the presence of *Dorcatherium* and the more primitive *Oiceros* and *Prostrepliceros* (Bonis et al. 1977).

3. Description

The examined specimen (VAT-107) (Fig. 2) is a well-preserved part of the right mandibular ramus with the teeth P_3—M_1 (in situ). The mandible is high, being 30 mm at the anterior end of P_3 and 31 mm at the posterior end of M_1. The length of the series P_3—M_1 is 48.0 mm at the alveolar level.

P_3: small without anterior cusp. At the posterior end of the tooth there is a protrusion of the cingulum, similar to a small talonid.

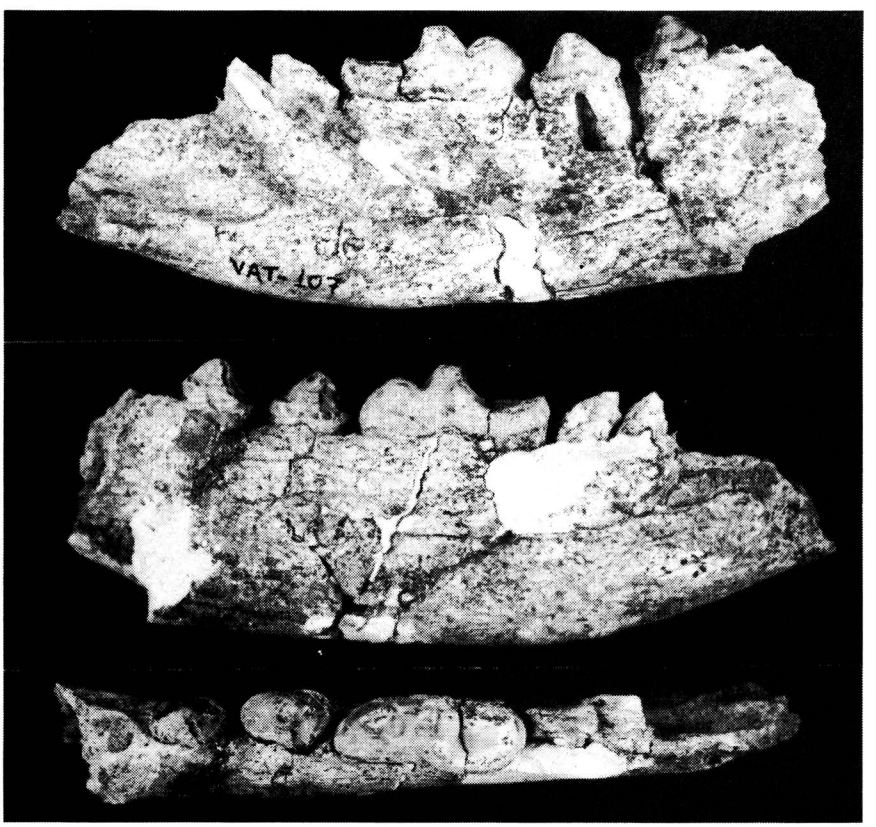

Fig. 2. *Plesiogulo crassa* Teilhard, VAT-107, right mandible, Vathylakkos, Thessaloniki, Greece. From top to bottom: external, internal and occlusal view; natural size.

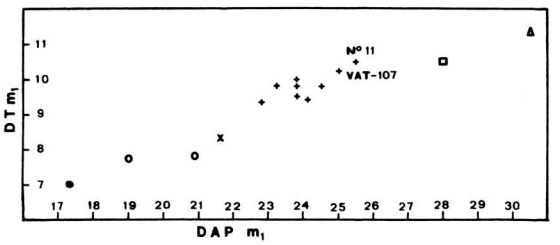

Fig. 3. DAP M_1 plotted against DT M_1 in the different species of *Plesiogulo*. • *P. brachygnathus*, x *P. praecocidens*, + *P. crassa*, o *P.* cf. *crassa* □ *P. monspessulanus*, Δ *P. major*.

P_4: similar to P_3 but is larger and has a greater protrusion at the posterior end.

M_1: bigger than the premolars and double the size of P_4. The protoconid is conical and the highest cusp of the tooth, while the paraconid is elongated and forms a carnassial ridge. A small metaconid is present. The talonid is very well developed. It is elongated, wide and occupies about 1/3 of the tooth's length. The wear on the talonid is rather advanced and its cusps are not clearly visible. Only the hypoconid is distinguishable and may have been well developed. The cingulum is well developed in all the teeth.

4. Discussion

The Vathylakkos *Plesiogulo* has the morphological characters of the species *P. crassa* as it was described by Teilhard (1945) and Kurtén (1970). They noted the following characters: medium to large size, the presence of a protrusion at the posterior end of the premolars ($P_{3,4}$), the presence of a metaconid and a large talonid on M_1. Mandible VAT-107 has dental dimensions similar to those of the known specimens of *P. crassa* (Fig. 3, Tab. 1, 2). There is a difference in the dimensions of M_1; it is longer than in other specimens and has the same dimensions as N° II (Zdansky 1924). The large dimensions of N° II were discussed and it was suggested that it belongs to a population slightly different from the typical "dorcadoides fauna" population of *P. crassa* (Kurtén 1970). The index 100 DT M_1/DAP M_1 for the small specimens is 39.0—42.2 (mean 40.4±1.3), while for N° II it is 41.1 and for VAT-107 40.8. It seems that the relative dimensions are about the same in the smaller and larger populations and there is a difference only in the absolute dimensions of M_1. There is also no clear difference in the size of the other teeth and the morphological characters are the same. Hence this particular size difference in M_1 should not be regarded as a specific difference.

Table 1. Anterio-posterior (DAP) and transverse (DT) diameter of the lower teeth of *Plesiogulo crassa*.

	P_3 DAP	DT	P_4 DAP	DT	M_1 DAP	DT
P. crassa VAT-107	10.4	7.1	12.4	8.4	25.0	10.2
Teilhard 1945: holotype no. 10261	9.9		12.5		23.0	
Zdansky 1924; no:						
1	9.7	6.4	12.6	7.5	24.1	9.4
2			14.0	8.1	24.5	9.8
7	9.5	6.8	12.6	7.8	23.2	9.8
8	10.0	7.0	13.5	8.2	23.8	9.8
9	9.8	6.2	12.3	7.1	22.8	9.3
11	10.7	7.6	13.2	8.2	25.5	10.5
12	9.9	6.8	13.0	7.8	23.8	9.5
Kurtén 1970: YPM-13816	9.2		12.7		23.8	9.9
P. cf. *crassa* Orlov 1941, no:						
2413-9	8.0	5.3	9.8	6.4		7.8
2413-11	8.0	5.3	10.0	6.3	19.0	7.7

A specimen (YPM 13816) from Dhok-Pathan (Siwalik) was referred to as *P. crassa* by Kurtén (1970). Its morphology is similar to that of VAT-107, but as noted by Kurtén (1970), YPM-13816 has a slightly developed anterior cusp in P_3 and P_4 which is lacking in VAT-107. Its dental dimensions are also slightly smaller than those of VAT-107.

The characteristics of the six species of *Plesiogulo* are given in Table 3. The differences between VAT-107 and the large Ruscinian species *P. major*

Table 2. Dimensions of the lower teeth in the different species of *Plesiogulo*.

Species and source	P_2	P_3	P_4	M_1	M_2
P. brachygnathus	—	8.3	9.6	17.3	—
(Zdansky 1924)	—	4.5	5.4	7.0	—
P. minor	7.0	8.3	10.2	19.0	5.9
(Teilhard 1945)	—	—	—	—	—
P. praecocidens	—	9.3	—	21.6	—
(Kurtén 1970)	—	—	—	8.3	—
P. crassa	7.37	9.78	13.03	23.92	7.68
(Kurtén 1970)		±0.19	±0.60	±0.84	±0.67
	5.87	6.64	7.75	9.60	6.55
		±0.33	±0.40	±0.41	±0.48
P. monspessulanus	—	10.0	14.0	28.0	—
(Viret 1939)	—	—	—	10.5	—
P. major	8.9	12.5	14.3	30.5	—
(Teilhard 1945)	—	—	—	11.3	—
Plesiogulo sp. n.	—	—	—	15.5	—
(Schmidt-Kittler 1976)	—	—	—	6.8	—

Table 3. Localities and principal characteristics of the different species of *Plesiogulo*.

Species	Locality	Size	Protocone of P^4	M_1 with metaconid
P. brachygnathus	Uncertain China	Very small	—	Present
P. minor	Kingyang Kansu China	Medium	Small	Present
P. praecocidens	Paoté, Loc. 49 Shansi China	Medium	Small	Absent
P. crassa	Yushé, Sansi China	Medium to large	Large	Present
P. monspessulanus	Montpellier France	Large	—	Absent
P. major	Yushé Shansi China	Large	—	Present

and *P. monspessulanus* are morphological as well as metrical (Table 2). VAT-107 is also different from *P. praecocidens*, which is smaller and has no metaconid on M_1. There are no clear differences between *P. minor* and *P. crassa* in the dental morphology, only in size. This size difference was noted by Kurtén (1970), but he considered the small form representative of a different species. Thus VAT-107 does not belong to *P. minor* because it is rather larger and quite distinct from this species (Fig. 4). *P. brachygnathus* also has the same M_1 morphology as VAT-107, but it is very small. The Siberian *Plesiogulo* (Orlov 1941) has a well-developed metaconid on M_1 and its dimensions are similar to those pf *P. minor*; it must therefore be placed in this species. However, the Siberian material was considered more like *P. crassa* because of the *Gulo*-like molars and the results of an allometry analysis (Kurtén 1970). The studied specimen is quite different in size from the Siberian material. According to its dental morphology and dimensions VAT-107 is closer to *P. crassa*.

There is one M_1, regarded as belonging to a new species, from the Lower Vindobonian locality of Pasalar (Turkey), (Schmidt-Kittler 1976). The dimensions of this specimen (Table 2) are smaller than those of *P. brachygnathus* and perhaps it does belong to a new species of *Plesiogulo*. *Plesiogulo* has also been found in Spain in the Lower Vallesian locality of Can Llobateres, and the species *P. brachygnathus* is known from the (?) Vallesian locality of Los Alejares (Teruel) (Alberdi 1974). These Spanish specimens may be both similar to *P. brachygnathus* and of equivalent age. The age of the type specimen of *P. brachygnathus* is uncertain but it is probably Pontian (Kurtén 1970). *Plesiogulo* is also known from Pikermi (Symeonidis 1974) but unfortunately there are no teeth, only some pieces of humerus, and so no comparison with the other material is possible.

From all the data given above it seems that *Plesiogulo* lived in Eurasia during the Vallesian Ruscinian period and it is possible that

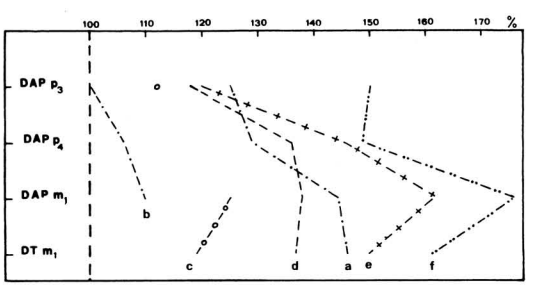

Fig. 4. Ratio diagram comparing the dental dimensions of *Plesiogulo* species. Standard: *P. brachygnathus*, a: VAT-107, b: *P. minor*, c: *P. praecocidens*, d: *P. crassa*, e: *P. monspessulanus*, f: *P. major*.

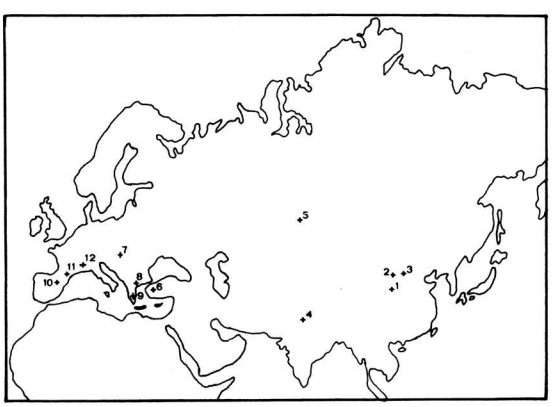

Fig. 5. Sketch map showing the distribution of *Plesiogulo* in Eurasia. 1 Kingyang-Hsien, 2 Yushé, 3 Paoté-Hsien, 4 Siwalik, 5 Pavlodar, 6 Pasalar, 7 Polgardi, 8 Vathylakkos, 9 Pikermi, 10 Terruel, 11 Can Llobateres, 12 Montpellier.

representatives of its early (Vindobonian) stage of evolution lived in Asia (Fig. 5).

The holotype of *P. crassa,* from Yushé (Shansi, China) is considered Turolian—Ruscinian. The other localities with *P. crassa* (Paoté, Shansi; Pavlodar, Siberia; Dhok Pathan, Siwalik) are all of Turolian Age, the last being Turolian—Ruscinian. *Plesiogulo* is a representative of the "dorcadoides fauna", which contains the genera *Chilotherium, Samotherium, Gazella, Hyaena, Ictitherium, Hipparion* etc. (Kurtén 1952). A similar fauna with representatives of these genera has been found in VAT (Arambourg-Piveteau 1929; Bonis et al. 1974; Koufos 1980). The presence of *P. crassa* in the lower Axios valley confirms the presence of the genus in southern Europe and it also shows that the species lived in Eurasia from Lower Turolian to Ruscinian.

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