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Presence of *Pavo bravardi* (Gervais, 1849) (Aves, Phasianidae) in the Ruscinian locality of Megalo Emvolon, Macedonia, Greece

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Боев, З., Г. Куфос – Наличие Pavo bravardi (Gervais, 1849) (Aves, Phasianidae) в русцинском местонахождении Мэгало Эмволон, Македония, Греция. Описывается левой тибиотарсус взрослого экземпляра *Pavo bravardi*. Находка происходит из 7-ого в мире и 2-рого на Балканах местонахождения этого вида. Мэгало Эмволон является новым (четвертым), неизвестным до сих пор третичным местонахождением птиц и дополняет фосильной летописи павлинов в Европе.

Abstract. A left tibiotarsus of an adult individual of *Pavo bravardi* is described. The find comes from the 7th site of this species of the world and the 2nd site on the Balkan Peninsula. Megalo Emvolon is a new (the fourth), unknown till now Tertiary avian locality of Greece and complete the fossil history of peafowl in Europe.

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Key words: Pliocene, Balkan Peninsula, *Pavo bravardi*, fossil birds, peafowls, genus *Pavo*.

Introduction

The locality Megalo Emvolon is situated 20 km southwest to Thessaloniki City (fig. 1). It is referred as "Falaise de Karabouroun" and the first collection includes a poor faunule indicating Pliocene age (Arambourg & Piveteau, 1929). Later on, some specimens have been accidentally collected by various scientists who visited the area. During the last ten years the palaeontological team of the Laboratory of Geology and Palaeontology, University of Thessaloniki led by Prof. G. D. Koufos, made serious efforts to collect more material from Megalo Emvolon. This is the better known Ruscinian locality with large mammals in Greece. The fossils are scarce dispersed here and there. Usually they are isolated or constitute small packs with very few bones. Several times after the finding of some bones in a site we excavated the surrounding area but no more fossils.

The deposits are fluvial and consist mainly of cross-bedded sands, gravels, silts, sand-silts with lenses and lenticular intercalations of sandstones or sands, with calcitic concretions. Three fossiliferous horizons have been recognised. A lower one situated near the bottom of the outcrop and named "Megalo Emvolon 1" (MEV). Twenty meters above there is another horizon situated above a bed with red sands and gravels, named "Megalo Emvolon 2" (MEM). The third horizon is situated ten meters above MEM, near the top of the section and it is named "Megalo Emvolon 3" (MEL) (Koufos et al., 1991). The character of the sediments indicate a very rapid deposition, while the

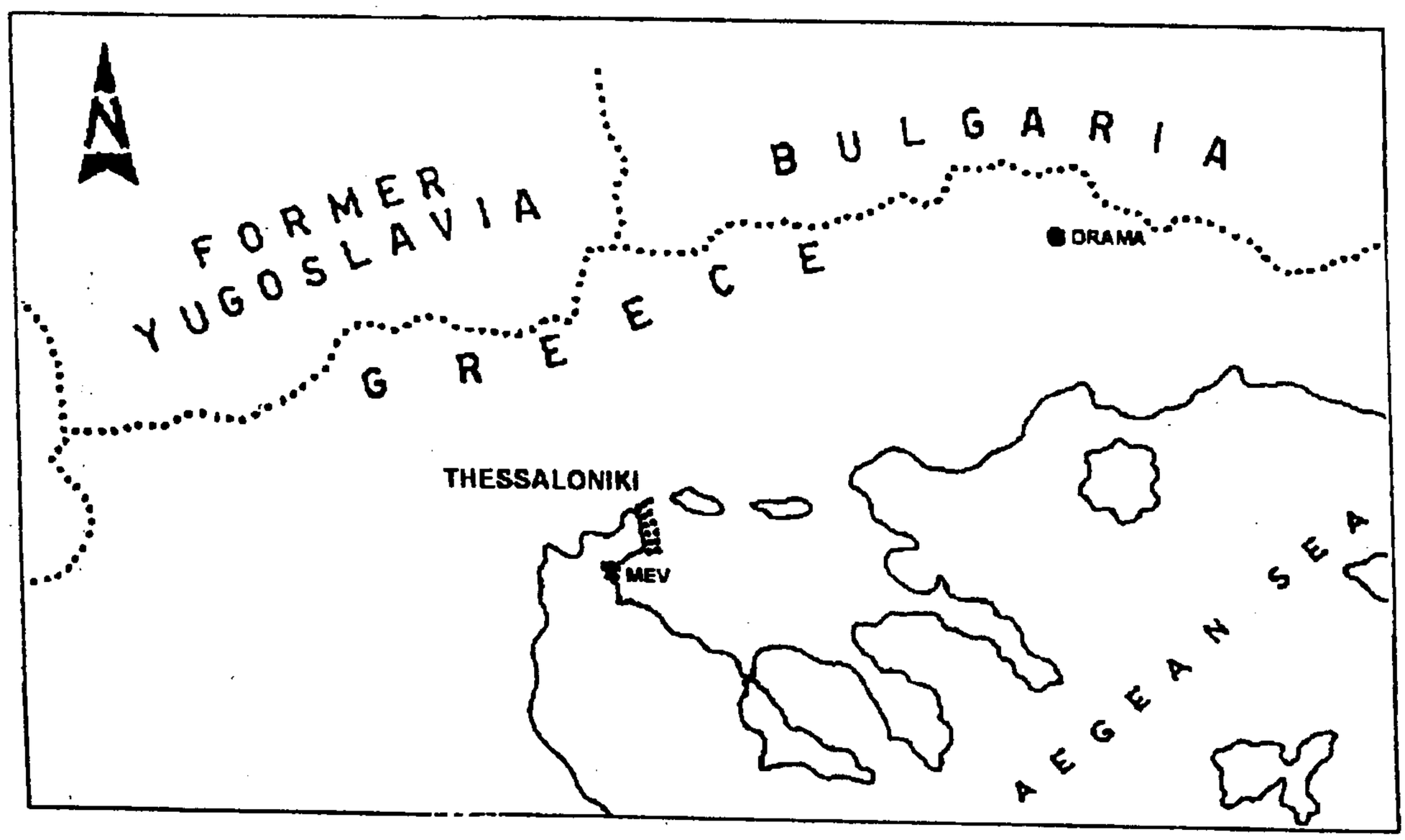


Fig. 1. Location of the site of Megalo Emvolon (MEV)

faunules from the different horizons do not suggest any age difference. For this reason all the material is referred as Megalo Emvolon fauna.

A revised fauna of Megalo Emvolon based on the old and new collection (Arambourg & Piveteau, 1929; Steffens et al., 1979; Bachmayer et al., 1980; de Bruijn, 1984; Koufos et al., 1991; Koufos & Koliadimou, 1993; Kostopoulos, Unpublished Thesis, Thessaloniki, 1996; Bonis & Bouvrain, 1996; Koufos, 1997) includes the following species: *Testudo* cf. *graeca, Testudo* sp., *Oryctolagus odessanus, Trischizolagus dumitrescuae, Trischizolagus* cf. *maritsae, Microspalax odessanus, Dolichopithecus ruscinensis, Nycteretes tingi, Hipparion longipes, Parabos macedoniae, Koufotragus bailloudi, Gazella borbonica, Sus minor.*

The faunal composition, as well as the comparison of the faunal elements with those of Eurasian faunas suggest Ruscinian age and more precisely a dating to the European mammal zone MN 15.

The studied bone of the bird was found near the bottom of the outcrop, in the fossiliferous horizon referred as MEV. In this horizon *Trischizolagus dumitrescuae, Trischizolagus* cf. *maritsae* and *Dolichopithecus ruscinensis* have been found.

Abbreviations

The following abbreviations are used in the paper: LGPUT - the Laboratory of Geology and Palaeontology (Thessaloniki); MHNB - Musee d'Histoire Naturelle (Bale); NHMT - the Natural History Museum (Tring).

Description and comparison

The studied specimen, No LGPUT, MEV-2 (fig. 2) represents a left tibiotarsus of an adult individual. It is damaged and the proximal third of its length is missing. The surface of the bone is also damaged. It is crushed, but the distal epiphysis is well preserved. The find is kept in the LGPUT, University of Thessaloniki and its preserved length is 208 mm.

The studied bone clearly differs from *Otis tarda* Linnaeus, 1758 and all gruids by the shape of canalis extensorius and pons supratendineus, besides the slender diaphyses both, of find No LGPUT, MEV-2 and *Otis tarda*. In cranial view the condylus lateralis is wider, while the epicondylus medialis is better developed than in *Otis tarda*. In *Grus grus* the epicondylus medialis is more projected than in the studied specimen.

Big ciconiiform taxa (chiefly Ciconiidae because of their size similarity) also differ from the Megalo Emvolon specimen by their bigger tuber on the lateral end of pons supratendineus.

The studied specimen has clear features, characteristic for bigger galliforms. Its large and horizontal pons supratendineus and the bigger dimensions (table 1; fig. 3) indicate genus *Pavo* (fig. 4). Meleagrididae (*Meleagris gallopavo* Linnaeus, 1758 is compared) differs by the more massive

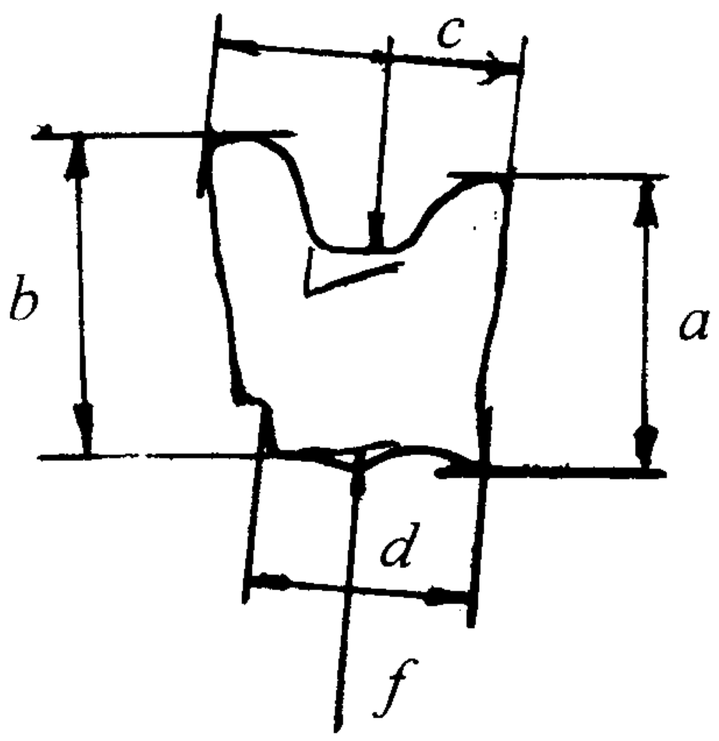
[1] Kostopoulos, D. 1966. The Pilo-Pleistocene artiodactyls of Macedonia (N. Greece). Systematics, palaeoecology, biochronology, biostratigraphy. Ph D. thesis, Univ. Thessaloniki; 612 p.

Fig. 2. *Pavo bravardi* LGPUT, MEV-2 - tibiotarsus sin. ad. (left to right): cranial and ventral views, caudal view, medial view and lateral view (Photograph: Boris Andreev)

distal epiphysis and more elliptical lateral profile of condylus lateralis.

In comparison with *Pavo muticus* Linnaeus, 1766 the Megalo Emvolon specimen has narrower condylus lateralis in its proximal part and in cranial view. The whole distal "epiphysal" part of the diaphysis is more straight and more robust while in *Pavo muticus* it is directed more laterally. The incisura intercondylaris is considerably wider and the condylus lateralis is narrower. Sulcus extensorius in cranial view has more axial, but not lateral, orientation on the cranial surface of diaphysis.

In comparison with *Pavo cristatus* Linnaeus, 1758 the distal "epiphysal" part of the diaphysis is less directed laterally. It seems that crista fibularis



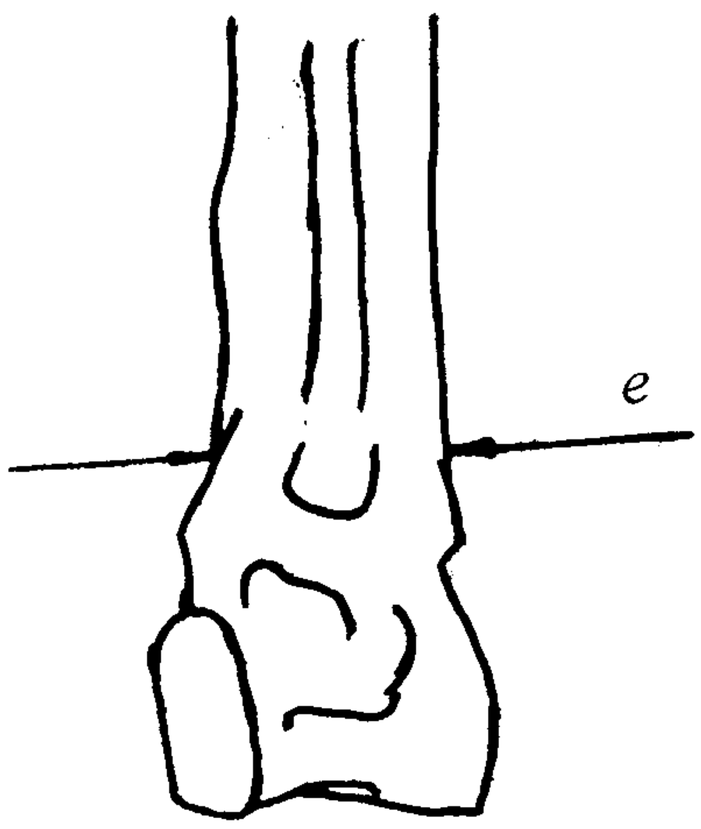


Fig. 3. Manner of measurements of the tibiotarsus in large phasianids: a - diameter of condylus lateralis; b - diameter of condylus medialis; c - cranial width of distal epiphysis; d - caudal width of distal epiphysis; e - distal width of diaphysis; f - intercondylar width of distal epiphysis; g - total length of tibiotarsus ref. to tabl. 1

commences more proximally - its distal end is more proximally situated than in *Pavo cristatus*.

Argusianus argus Linnaeus, 1766 is rather smaller than the studied specimen. The proximal edge of pons supratendineus is sharpened and directed proximally in its lateral part. In the compared fossil bone it is almost parallel to the axis of the trochlea of distal epiphysis.

In this way, the comparison suggests a big species of genus *Pavo*. It was bigger than the biggest recent individuals of *Pavo cristatus*. *Pavo cristatus* is bigger than *Pavo muticus*. An almost complete tibiotarsus of *Pavo bravardi* is known from Senéze (Mourer-Chauviré, 1990). As it is seen from planche 1 and table 1 (p. 82) of this paper the Megalo Emvolon tibiotarsus clearly exceeds in size both recent species of peafowls. Even more, it exceeds also the tibiotarsus of Senéze (No MHNB Se 1553) (Mourer-Chauviré, 1990). Concerning the size of *P. bravardi* it is distinctly larger than any living species (Bochenski & Kurochkin 1987). We refer the Megalo Emvolon specimen to *Pavo bravardi* Gervais, 1849, having in mind its evident morphological and dimensional similarity to *Pavo* and especially to the Senéze tibiotarsus, No MHNB Se 1553 (Mourer-Chauviré, 1990; Pl. 1, Figs 8-9).

P. bravardi has been established in six localities (fig. 5): 1) Sérrat-d'en-Vacquer MN 15; 2) Arde'; MN 16; 3) Saint-Vallier MN 17; 4) Senéze MN 17 (1-4 from France; Mourer-Chauviré, 1990; 1993; 1996), 5) Lucheshti MN 16 (SW Moldova; Bochenski, Kurochkin, 1987; Mlikovsky, 1996a) and 6) Muselievo MN 15 (N Bulgaria; Boev, 1996; in press).

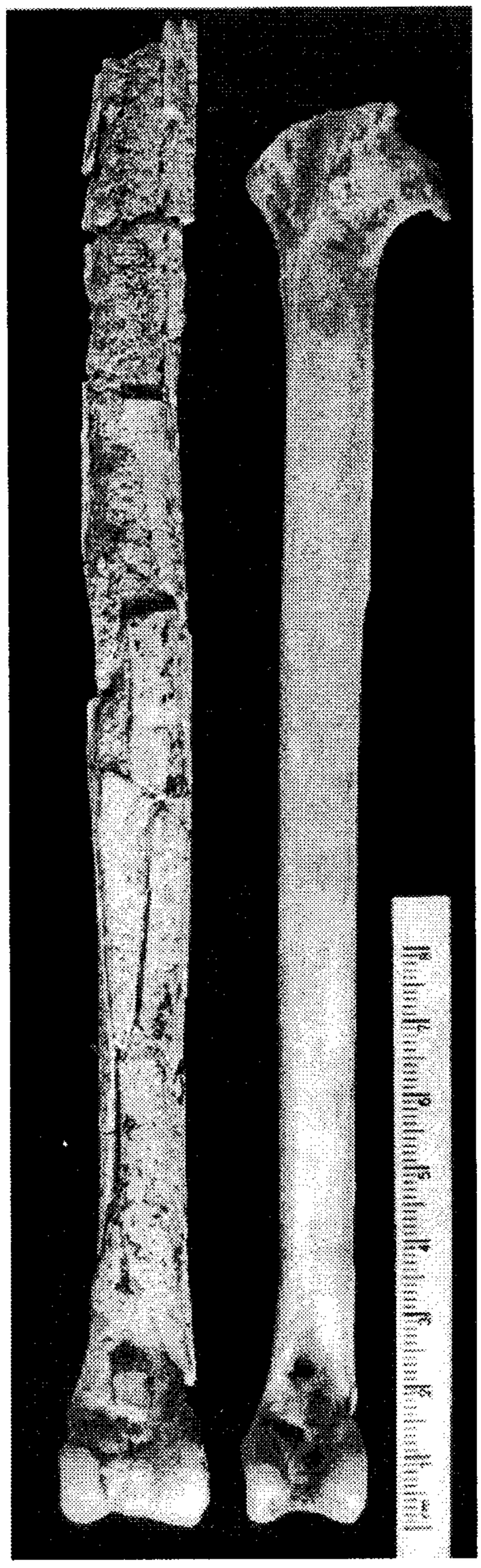


Fig. 4. Cranial view of distal tibiotarsus in *Pavo bravardi* LGPUT, MEV-2 (left) and *Pavo cristatus* NMNHS 2/1990 (right)

Table 1
Measurements (in mm) of fossil and recent Pavo (ref. to Fig. 3)

Species	a	b	c	d	e	f	g
Fossil							
Megalo Emvolon - Greece *Pavo bravardi*							
LGPUT, MEV-2	19,5	20,6	21,3	18,5	15,6	15,1	208*
Senéze - France *Pavo bravardi* MHNB Se 1553**	19,0	-	20,0	-	-	-	ca.194
Recent							
Pavo muticus NHMT 1390 a 1847.12.11.13	16,5	18,0	18,6	15,4	10,7	10,3	191
Pavo muticus NHMT 1390 b 1869.10.19.26	14,6	15,3	15,0	11,3	9,7	9,6	152
Pavo muticus NHMT 1952.2.34	16,2	18,0	17,7	14,3	12,6	10,6	200
Pavo muticus NHMT 1065 a 1850.8.15.18	-	-	-	ca. 13,0	-	-	ca. 170
Pavo muticus **	16,0-20,0 (8)		16,6-20,5 (8)				179-232 (8)
Pavo cristatus NHMT 1952.2.132	17,1	18,2	18,2	14,5	18,2	11,0	185
Pavo cristatus NHMT 1952.2.131	17,0	18,0	18,0	15,3	12,7	10,9	207
Pavo cristatus NHMT 1973.66.68	13,8	15,6	14,8	12,2	10,3	10,2	174
Pavo cristatus NHMT 1987.14.1	15,5	16,8	15,7	13,7	15,0	10,0	175
Pavo cristatus NHMT 1859.9.6.421	17,7	18,6	17,0	15,0	12,4	11,1	192
Pavo cristatus **	15,4-19,1 (7)		14,8-20,2 (7)				161-198 (7)
Argusianus argus NHMT 1850.11.22.75	13,6	14,4	13,4	11,2	8,9	9,6	147
Otis tarda NHMT 1898.6.3.1	20,8	24,7	21,5	20,2	16,7	15,1	224
Grus grus NHMT 1952.2.58.	19,3	19,7	18,8	19,5	12,8	10,4	ca. 286
Ciconia ciconia NHMT 1952.3.132	20,6	20,9	17,5	14,6	12,4	13,2	293
Meleagris gallopavo NHMT 1952.2.408	21,0	21,9	22,6	18,7	15,4	14,5	218

* Measurement of the fragment.
** Measured by Mourer-Chauvire' (1990).

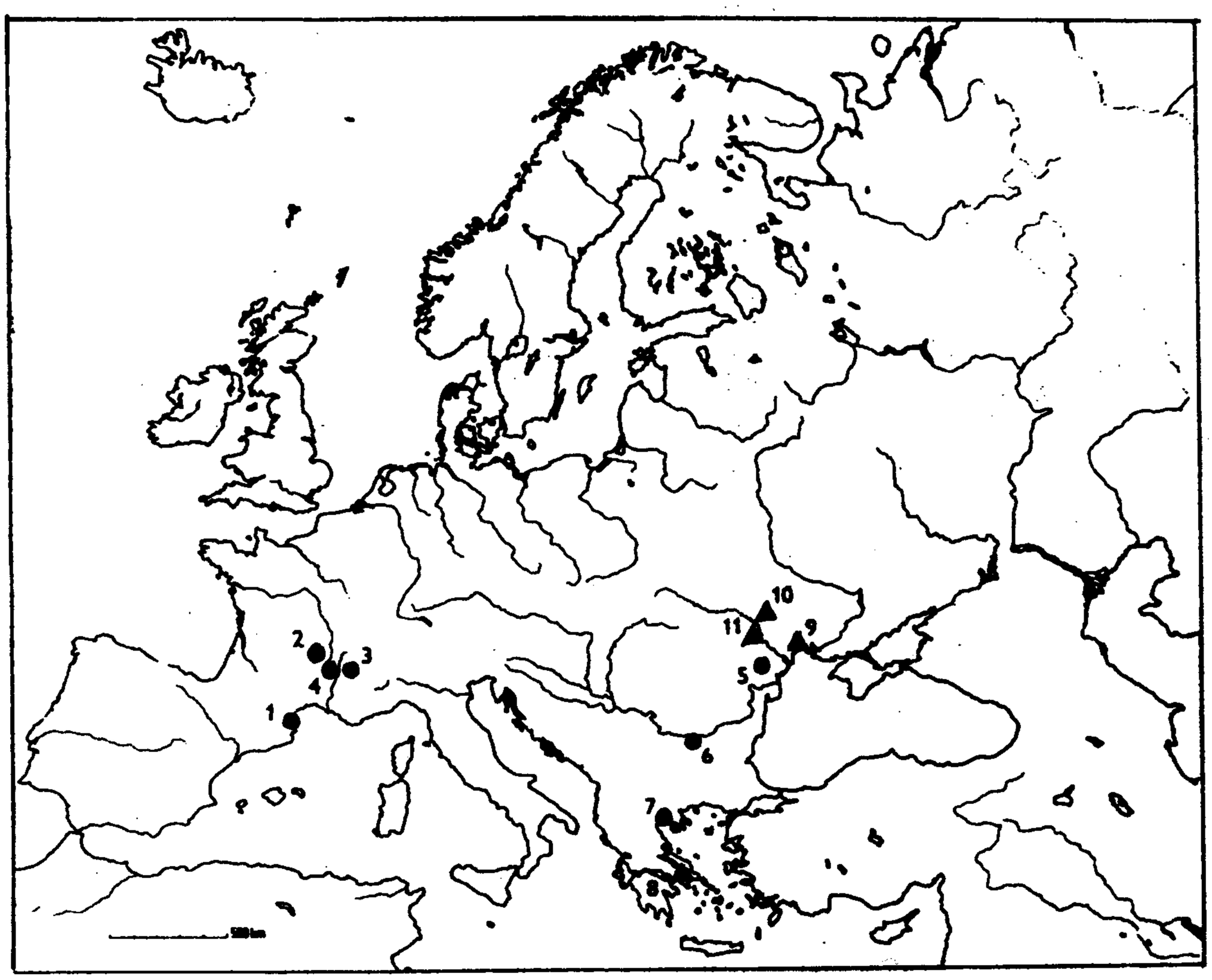


Fig. 5. Geographical distribution of g. *Pavo* in Europe: *Pavo bravardi*: 1 - Serrat-d'en-Vacquer; 2 - Arde'; 3 - Saint-Vallier; 4 - Senéze (France); 5 - Lucheshti (Moldova); 6 - Muselievo (Bulgaria); 7 - Megalo Emvolon (Greece); *Pavo aesculapi*: 8 - Pikermi (Greece); 9 - Odessa; 10 - Novoelisavetovka (Ukraine); 11 - Kolkotova Balka (Moldova) (Drawing: Vera Hristova)

The other, smaller species of peafowl, *Pavo aesculapi* (Gaudry, 1862), is known from 5 sites: 1) Pikermi (S Greece) MN 12-13 (Janossy, 1991; Mlikovsky, 1996 b), 2) Kolkotova Balka MN 9-10 (SE Moldova; Janossy, 1991; Mlikovsky, 1996 a), 3) Odessa catacombs MN 15 (SW Ukraine; Janossy, 1991; Mlikovsky, 1996) and 4) Novoelisavetovka MN 11(SW Ukraine; Janossy, 1991; Mlikovsky, 1996 c) and 5) Polgardi MN 13 (W Hungary; Janossy, 1991; Mlikovsky, 1996 d).

Conclusions

The establishment of the find of *Pavo bravardi* in Megalo Emvolon represents the seventh site of this species up to now. It is the second site in the Balkan Peninsula (see Boev, in press) and the eleventh site of fossil peafowls (g. *Pavo*) in Europe (fig. 5). Thus, the genus *Pavo* in the Plio-Pleistocene has a quite good distribution in Southwestern Europe. The stratigraphical range of the Bravard's peafowl (MN zones 14-18) defined by Mourer-Chauviré, 1989; 1990; 1993) is also confirmed. Megalo Emvolon is a new (the fourth), unknown till now (Mlikovsky, 1996 b), Tertiary avian locality of Greece.

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