

Fossil birds of Dorkovo - an Early Pliocene site in the Rhodope Mts. (Southern Bulgaria)

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Боев, З. Н. - Ископаемые птицы Дорково из раннеплиоценового местонахождения в Родопях (Южная Болгария). Описываются находки птиц из первого комплексно исследованного (1983—1985) в Болгарии палеонтологического местонахождения позвоночной фауны. С раннего плиоцена (русцинского яруса, 5,4 - 3,4 млн. лет) обнаружены 3 дистальных фрагмента длинных костей конечностей. В таксономическом отношении они относятся к 3 семействам отрядов Anseriformes и Galliformes: *Balcanas pliocaenica* g. n. et sp. n. - humerus sin.; *Tetrao rhodopensis* sp. n. - humerus sin. dist. и *Perdicinae* gen. indet. - tibiotarsus sin. dist. Диагноз *Balcanas pliocaenica* g. n. et sp. n.: Средний по размеру анатид из трибы Апатини отличающийся: более узкой и поперечно ориентированной fossa m. brachialis, косо очерченной относительно диафиза медиальной гранью epicondylus ulnaris в вентральном виде, более развитой fossa olecrani и более мелкого и неясного ограничения epicondylus radialis от condylus radialis, чем у *Anas* и *Aix*, более латерально расположенной и яснее маркированной fossula ligamenti articulationis на epicondylus radialis. Диагноз *Tetrao rhodopensis* sp. n.: Древнейший тетраонид из линии глухаров (рода *Tetrao*), отличающийся от остальных видов дистальной сплюснутостью и более лонгитудинально ориентированным (параллельно диафизиса) condylus dorsalis.

Abstract. The avian finds of the first in Bulgaria complexly studied (1983-1985) palaeontological site of vertebrate fauna are described. Three finds (distal endings of long bones of the legs) originated from the Early Pliocene (Ruscinian, MN zone 14, 5.4 - 3.4 Ma). Taxonomically, they are referred to 3 families of Anseriformes and Galliformes: *Balcanas pliocaenica* g. n. et sp. n. - humerus sin.; *Tetrao rhodopensis* sp. n. - humerus sin. dist. and *Perdicinae* gen. indet. - tibiotarsus sin. dist. Diagnosis of *Balcanas pliocaenica* g. n. et sp. n.: A medium sized anatid of Anatini tribe with narrower and more transversally orientated fossa m. brachialis, obliquely outlined toward diaphysis medial edge of epicondylus ulnaris in ventral view, better developed fossa olecrani and shallower and unclear outlining of epicondylus radialis from condylus radialis, than both, in *Anas* and *Aix*, more laterally located and more clearly marked fossula ligamenti articulationis on the epicondylus radialis. Diagnosis of *Tetrao rhodopensis* sp. n.: The oldest known *Tetrao* species, differing from other species of the genus by its more longitudinal orientation, parallel to the diaphysis, and its distally flatten condylus dorsalis.

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Key words: Tertiary birds; Early Pliocene avifauna; Ruscinian fauna; Bulgaria; new genera and species; Rhodope Mts.; Fossil vertebrates of Balkan Peninsula; paleornithology.

Introduction

In 1983-1985 a joint Bulgarian-French Palaeontological Expedition has been carried out in the vicinity of Dorkovo village (Plovdiv Region, former Pazardzhik District) by the National Museum of Natural History in Sofia and the Museum National d'Histoire naturelle in Paris. The site is located about 1 km South of the village (Fig. 1) in a stony hill at ca. 850 m a.s.l. UTM code: KG 65. The

recovered fossil mammalian fauna dates the site as Ruscinian, i.e. MN zone 14 (Thomas et al., 1986 a, b). Associated fauna: *Natrix* sp., cf. *Rana* sp., *Tetralophodon longirostris*, *Anancus arvernensis*, *Dicrorhinus megarhinus*, *Cervidae* gen. et sp. indet., *Suidae* gen. et sp. indet., *Ursus* sp., *Dolichopithecus* sp., *Mesopithecus* cf. *monspessulanus*, *Petenya* sp., *Mygdalinia* sp., *Dibolia* sp., *Talpa* sp., *Trischizolagus* sp., *Prolagus* cf. *michauxi*, *Occitanomys* sp., *Castillomys* sp., *Prosomys insuliferus*, *Muscardinus*

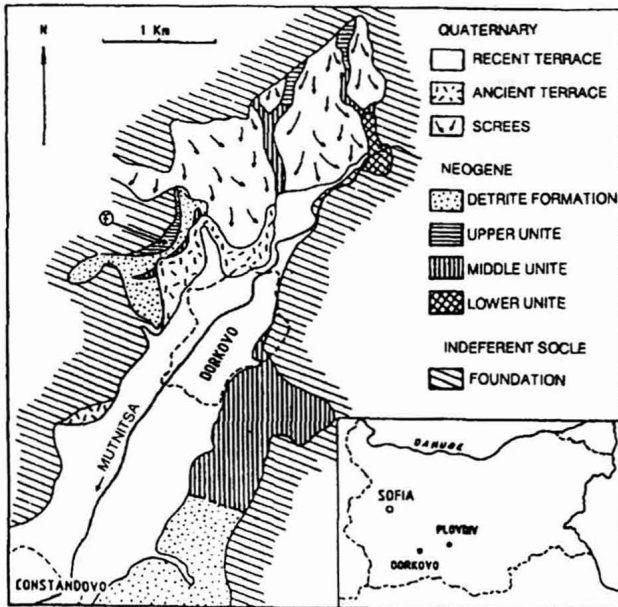


Fig. 1. Geological map and location of the Early Pliocene site near Dorkovo (after Thomas et al., 1986)

sp., Castoridae gen. et sp. indet., Sciuridae gen. et sp. indet. (Thomas et al., 1986 a, b).

Material

Avian fossil material consists of three small bone fragments of the long bones of the legs. The finds belong to 3 species (2 orders) of birds (Boev, 1996). All of them represent small distal endings of the bones. In two cases the diaphyses are not preserved.

Description and comparison of the avian finds

Balcanas g. n.

Type species. *Balcanas pliocaenica*, new species.
Included species. Type species only.

Table 1
Measurements of humerus sin. dist. in fossil and recent Anatini

Species	a	b	c	d	e
<i>Balcanas pliocaenica</i> g.n, sp.n. - NMNHS 484	2.6	11.3	6.7	4.1	6.5
Recent					
<i>Anas platyrhynchos</i> - NMNHS 9/1989	4.2	13.2	9.0	5.9	9.6
<i>Anas platyrhynchos</i> - UCBL 54/6	3.0	13.3	6.7	4.1	6.5
<i>Anas penelope</i> - NMNHS 2/1993	2.9	10.4	7.3	4.5	7.0
<i>Anas strepera</i> - NMNHS 1/1994	2.6	10.7	7.4	4.7	7.0
<i>Anas strepera</i> - UCBL 58/1	3.1	13.2	8.6	5.2	8.0
<i>Anas clypeata</i> - UCBL 61/1	2.5	10.6	7.4	5.1	7.4
<i>Anas crecca</i> - UCBL 55/3	1.8	8.6	5.5	3.1	5.5
<i>Anas querquedula</i> - UCBL 57/2	2.0	8.4	5.8	3.4	5.6
<i>Aix galericulata</i> - NMNHS 1/1989	2.2	10.9	6.9	4.3	6.8
<i>Aix sponsa</i> - NMNHS 1/1993	2.4	11.1	7.5	4.5	6.8
<i>Aix sponsa</i> - NMNHS 2/1993	2.6	11.3	7.5	4.5	6.7
<i>Marmaronetta angustirostris</i> - UCBL 56/1	2.3	10.0	6.4	4.7	6.6

Collections acronyms. UCBL - Université' Claude Bernard - Lyon; NMNHS - Natural Museum of Natural History - Sofia.

Etymology. Praephyx "*Balc-*" - after the name of the Balkan peninsula and "*anas*" - the name of the closest genus.

Diagnosis. A medium sized anatid of Anatini tribe with narrower and more transversally orientated fossa m. brachialis, obliquely outlined toward diaphysis medial edge of epicondylus ulnaris in ventral view, better developed fossa olecrani and shallower and unclear outlining of epicondylus radialis from condylus radialis, than both, in *Anas* and *Aix*, more laterally located and more clearly marked fossula ligamenti articulationis on the epicondylus radialis.

Balcanas pliocaenica sp. n.

Holotype. Humerus sin. dist. (Fig. 2 a, b); collections of the Fossil and Recent Birds Department of the National Museum of Natural History - Sofia, Bulgarian Academy of Sciences, NMNHS 484. Collected in 1985 by the members of the joint Bulgarian-French Palaeontological Expedition.

Locality. One km South of the village Dorkovo (NE of the town of Velingrad; see "Introduction"); 42.05 N, 24.08 E.

Horizon. Sands and clay sands of oblique and complex inner stratification and green-yellow clays containing numerous bone microfragments (Thomas et al., 1986 a, b).

Chronology. Early Pliocene; Russcinian, MN zone 14 (5.0 - 4.5 Ma).

Etymology. The name "*pliocaenica*" is given after the name of the Pliocene epoch, where the find of the species originates from.

Paratypes. No additional material was collected and no paratypes were specified.

Diagnosis. As the genus.

Measurements. Table 1; Fig. 3.

Comparative material examined. The find was compared with homologous skeletal elements of the following species: *Anas platyrhynchos* - NMNHS 9/1989; UCBL 54/6; *Anas penelope* - NMNHS 2/

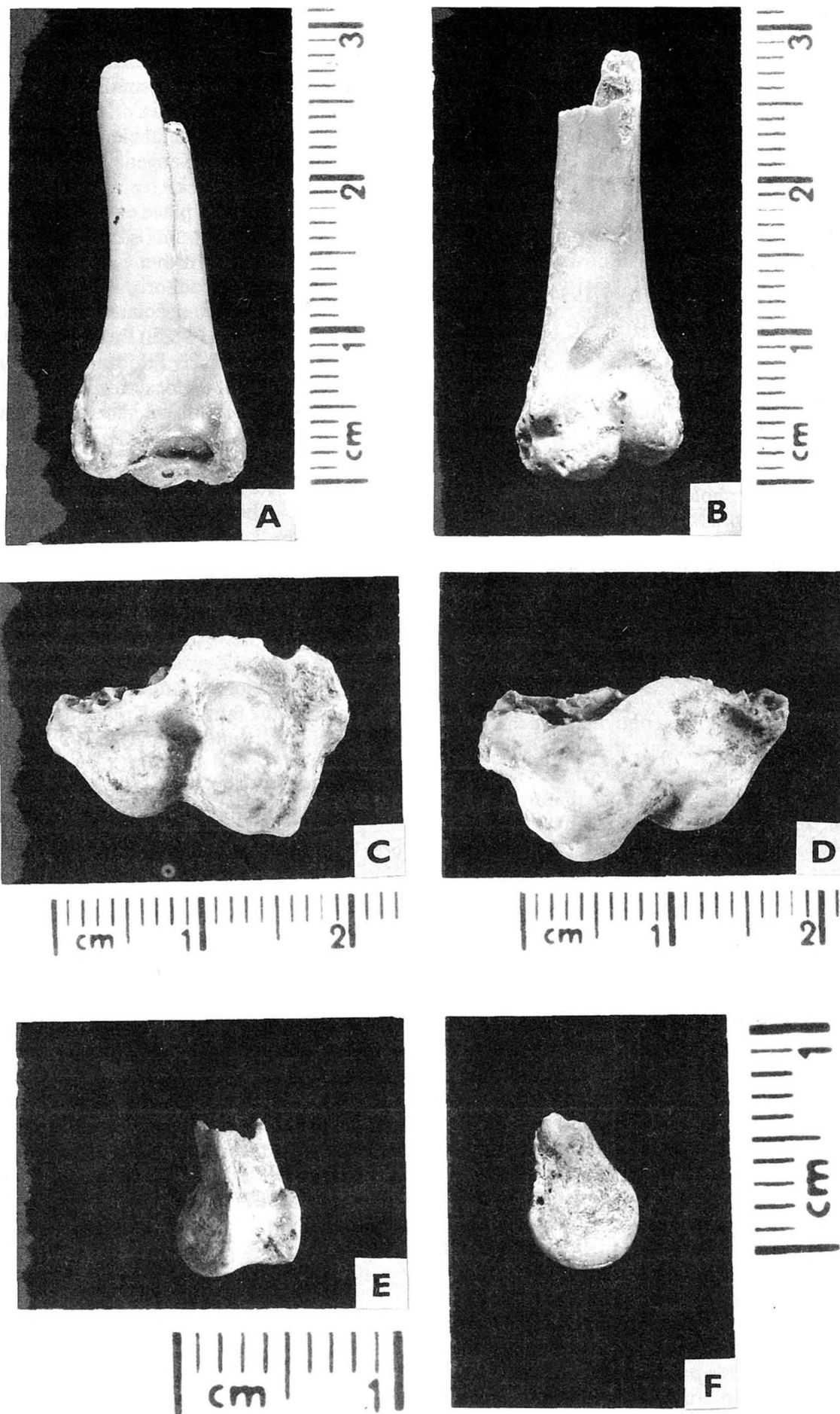


Fig. 2. The avian bone remains found near Dorkovo: *Balcanas pliocaenica* g. n. et sp. n. - humerus sin. dist., NMNHS 484, holotype (a, b); *Tetrao rhodopensis* sp. n. - humerus sin. dist., NMNHS 483, holotype (c, d); Perdicinae gen. indet. - tibiotarsus sin. dist., NMNHS 485 (2 e, f) (Photograph: Boris Andreev)

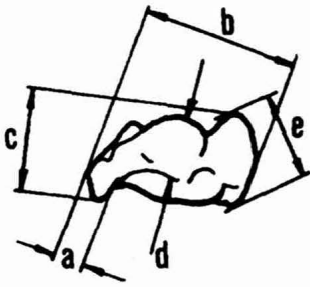


Fig. 3. The manner of measuring of humerus dist. in Anatini

1993; *Anas strepera* - NMNHS 1/1994; UCBL 58/1; *Anas clypeata* - UCBL 61/1; *Anas crecca* - UCBL 55/3; *Anas querquedula* - UCBL 57/2; *Aix galericulata* - NMNHS 1/1989; *Aix sponsa* - NMNHS 1/1993; NMNHS 2/1993; *Marmaronetta angustirostris* - UCBL 56/1.

Comparison and discussion. The find shows the general features of Anseriformes. It differs from Cygnini both, morphologically and dimensionally (Table 1; Fig. 3), from Mergini it differs by the more horizontal orientation of fossa musculi brachialis. The find No 484 differs from *Bucephala clangula* and *Clangula hyemalis* also by the more gradual transition of diaphysis into the epiphysis. It differs from Tadornini by its smaller size, and the more clearly outlined fossa olecrani, from Aythyni - by the thicker distal end of diaphysis, from Dendrocynini - by the less developed epicondylus dorsalis.

Most of the features characteristic for Anatini are presented. The specimen of Dorkovo differs from *A. platyrhynchos* by the more gracile diaphysis in the distal half and the smaller size. It differs from both *A. platyrhynchos* and *A. strepera* by the clearly outlined and deeper fossa olecrani. The differences from *A. clypeata* concern the longer fossa olecrani and the much smaller condylus ventralis, from *Marmaronetta angustirostris* - the flattened condylus ventralis in its ventral part. The differences from *A. crecca* and *A. querquedula* are shown in larger size and the more elongated condylus dorsalis. Thus, in comparison with g. *Anas*, the Anatid from Dorkovo has more transversally orientated fossa m. brachialis, while in comparison with *Aix*, it has more narrow and elongated fossa m. brachialis. In *Anas* epicondylus ulnaris in ventral view connects more gradually with the diaphysis, while in *Aix* its medial edge (Fig. 4 - 1) outlines it obliquely toward diaphysis. The find 484 resembles g. *Aix* in this feature. Fossa olecrani is much better outlined than both, in *Anas* and *Aix*. On the contrary, the boundary outlining epicondylus radialis from condylus radialis is more shallow and unclear, than in *Anas* and *Aix*. Fossula ligamenti articulationis (Fig. 4 - 2) is more laterally situated in *Anas*, while in *Aix* it is positioned more medially in ventral view. This structure is more laterally located in the Dorkovo specimen. Moreover, it is more clearly marked, than both in *Anas* and *Aix*.

Having in mind this mosaic features of find No 484, we propose to place it in a separate genus. The morphological comparison characterises *Balcanas pliocaenica* g. & sp. n. as a small to medium sized duck, combining the features of *Anas* and *Aix*. Such mosaic structure of skeletal elements is known for many Tertiary, mainly Neogene, taxa. For example, the Early Miocene ducks from France have been regarded as difficult to place even in a modern tribe (Olson, 1985). As the g. *Anas* is known since the Late Oligocene of Europe (former Czechoslovakia) and Asia (Kazakhstan) (Brodkorb, 1964), we only may consider the Dorkovo specimen as parallel taxon coexisting with *Anas* in S (SE) Europe at least during the Late Miocene - Early Pliocene times. Unfortunately, no fossil taxa are described up to present in the g. *Aix*. A total of 3 fossil genera of "Anatinae" (*Eoneornis* and *Eutelornis* from the Middle Miocene of Argentina, and *Pachyanas* from the Quaternary of Chatham Islands, and 40 fossil species, 19 of them out from the Palearctic region, are described up to now (Brodkorb, 1964; 1967). Thus, the generic identity of *Balcanas pliocaenica* g. n., sp. n. may be excluded. As Olson (1985) writes, Anatids are not common as fossils until the Neogene, while in the Plio-Pleistocene freshwater deposits, they are among the dominant groups of birds. Following this author, the principal radiation of modern tribes and genera of the family took place by the Miocene time.

Tetrao rhodopensis sp. n.

The general shape suggests a humerus of a Galliform bird. In Phasianidae epicondylus dorsalis lies approximately in one plane, while in Tetraonidae it lies in a torsioned plane and in ventral view it looks like figure of eight. The plumped proximal end of condylus dorsalis, highly protruding condylus ventralis and the relief of the epicondylus dorsalis exclude family Phasianidae (genera *Pavo* and *Meleagris*). All species of *Tetraogallus*, *Gallus* and *Phasianus* (s. l.) are excluded morphologically and dimensionally, too.

Holotype. Humerus sin. dist. (Fig. 2c, d); collections of the Fossil and Recent Birds Department of the National Museum of Natural History - Sofia, Bulgarian Academy of Sciences, NMNHS 483. Collected in 1985 by the members of the joint Bulgarian-French Palaeontological Expedition.



Fig. 4. Comparison of distal humerus sin. in Anatinae (left to right): *Anas*, *Aix*, *Balcanas*

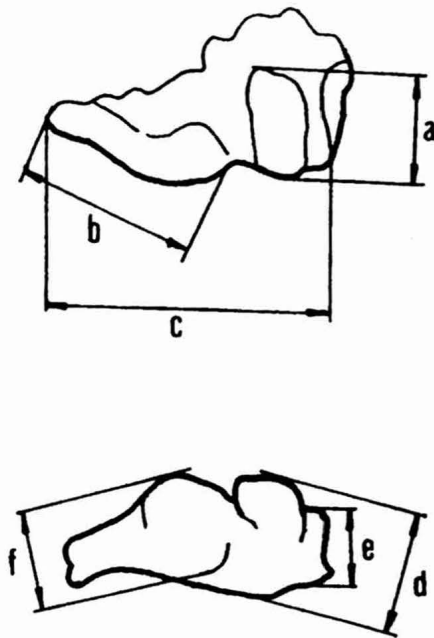


Fig. 5. The manner of measuring of humerus dist. in *Tetrao*

Locality. One km South of Dorkovo village (NE of the town of Velingrad; see "Introduction"); 42.05 N, 24.08 E.

Horizon. Sands and clay sands of oblique and complex inner stratification and green-yellow clays containing numerous bone microfragments (Thomas et al., 1986 a, b).

Chronology. Early Pliocene; Russcinian, MN zone 14 (5.0 - 4.5 Ma).

Etymology. The name "*rhodopensis*" is given after the name of the Rhodope mountains, where the find of species originates from.

Paratypes. No additional material was collected and paratypes were not specified.

Diagnosis. The oldest known *Tetrao* species, differing from other species of the genus by its more longitudinal orientation, parallel to the diaphysys, and its distally flatten condylus dorsalis.

Measurements. Table 2; Fig. 5.

Comparative material examined. The find was compared with analogous skeletal elements of the following species: *Tetrao conjugens* NMNHS 1620; *Tetrao praeurogallus* - NMNHS 1621; *Tetrao urogallus* - UCBL KG/1; *Tetrao tetrax* - UCBL 123/2; KG/2; *Lagopus lagopus* - UCBL KG/4; *Lagopus mutus* - UCBL 122/1; *Pavo cristatus* - UCBL 455/2; *Pavo muticus* - UCBL (I-73); *Meleagris gallopavo* - UCBL /1.

Comparison and discussion. The find No 483 differs from *Tetrao urogallus*, *T. tetrax* and *Lagopus* not only metrically (Table 2), but also by the less ventrally limited condylus ventralis, more rounded protrudence of the diaphysis between the sulcus scapulotricipitalis and sulcus humerotricipitalis.

Because of the lack of homologous skeletal elements, the find of Dorkovo cannot be compared with *T. macropus* Janossy 1976. Both species, *T. macropus* and *T. conjugens* Janossy 1974, are described from the second half of the Late Pliocene - Lower Pleistocene. *T. macropus* originates from the "Uppermost Pliocene ("Lowest Villafranchian")" from Csarnota 2, Mts. Villany in Southern Hungary, by the following skeletal elements: tibiotarsus sin. dist., radius sin. dist., phalanx 1 dig. 3, phalanx 1 dig. 2, phalanx 2 dig. 3, phalanx 2 dig. 2, and phalanx 3 dig. 3. Janossy (1976 a) estimates that *T. macropus* was of about 9 % larger than recent *T. urogallus*. The find No 483 is much larger than *T. urogallus*, too. The external dimensions (del Hoyo et al., 1994) and the wing skeleton elements (carpometacarpus; Janossy, 1969) of the Black-billed Capercaillie (*T. parvirostris* Bonaparte, 1856) are considerably smaller (of about of 10%) than these of *T. urogallus*. Thus, the taxonomical identity of the Dorkovo specimen and *T. macropus* and *T. parvirostris* may be excluded. The comparison of the width of distal epiphysis of humerus in *Tetrao* is given on Table 3. If the specimen No 483 belonged to a female, it lies dimensionally in the range of *T. urogallus* in relation of the width of the distal epi-

Table 2
Measurements of humerus sin. dist. in fossil and recent *Tetrao*

Species	a	b	c	d	e	f
Fossil species:						
<i>Tetrao rhodopensis</i> sp.n. - NMNHS 483	9.9	12.0	18.4	10.8	6.3	7.4
<i>Tetrao conjugens</i> - NMNHS 1620	10.5	13.2	19.4	11.0	6.6	7.0
<i>Tetrao praeurogallus</i> - NMNHS 1621	11.8	13.6	21.4	12.0	7.6	—
Recent species:						
<i>Tetrao urogallus</i> - UCBL KG/1	12.9	15.5	23.0	14.2	8.2	9.0
<i>Tetrao tetrax</i> - UCBL 123/2	8.0	9.5	13.8	8.2	5.2	5.4
<i>Tetrao tetrax</i> - UCBL KG/2	7.9	8.6	13.9	8.0	4.6	5.0
<i>Lagopus lagopus</i> - UCBL KG/4	7.0	7.7	11.7	6.8	4.0	4.8
<i>Lagopus mutus</i> - UCBL 122/1	6.8	7.0	11.0	6.6	3.7	4.4
<i>Pavo cristatus</i> - UCBL 455/2	11.7	15.7	23.0	12.6	7.4	8.5
<i>Pavo muticus</i> - UCBL (I-73)	12.7	17.3	25.5	13.3	7.8	9.8
<i>Meleagris gallopavo</i> - UCBL /1	15.6	19.4	19.6	14.8	9.1	10.7

Collections acronyms. UCBL - Université Claude Bernard - Lyon; NMNHS - Natural Museum of Natural History - Sofia.

Table 3
Width of the distal epiphysis of humerus in fossil and recent *Tetrao*
(after Janossy, 1974)

Species	Number	Width of dist. ep. (mm)
Fossil	1	18,4
<i>Tetrao rhodopensis</i> sp.n.	1	16,0
<i>Tetrao conjugens</i>	1	20,5
<i>Tetrao praeurogallus</i>	2	19,4; 21,4
Recent		
<i>Tetrao urogallus</i> (m)	37	21,0 - 26,0
<i>Tetrao urogallus</i> (f)	16	16,9 - 20,0
<i>Tetrao tetrix</i> (m)	8	15,7 - 16,5
<i>Tetrao tetrix</i> (f)	15	13,6 - 14,2

physis (Table 3), but the considerable morphological differences exclude such an identity. The morphological differences are considerable from the fossil species *T. conjugens*, too. Janossy (1974) writes that the fragmentary distal ending of the humeral bone is morphologically close to *T. urogallus* in lateral and distal view. The larger depth of distal epiphysis in the male *T. urogallus* varies between 12.4 and 14.4, while in females it is between 9.1 and 10.5. In *T. tetrix* (males and females) it is 7.7 to 8.7 mm. This measurement in *T. conjugens*, measured by Janossy (1976) is 9.0, and in the Dorkovo specimen it is 11.2 mm. It is noteworthy that it lies in the hiatus between the (*T. tetrix* /m.+f./ and *T. urogallus* /f./) and (*T. urogallus* /m./). The dimension of another specimen of *T. conjugens* measured by Janossy (1976) is 10.5 (while the find of Dorkovo has 11.2, and *T. praeurogallus* - 11.0 and 12.0. *T. conjugens* is known from the "Upper Pliocene (Lower Villafranchian) from Weze I in South Poland. According to Janossy, these two species are the oldest known Tetraonids by now. The age of No 483 is MN 15 - Ruscinian, i. e. much older. It is evident from Fig. 2, Plate II, No 1 of the work of Janossy (1976) that the find of Dorkovo differs from *T. conjugens* by its medial profile of distal epiphysis. Dr. Janossy affirms, that the distal epiphysis in *T. conjugens* is larger in relation to diaphysis, than in *T. tetrix* and *T. urogallus*. This part of the bone seems more elongated in distal view, than in recent forms. He states that *T. conjugens* was an excellent example for the mosaic evolution, a typical transitional form between recent *T. urogallus* and *T. tetrix*. Metrically it was closer to *T. urogallus*, but morphologically closer to *T. tetrix*. According to Janossy (1976), *T. conjugens* and *Lyrurus (T.) partium* lie on the *T. tetrix* lineage, while *T. macropus* and *T. praeurogallus* lie on the recent *T. urogallus* lineage. All these fossil species originate from the Lower to Middle Pleistocene. The Middle Pleistocene *T. praeurogallus* is described by Janossy (1969) as a medium-sized Tetraonid with narrower epiphyses of carpometacarpus, humerus and tibiotarsus than the Euroasiatic Capercaillies. As seen from Tables 2 and 3, *T. rhodopensis* sp.n. has also a narrower distal

epiphysis. But after all, because of the geochronological reasons we may exclude the taxonomical identity of Dorkovo find with all fossil species of g. *Tetrao*: *T. macropus*, *T. conjugens* and *T. praeurogallus*. Fig. 6 shows the comparison of distal humerus in *Tetrao* species. The inclined axis passes through the condylus dorsalis. It is noticing that in the oldest

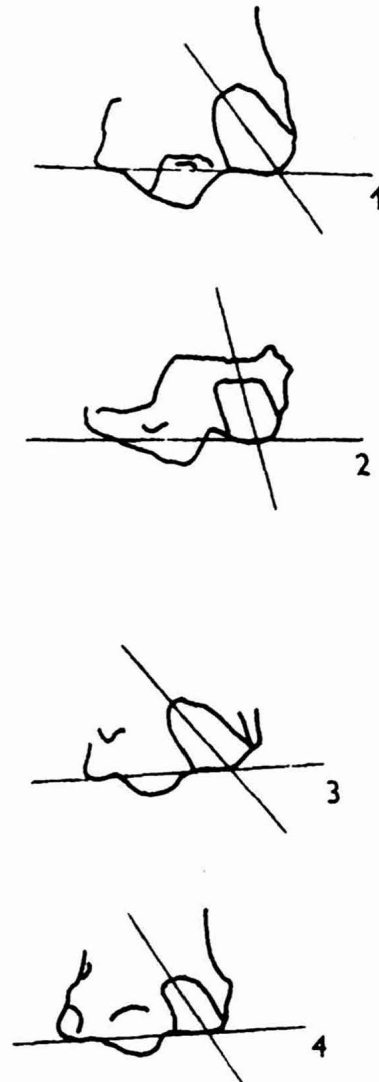


Fig. 6. Comparison of distal humerus in *Tetrao* species: *T. praeurogallus* (1), *T. rhodopensis* sp. n. (2), *T. urogallus* (3), *T. conjugens* (4) (Drawing: Vera Hristova)



Fig. 7. Comparison of distal tibiotarsus in Perdicinae gen.: *Perdix perdix* (left) and Perdicinae gen. et sp. indet. (right)

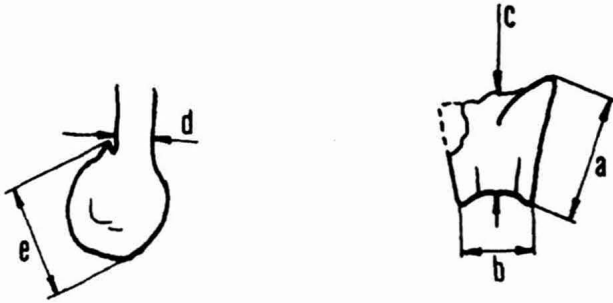


Fig. 8. The manner of measurements of tibiotarsus dist. in Perdicinae

species, *T. rhodopensis* sp. n., the angle is larger than in all other fossil species of *Tetrao*.

PERDICINAE gen. indet.

The find of Dorkovo (Fig. 2, e, f) is a certain Phasianid form, because the Tetraonidae species have more flattened distal epiphysis in lateral view.

The find No 485 differs from *C. coturnix* by the absence of the small prickle (spur) in the base of the condylus lateralis (Fig. 7). It differs from *Chauvireria balcanica* (Boev, 1997, MN 17) by its almost round trochlea. In *Ch. balcanica* in lateral view it is a horizontal oval. The differences from *Perdix perdix* are shown in dimensions (Table 4; Fig. 8), the sharp dentil on the caudal edge of condylus lateralis (Fig. 7) and more developed, but more laterally positioned projection. It differs from *Palaeocryptonyx* by the sharp edge of condylus lateralis and by the profile of the trochlea tibiotarsi. Other species (*Alectoris*, *Phasianus*, *Gallus*, etc.) include species of much larger size. We have not on our disposal any comparative material of *Francolinus* species, but the find from Dorkovo seems a little bit smaller in size.

Palaeoecological interpretation of the site through the recovered avifauna

The g. *Tetrao* is considered an indicator for forest landscape. It is spread at present predominantly in the coniferous and mixed coniferous-deciduous forest zone in the mountains of Southern Palearctic. The presence of *Tetrao* remains in Dorkovo confirms the former statement of Thomas et al. (1986) that a forest landscape might occurred in the region of the site. The large mammalian fauna is typical for the clear forest of parklike type, for the wooded savannah, as well as for the more dense forest habitats.

The *Tetrao* remain in Bulgarian Ruscinian completes our knowledge on the origin and distribution of Tetraonids at all. Summary data of Janossy (1991) indicate that no information up to 1991 is available on appearance of Tetraonids in earlier times than final of Ruscinian.

The occurrence of bone remains of a dabbling duck (*Balcanas pliocaenica* g. n. et sp. n.) indicates the presence of large water bodies with open surface of steady or slow-moving water. It is possible that such a water basin have been formed along the stream of the Palaeo-Mutnitsa river, which flow in the vicinity of site. Such suggestion was proved by the analysis of the bone finds accumulation, as well as the presence of fossil beavers (*Castoridae* gen. et sp. indet.) (Thomas et al., 1986).

The third find (Perdicinae g. et sp. indet.) has not considerable indicator significance. Its fragmental preservation does not allow a further determination. On the other hand, it may be affirmed that open forestless grassy landscapes of xerophyllous vegetation, dominated by Poaceae, typical habitats for most Perdicinae phasianids of Palearctic and Ethiopic distribution, occurred in the vicinity of Dorkovo.

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Table 4
Measurements of tibiotarsus sin. dist. in fossil and recent Perdicinae

Species	a	b	c	d	e
Fossil					
Perdicinae gen. — NMNHS - 485	5.2	3.6	3.6	3.1	5.3
<i>Palaeocryptonyx donnezani</i> - UCBL 92892	5.2	4.4	4.1	2.6	5.2
<i>Palaeocryptonyx donnezani</i> - UCBL 92892	5.2	4.3	3.7	2.6	5.2
Recent					
<i>Coturnix coturnix</i> - UCBL 130/2	4.1	3.2	2.9	2.0	4.2
<i>Coturnix coturnix</i> - UCBL 130/1	5.3	4.4	3.6	3.0	5.1
<i>Lophortyx californica</i> - UCBL (1974)	4.6	3.7	3.4	2.5	4.8
<i>Chauvireria balcanica</i>	4.9	4.0	3.6	2.8	4.8
<i>Perdix perdix</i> - UCBL 1./1	6.0	5.3	4.1	3.4	7.0

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