



Late Pleistocene avifauna of Nanin Kamak Cave (CN Bulgaria)

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Abstract. A total of 83 bones and bone fragments of birds collected in the Nanin Kamak Cave near Musselievo village have been identified as 21 species of 9 orders: *Anas crecca*, cf. *Anas platyrhynchos*, *Tetrastes bonasia*, cf. *Tetrao tetrix*, *Coturnix coturnix*, *Perdix perdix*, *Phasianus colchicus*, *Columba livia/oenas*, *Columba palumbus*, *Streptopelia turtur*, *Fulica atra*, *Numenius phaeopus/taenuirostris*, *Burhinus oedicephalus*, *Glareola* cf. *nordmanni*, *Scolopax rusticola*, *Falco tinnunculus*, *Tachybaptus ruficollis*, *Otis tarda*/ *Tetrax tetrax*, *Alauda arvensis*, *Eremophila alpestris*, and *Oenanthe oenanthe*. It is concluded that a forest-steppe landscape dominated in the region of the cave in that period of the Late Pleistocene.

Key words: Fossil birds, Late Pleistocene, Bulgaria, Balkan Peninsula, Nanin Kamak Cave, Pleistocene forest-steppe.

Introduction

Region of the Muselievo village (C Northern Bulgaria), 10 km from the Danube river) has provided a very important fossil avifauna, dated Early Pliocene - 2-nd half of the Middle Ruscianian, MN 15 (BOEV, 2001a). Present paper deals with some Late Pleistocene avian remains, collected from another locality, the Nanin Kamak Cave (earlier named Muselievo - 2) of the vicinities of the same village.

Material and Methods

The studied material has been handed for examination and keeping at the National Museum of Natural History, BAS in Sofia (NMNHS) in 2005 by Mr. Georgi Hristov (geologist, Pleven), who collected the finds. It consists in 83 bones and bone fragments of birds, as follows: No NMNHS: 14982-15009, 15011-15018, 15020-15023, 15025-15026, 15028-15042, 15045-15052, 15054-15055, 15057-15060, 15062-15068, 15070-15073, 15077.

The material was collected in 1988 in the cave (3-5 m from the cave entrance along the cave walls) in a neighboring hill (Georgi Hristov, pers. comm.). The Nanin Kamak Cave is located about 400 m east of the Muselievo village.

After Vasil Popov (Institute of Biodiversity and Ecosystem Research, BAS) the site is dated "late Pleistocene" (pers. comm.), i. e. ca. 126,000-12,000 years ago, but more precise dating is impossible.

Associated fauna: Numerous finds of small mammals, mostly rodents - voles and hamsters (Cricetidae J. Fischer, 1817), mice (Muridae Illiger, 1811) (V. Popov, unpubl. data); *Megaloceros giganteus* (Blumenbach, 1799), a find collected in the surroundings of the cave (SPASSOV, 1982).

Results and Discussion

The uncovered bird fauna is surprisingly rich. At least 21 recent species of 9 orders are established (Table 1). Most numerous are the

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finds of common quail (*Coturnix coturnix* (Linnaeus, 1758)) and European turtle dove (*Streptopelia turtur* (Linnaeus, 1758)). They comprise over 37 percent of the finds.

Birds of grass openland habitats

Numenius phaeopus (Linnaeus, 1758) or *N. taenuirostris* Vieillot, 1817. The whimbrel is a small curlew (body length of 37-47 cm; wingspan of 75-90 cm). The slender-billed curlew is slightly smaller (36-41 cm and 77-88 cm resp.; CRAMP, 1983). The compared specimen NMNHS 15072 is also slightly smaller than a recent specimen of *N. phaeopus* in the collection of the NMNHS. The

fragmentariness of the find excludes more detailed identification. Both species are not numerous in the Pleistocene record.

Glareola cf. *nodmanni* Fischer von Waldheim, 1842. The compared measurement (tarsus length) from the Nanin Kamak Cave, the specimen NMNHS 14987, is 36.78, i. e. it lies within the range of Black-winged Pratincole (Table 2). Since we have no comparative material of *G. normanni*, because of high similarity of all bone and its metical differences we refer it to Black-winged pratincole. *G. normanni* is an unknown so far species in the Pleistocene record of the Palearctic (TYRBERG, 1998; 2008).

Table 1. Measurements of some of the Late Pleistocene avian finds from the Nanin Kamak Cave .

Species	Bone	Collection No.	Measurement	Dimension (mm)	Note
ANSERIIFORMES					
<i>Anas crecca</i> cf. <i>Anas platyrhynchos</i>	coracoid dex.	14990	maximal total length	ca. 34.18	
	phallanx 1 dig. 3 pedis dex.	14984	total length	21.3	
GALLIFORMES					
<i>Tetrastes bonasia</i> cf. <i>Tetrastes bonasia</i>	coracoid dex. prox.	15001	width of f. a. scapularis	5.20	
	sternum – crista sterni, cranial part	14982	frontal thickness of crista sterni in the middle	4.21	
	sternum – crista sterni, cranial part	15008			
	mandibula sin. porx – pars articularis	15009	width of articular end	9.00	
	sternum – crista sterni, medial part	15000	thicknes of crista sterni at the base	0.50	
	ulna sin.	14994	width of distal epiphysis	5.95	slightly (1/8) shorter than <i>Lagopus lagopus</i>
	coracoid sin. dex. prox.	14998	length of facies articularis sternalis	9.70	
	costa sin. - ?5-6	14999	width of articular vertebral end	10.8	
	coracoid dex. dist.	15059	width of proc. acoracoideus	6.74	
	ulna dex.	15014	width of distal epiphysis	3.10	
<i>Coturnix coturnix</i>	tbt. sin.	15003	width of proximal epiphysis	4.80	
	tmt dex. prox.	15052	width of proximal epiphysis	4.54	
	tmt dex. dist.	15020	thickness of tr. metatarsalis 3	2.95	
	humerus sin. prox.	15040	thicknes of caput humeri	3.50	caput humeri
	scapula dex. prox.	15051	width of f. a. humeralis	2.45	
	tbt dex. dist.	15022	minimal thickness of diaphysis	1.95	without epiphysis
	femur sin. dist.	15028	width of distal epiphysis	5.45	
	coracoid sin. dist.	15034	width of f. a. scapularis	1.90	
	tmt dex.	15062	width of proximal diaphysis	4.30	
	tmt sin.	15031	width of distal epiphysis	4.80	
	synsacrum – corpora vertebrorum	15054	total length	21.20	
	femur dex.	15066	width of proximal diaphysis	5.75	
femur sin.	15067	width of distal diaphysis	4.95		
synsacrum – corpora vertebrorum	15046	total length	25.00		
coracoid dex.	15026	maximal total length	21.3		

	synsacrum – corpora	15002	total length	27.35	
	vertebrorum				
	tmt sin.	15016	width of distal epiphysis	4.90	
	tbt dex. prox.	14991	width of proximal epiphysis	2.16	
	tbt dex.	15004	width of distal epiphysis	4.40	
	sternum – crista sterni	15058	frontal thickness of crista sterni in the middle		
<i>Perdix perdix</i>	scapula dex. prox.	15047	width of facies articularis humeralis	4.26	
	tmt sin. dist.	15064	width of distal epiphysis	7.97	
cf. <i>Perdix perdix</i>	vertebra cervicalis xx	15070	width of caudal end	7.60	
	ulna dex.	15068	total	69.00	
<i>Phasianus colchicus</i>	Radius dex. prox.	15060	maximal width of prox. epiphysis	5.10	
	humerus dex. prox.	15071	width of proximal end	17.85	
	scapula dex. prox.	15063	width of f. a. humeralis	5.00	
	vertebra cervicalis xx	15007	width of cranial end	12.55	
cf. <i>Phasianus colchicus</i>	phalanx 3 dig. 2 pedis dex.	15029	total length	12.20	
	os frontale dex.	15065	minimal width	5.25	juv.
Phasianidae gen. indet.	vertebra cervicalis xx	15073	width of proximal end	11.89	
	vertebra cervicalis 6	14983	width of proximal end	13.5	
	scapula sin. dist.	15077	width in the middle	6.05	
	tbt	15035	thickness in the middle	5.09	splinter of medial part of diaphysis
	humerus sin. prox.	15039	thickness of caput humeri	6.16	caput humeri, splinter; raptor claw hole
cf. Phasianidae gen. indet.	vertebra cervicalis xx	15041	width of f. a. caudalis	4.40	splinter
	phalanx 1 dig. 1 pedis sin.	15030	total length	17.10	
	phalanx dig. pedis	15045	total length	8.65	juv.
	phalanx 1 dig. 1 pedis sin.	15037	total length	15.35	
	phalanx 3 dig. 4 pedis dex.	15036	total length	10.9	
COLUMBIFORMES					
	cmc sin.	15018	total length	33.20	slightly slender than <i>C. livia</i>
<i>Columba livia/oenas</i>	tbt sin. dist.	15025	width of distal epiphysis	6.95	
	scapula dex. prox.	15032	width of f. a. scapularis	4.90	juv.
<i>Columba palumbus</i>	cmc dex. prox.	15006	thickness of trochlea carpalis	5.40	
	humerus dex.	15013	total length	35.55	
	radius dex.	15023	total length	30.10	juv.
	humerus sin. prox.	14997	thickness of caput humeri	2.95	
	cmc sin.	15049	total length	24.90	
	tmt sin.	15038	maximal width of distal epiphysis	5.36	
<i>Streptopelia turtur</i>	tmt sin.	14996	width of proximal epiphysis	5.15	
	tmt dex.	14989	total length	21.80	
	tbt sin.	14992	minimal thickness of diaphysis	2.30	without diaphyses
	ulna dex.	14985	width of distal epiphysis	4.70	
	phalanx prox. dig. maj. sin.	15015	dorsal total length	11.45	
	radius dex.	14995	minimal thickness of diaphysis	1.5	
GRUIFORMES					
<i>Fulica atra</i>	scapula sin.	14986	width of facies articularis humeralis	4.45	
CHARADRIIFORMES					
<i>Numenius phaeopus/taeniurostris</i>	mandibula dex. –	15072	width of articular end	5.6	slightly smaller than <i>N. phaeopus</i>
<i>Burrhinus oedicnemus</i>	pars articularis				
	phalanx prox. dig. maj. sin.	15017	total length	18.45	
	tmt sin.	14987	width of distal epiphysis	4.20	slightly (1/15) longer than <i>G. pratincola</i>
<i>Glareola cf. nordmanni</i>			total length	36.78	
<i>Scolopax rusticola</i>	cmc dex. prox.	14993	thickness of trochlea carpalis	3.80	
FALCONIFORMES					
<i>Falco tinnunculus</i>	cmc dex.	15005	total length	34.90	
PODICIPEDIFORMES					

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<i>Tachybaptus ruficollis</i>	cmc sin.	15050	total length	23.40
OTIDIFORMES				
<i>Otis tarda/ Tetrax tetrax</i>	phalanx 1 dig. 3 pedis dex.	15057	width of facies art. dist.	6.02
Aves ordo indet.	vertebra cervicalis xx	15011	frontal height	6.42 splinter
	vertebra lumbalis 1	15033	width of f. a. caudalis	3.65
	vertebra cervicalis 3	14988	width of proximal end	8.19
PASSERIFORMES				
<i>Alauda arvensis</i>	tbt sin.	15042	width of distal epipysis	2.85
<i>Eremophila alpestris</i>	ulna dex.	15021	total length	29.25
<i>Oenanthe oenanthe</i>	humerus dex.	15048	maximal total length	19.26
<i>Turdus iliacus</i>	tmt dex.	15012	total length	32.10
	tmt dex.	15055	total width of tr. m. 3 and 4	2.59
Total: 83 bone finds				

Table 2. Comparison of the tarsus length (mm) in *Glareola pratincola* and *G. nordmanni* (after CRAMP, 1983).

Tarsus length	<i>Glareola pratincola</i>		<i>Glareola nordmanni</i>		NMNHS 14987
	males	females	males	females	
Mean	32.2 (16)	31.1 (13)	38.6 (14)	36.2 (11)	36.78
Range	31-34	28-32	37-40	35-37	

Burrhinus oedicnemus (Linnaeus, 1758). *B. oedicnemus* is known from middle to late Pleistocene of Azerbaijan, France, Spain (TYRBERG, 1998) and Italy (TYRBERG, 2008). Bulgaria is the 5th country with the species fossil record.

Other grass openland species

Coturnix coturnix, *Perdix perdix*, *Streptopelia turtur*, *Otis tarda/ Tetrax tetrax*, and *Alauda arvensis*. These species were widely recorded throughout all Palearctic, including on the Balkan Peninsula (TYRBERG, 1998; 2008).

Bird of woodland habitats

This group was represented by six species at least in the cave deposits: *Tetrastes bonasia*, cf. *Tetrao tetrax*, *Phasianus colchicus*, *Columba palumbus*, *Scolopax rusticola*, and *Turdus iliacus* (Table 1). At present they inhabit both coniferous, mixed and broad-leaf forest.

Birds of aquatic habitats

Six species at least have been found in the cave: *Anas crecca*, cf. *Anas platyrhynchos*, *Fulica atra*, *Tachybaptus ruficollis*, *Numenius phaeopus/taenuirostris*, and *Glareola* cf. *nordmanni* (Table 1). The aquatic habitats are represented at present too. The Osam River flows in the Danube River in the region of the site.

Birds of rocky habitats

Five (four) species at least have been found in the cave deposits: *Columba livia/oenas*, *Falco*

tinnunculus, *Burrhinus oedicnemus*, *Eremophila alpestris*, and *Oenanthe oenanthe* (Table 1). Various rocky habitats are still represented in the cave surroundings. The Eurasian thick-knee prefers dry grassland, stony shores, sand dunes, grass steppe, stony, sand or clay plains, and sand or stony landscapes (HARRISON, 1982).

Paleoenvironmental reconstruction

SPASSOV (1982) cites a paleobotanical research of E. Bozhilova (unpubl. data), confirming the presence of forest-steppe vegetation in the late Pleistocene in the region. This corresponds to the relative share of the most common birds among the collected bone remains - *Coturnix coturnix* (20) and *Streptopelia turtur* (11), followed by *Tetrastes bonasia* (4(8)), *Perdix perdix* (3(4)) and *Phasianus colchicus* (4). The forest-steppe landscape has been widely established for many regions in the Northern Bulgaria in the vicinities of the avian localities in the Late Pleistocene (BOEV, 2001b).

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References

BOEV Z. 2001a. Early Pliocene avifauna of Muselievo (C Northern Bulgaria). *Acta zoologica cracoviensia*, 44(1): 37-52.

- BOEV Z. 2001b. Birds over the mammoth's head in Bulgaria. In: Cavaretta, G., P. Gioia, M. Mussi, M. R. Palombo. *The World of Elephants*. Proceedings of the 1st International Congress. Roma, 16-20.10.2001, pp. 180-186.
- CRAMP S. (Chief Ed.) 1983. *Handbook of the birds of Europe, the Middle East and North Africa: the birds of the Western Palearctic*. Volume III Waders to Gulls. Oxford University Press, Walton Street. Oxford, 913 p. + 105 plts.
- HARRISON C. J. O. 1982. *An Atlas of the Birds of the Western Palearctic*. Princeton Univ. Press, Princeton, New Jersey. 332 p.
- SPASSOV N. 1982. Fossils of the Alpine Ibex and the Irish Elk in Bulgaria and the role of the antlers of the Irish Elk. *Priroda*, 5: 21-27. (In Bulgarian).
- TYRBERG, T. 1998. *Pleistocene birds of the Palearctic: a catalogue*. - Publ. of the Nuttall Ornithol. Club, No 27, Cambridge, Massachusetts; 720 p.
- TYRBERG T. 2008. *Internet supplement to: Tyrberg, T. 1998. Pleistocene Birds of the Palearctic: A Catalogue*. - Publ. of the Nuttall Ornithol. Club, No 27. Cambridge, Massachusetts, pp. 1-720. Updated 24 February 2008: Available at: [<http://web.telia.com/~u11502098/pleistocene.pdf>]

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