

Neogene Avifauna of Bulgaria

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Abstract

A full taxonomic list of the Neogene avifauna of 12 sites in Bulgaria is presented. The total material consists of 1766 bone fossils of MNI 236: Middle Miocene: 1) Kardam, MN 5-8; Late Miocene: 2) Kremikovtsi, MN 12-13; 3) Hrabarsko, MN 11-13; 4) Troyanovo, MN 11-15; 5) Hadzhidimovo, MN 11-12; Early Pliocene: 6) Muselievo, MN 15; 7) Sofia-1, MN 11-13; 8) Sofia-2, MN 14-15; 9) Dorkovo, MN 14; Late Pliocene: 10) Varshets, MN 17; 11) Slivnitsa, MNQ 18; 12) Balsha, MNQ 18-19. A total of 96 taxa of 24 families and 12 orders are established. Varshets is the richest Neogene site in Bulgaria and the richest one of the Late Pliocene (Villanyian) of Europe, containing fossils of at least 62 taxa.

Introduction

The Neogene avifauna of Bulgaria remained almost unstudied until the present time. Only three sites were known, two of them (Hrabarsko and Troyanovo) contained two new species (Burchak-Abramovich and Nikolov, 1984).

Bird finds from the Neogene deposits are known at present from twelve sites (Table 1). Five of them are of Miocene age including one of Middle Miocene (Kardam) and four of Late Miocene (Hrabarsko, Troyanovo, Kremikovtsi and Hadzhidimovo). Seven other sites are of Pliocene age. Four sites contain fossils of the Early Pliocene (Ruscinian; Sofia - 1, Sofia - 2, Muselievo and Dorkovo) and three other of the Late

Pliocene (Villanyian; Varshets, Slivnitsa and Balsha) (Boev, 1996, 1999a).

Material and Methods

The avian finds of the Neogene sites of Bulgaria, collected between the 1950s and 1999, number 1766 bone fragments, bones and articulated skeletons of at least 236 individuals (Tables 1, 2). The great majority of them (95.9 percent) come from the Late Pliocene. All finds are kept in the Fossil and Recent Birds Department of the National Museum of Natural History, Bulgarian Academy of Sciences, Sofia (NMNHS). Most of them are identified through the comparative avian osteological collection of the NMNHS. One of the sites (Sofia - 1) is reported only by the literature data with no preserved avian fossils.

The material was identified through the comparative osteological collections of the following institutions: NMNHS, Université Claude Bernard - Lyon (UCBL), Institute of Systematics and Evolution of Animals - Krakow (ISEAK), Natural History Museum - Tring (NHMT), and the Paleontological Institute of the Russian Academy of Sciences - Moscow (PIRASM).

The dates follow the chronostratigraphy of Mein (1990). The geographic location of the sites is given on the map of UTM-grid (Lehrer and Deltchev, 1978) of 10-km squares (Fig. 1). The osteological nomenclature is after Baumel and Witmer (1993).

Short Description of the Sites

1. Kardam (43.45 N, 28.06 E; UTM grid: NJ 84). The find comes from drilling operations at 120 m depth

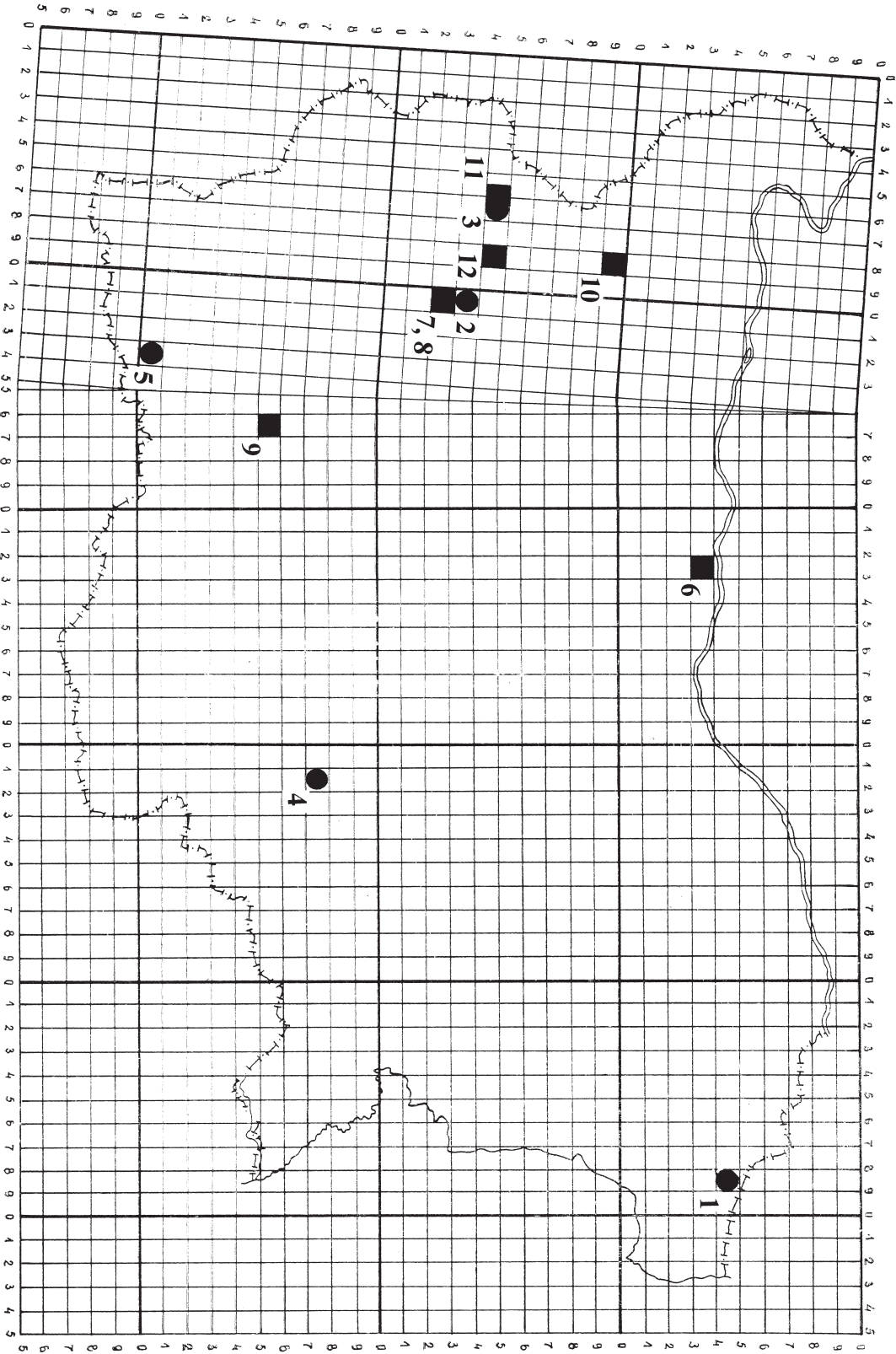


FIGURE 1. Location of the sites of Neogene avifauna in Bulgaria: Miocene (circles): 1 - Kardam; 2 - Kremikovitsi; 3 - Hrabarsko; 4 - Troyanovo; 5 - Hadzhidimovo; Pliocene (squares): 6 - Muselievo; 7 - Sofia - I; 8 - Sofia - 2; 9 - Dorkovo; 10 - Varshets; 11 - Slivnitsa; 12 - Balsha.

TABLE 1. Chronostratigraphical distribution of the Neogene avian fossils from Bulgaria

Period	Sub-period	Sites	Number of finds	Percentage of all material	Number of taxa	Percentage of all the Neogene avifauna
Pliocene	Late Pliocene	Balsha	3	0.17	2	2.08
		Slivnitsa	101	5.72	15	15.63
		Varshets	1589	89.98	62	64.58
	Early Pliocene	Dorkovo	3	0.17	3	3.13
		Sofia-2	1	0.06	1	1.04
		Sofia-1	(-)	(-)	(-)	(-)
		Muselievo	14	0.79	4	4.17
Miocene	Late Miocene	Hadzhidimovo	1	0.06	1	1.04
		Troyanovo	21	1.19	2	2.08
		Hrabarsko	24	1.36	4	4.17
		Kremikovtsi	1	0.06	1	1.04
	Middle Miocene	Kardam	8	0.45	1	1.04
	Early Miocene	–	–	–	–	–
Total			1766	100.01	96	100.00

from the vicinity of the Kardam village (Dobrich District; NE Bulgaria). 150 m a. s. l. Middle Miocene (MN 5-8).

2. Kremikovtsi (42.47 N, 23.30 E; UTM grid: GN 03). From the vicinity of the Kremikovtsi village (Sofia District; W Bulgaria). 700 m a. s. l. Late Miocene (MN 12-13).

3. Hrabarsko (42.48 N, 23.03 E; UTM grid: FN 64). The finds come from the former "Plamak" coalmine near the Hrabarsko village (Sofia District; W Bulgaria), 24 km NW of Sofia City. 650 m a. s. l. Late Miocene (Pontian) (Burchak-Abramovich, Nikolov, 1984); MN 11-13 (Boev, 1996); Middle to Late Turolian to Meotian-Pontian. The layers belong to the Balsha member of the Gnilyane Formation (Kamenov and Koyumdzhieva, 1983).

4. Troyanovo (42.12 N, 25.57 E; UTM grid: MG 17). The finds come from the "Troyanovo - 1" coalmine near the Troyanovo village (Stara Zagora District; CS Bulgaria). 100 m a. s. l. Late Miocene - Early Pliocene (MN 11-15).

5. Hadzhidimovo (41.30 N, 23.52 E; UTM grid: GM 30). Vicinity of the Hadzhidimovo village near the town of Gotse Delchev (Blagoevgrad District; SW Bulgaria). 500 m a. s. l. Late Miocene (Turolian - Meotian, lower part; MN 11-12; ca. 7 mya). The sediments belong to the Nevrokop Formation (Vatsev, 1980; Nikolov, 1985).

6. Muselievo (43.36 N, 24.50 E; UTM grid: LJ 23). The site is a rock shelter up to 1.5 m depth in a destroyed Pliocene cave (?Sarmatian limestone), about 1 km SE of the Muselievo village (Pleven District;

TABLE 2. Taxonomic composition of the Neogene avian fossils from Bulgaria.

Taxa	Collection numbers, NMNHS	Number of bone finds	MNI
Middle Miocene			
<u>1. Kardam</u>			
Sturnidae gen.	1626-1633	8	1
Subtotal		8	1
Late Miocene			
<u>2. Kremikovtsi</u>			
Anatinae gen.	2948	1	1
Subtotal		1	1
<u>3. Hrabarsko</u>			
<i>Phalacrocorax</i>			
<i>serdicensis</i> Burchak-Abr.			
and Nikolov, 1982	1392-1406	15	1
Larinae gen.	1646	1	1
<i>Melanocorypha</i> sp. n.	475	1	1
Alaudidae gen.	476	1	1
Aves indet.	477-482	6	1
Subtotal		24	5
<u>4. Troyanovo</u>			
<i>Anser thraceiensis</i>			
Burchak-Abr. and			
Nikolov, 1982	1407-1420; 1622-1625	18	1
Anatinae gen.	1650-1652	3	1
Subtotal		21	2
<u>5. Hadzhidimovo</u>			
<i>Buteo spassovi</i> Boev, 1998	10190	1	1
Subtotal		1	1
Early Pliocene			
<u>6. Muselievo</u>			
<i>Lagopus</i> aff. <i>atavus</i>	422	1	1
<i>Pavo bravardi</i>	418-421	4	1
<i>Accipiter</i> sp. ex gr. <i>gentilis</i>	423	1	1
<i>Falco</i> sp. ex gr. <i>cherrug</i>	424	1	1
Passeres indet.	1614; 1619	2	2
Aves indet.	1612; 1613; 1616; 1617; 1618	5	3
Subtotal		14	9
<u>7. Sofia-1</u>			
(Aves indet.)		?	?
Subtotal		-	-

TABLE 2. Taxonomic composition of the Neogene avian fossils from Bulgaria (continued).

Taxa	Collection numbers, NMNHS	Number of bone finds	MNI
<u>8. Sofia-2</u>			
<i>Cygnus verae</i> Boev, 2000	1644	1	1
Subtotal		1	1
<u>9. Dorkovo</u>			
<i>Balcana pliocaenica</i>			
Boev, 1998	484	1	1
<i>Tetrao rhodopensis</i>			
Boev, 1998	483	1	1
Perdicinae gen.	485	1	1
Subtotal		3	3
Late Pliocene			
<u>10. Varshets</u>			
Anatini gen.	11801	1	1
<i>Accipiter</i> sp.	113; 204	2	1
<i>Circaetus</i> sp.	162; 192; 273	3	1
<i>Aquila</i> sp. ex gr. <i>clanga</i>	138; 252;	2	1
<i>Hieraaetus</i> sp.	150; 243; 244; 251; 253	5	1
<i>Hieraaetus</i> cf. <i>fasciatus</i>	242	1	1
<i>Hieraetus</i> sp. n.	137; 251; 254;	3	1
<i>Aquila</i> sp.	3002	1	1
<i>Gyps</i> sp. n.	154; 159; 160; 182; 246-248	7	1
<i>Buteo</i> sp.	261	1	1
Accipitridae gen.	3002	4	2
<i>Falco</i> ex gr. <i>tinnunculus</i>	131; 132; 136; 143-145; 189; 236; 304-306;		
	317-321	16	3
<i>Falco bakalovi</i> Boev, 1998	1642	1	1
<i>Falco</i> sp.	131	1	3
Falconidae gen.	134	1	2
<i>Tetrao</i> aff. <i>partium</i>	157; 158; 178; 185; 194; 196; 198; 201; 245;		
	278-283; 1635-1639	20	2
<i>Lagopus balcanicus</i>			
Boev, 1995	1-13; 139; 249; 250; 322-326; 328; 329; 336		
	-339; 377-386; 1634; 1640; 1641; 1643	41	5
<i>Tetrao/Lagopus</i>	164; 165; 257	3	1
cf. <i>Perdix</i> sp.	2690-2702	13	3
<i>Chauvireria balcanica</i>			
Boev, 1997	47; 48; 51-58; 77; 78; 80; 81; 84-86; 47-111;		
	396-410; 1647; 1648; 1653-2650; 3007;		
	11606; 11607; 11612-11616; 11770; 11784;		
	11792; 11794; 11795; 11798; 11799; 11811	1113	49
Perdicinae gen.	12291	1	1
<i>Phasianus</i> sp.	256	1	1

TABLE 2. Taxonomic composition of the Neogene avian fossils from Bulgaria (continued).

Taxa	Collection numbers, NMNHS	Number of bone finds	MNI
Phasianidae gen.	35-37; 41; 188; 274-276; 288; 2706 -2708; 11603; 11775; 11776	15	3
<i>Gallinula balcanica</i>			
Boev, 1999	112	1	1
<i>Porzana</i> sp. n.	301	1	1
<i>Otis</i> aff. <i>Khosatzkii</i>	140-142; 149; 156; 252	6	2
Otididae gen.	148; 151	2	1
<i>Actitis balcanica</i>			
Boev, 1998	45	1	1
Charadriiformes fam.	3005	1	1
<i>Apus baranensis</i>			
Janossy, 1977	15-23	9	4
<i>Columba</i> sp. - 1	11601; 11604	2	1
<i>Columba</i> sp. - 2	127-130	4	1
<i>Streptopelia</i> sp.	299-300; 1161	3	1
<i>Athene</i> sp.	11277	1	1
<i>Anthus</i> sp.	175-177	3	2
<i>Motacilla</i> sp.	284	1	1
<i>Melanocorypha</i> sp.	295; 296	2	1
<i>Alauda</i> sp.	174; 297; 298	3	1
<i>Lullula</i> sp.	173	1	1
<i>Lullula arborea</i>	170	1	1
<i>Galerida</i> sp. - 1	153	1	1
<i>Galerida</i> sp. - 2	155	1	1
<i>Eremophila</i> sp. n.	179	1	1
<i>Parus</i> sp. ex gr. <i>major</i>	27; 34; 170	3	1
<i>Parus</i> sp.	43; 126; 167; 168; 277	5	1
Paridae gen.	202	1	1
<i>Regulus bulgaricus</i>			
Boev, 1999	24	1	1
cf. Sylviidae gen.	12266	1	1
cf. <i>Muscicapa</i> sp.	166	1	1
<i>Fringilla</i> sp.	169; 171; 172; 180; 187; 191; 193; 199; 200; 241; 272; 302	12	2
<i>Loxia patevi</i> Boev, 1999	307-311	5	1
<i>Coccothraustes simeonovi</i>			
Boev, 1998	114; 116; 117; 119-121	6	2
<i>Carduelis</i> sp.	208; 258-260; 387-395	13	2
Fringillidae gen.	411-417	7	3
<i>Emberiza</i> sp.	28; 125; 186; 205	4	1
Emberizidae gen.	38-39; 705	3	1
<i>Turdus</i> sp. ex gr. <i>merula</i>	29; 31	2	2
<i>Turdus</i> sp.	190; 197	2	1
<i>Turdus</i> sp. ex gr. <i>philomelos</i>	314; 316; 11605	3	1
<i>Turdus</i> cf. <i>Iliacus</i>	42 1 1		

TABLE 2. Taxonomic composition of the Neogene avian fossils from Bulgaria (continued).

Taxa	Collection numbers, NMNHS	Number of bone finds	MNI
<i>Erithacus</i> sp.	203	1	1
Turdidae gen.	289	1	1
<i>Pyrhcorax</i> sp. (cf. <i>pyrrhcorax</i>)	30	1	1
<i>Pyrhcorax</i> cf. <i>graculus</i>	12244	1	1
<i>Pyrhcorax</i> sp.	209-221; 222-228	20	3
? <i>Nucifraga</i> sp.	183	1	1
<i>Pica</i> sp. n.	146; 147; 229-235; 340-344	14	2
<i>Corvus</i> cf. <i>Monedula</i>	240; 290; 292; 293; 347-376;	34	5
<i>Corvus</i> sp.	255; 286; 312-313	4	1
Corvidae gen.	195; 286; 287	3	3
<i>Sturnus</i> sp. n.	163; 268; 269	3	1
<i>Emberiza</i> sp.	28; 125; 186; 205	4	1
Emberizidae gen.	38-39	2	1
Oscines fam.	25; 26; 206-208; 271; 459	7	17
Aves indet.	40; 46; 345; 346; 3003; 3004; 3006; 11617; 11691-11769; 11774; 11777-11783; 11785-11790; 11793; 11797; 11800; 11803-11810; 11812-11818; 12294; 12296-12297	122	12
Subtotal		1589	185
11. Slivnitsa			
Botaurinae gen.	431	1	1
<i>Geronticus balcanicus</i>			
Boev, 1998	14; 453	2	1
<i>Anas</i> sp.	433	1	1
cf. Aquilinae gen.	452	1	1
<i>Falco</i> sp. ex. gr. <i>tinnunculus</i>	438	1	2
<i>Chauvireria</i> sp. n.	3100; 3060; 3061; 3076; 3063-3083; 3085-3098; 3107-3110; 3099; 3101-3105; 3111-3115	54	4
<i>Turdus</i> cf. <i>Philomelos</i>	443	1	1
Turdidae gen.	442	1	1
<i>Coccothraustes balcanicus</i>			
Boev, 1998	440	1	1
<i>Corvus</i> sp. ex gr. <i>monedula</i>	441; 447-450	5	1
<i>Pyrhcorax</i> sp.	439; 445	2	1
aff. <i>Lullula</i> sp.	430	1	1
<i>Emberiza</i> sp.	446	1	1
<i>Corvus</i> aff. <i>Praecorax</i>	432	1	1
<i>Corvus</i> sp.	425; 435; 437; 441; 444	5	1
Corvidae gen.	429	1	1
Oscines fam.	11671; 11681-11683	4	2

TABLE 2. Taxonomic composition of the Neogene avian fossils from Bulgaria (continued).

Taxa	Collection numbers, NMNHS	Number of bone finds	MNI
Aves indet.	11668; 11669; 11672-11680; 11684-11690	18	4
Subtotal		101	26
12. Balsha			
<i>Lagopus</i> sp. (cf. <i>lagopus</i>)	12315	1	1
cf. <i>Lagopus</i> sp.	12313; 12314	2	1
Subtotal		3	2
Total		1766	236

CN Bulgaria). 150 m a. s. l. 2-nd half of the Middle Ruscinian (MN 15; 3,3-3,1 Ma) (Popov and Delchev, 1997).

7. Sofia - 1 (42.39 N, 23.17 E; UTM grid: GN 02). The Juzhen Park of Sofia City (Sofia City District; W Bulgaria). 600 m a. s. l. Late Miocene (MN 11-13) - (most probably) Early Pliocene (MN 14-15) (S. Breskovski, pers. comm.). The site is included in the list only by the published data of Popov *et al.* (1921) about collected and undetermined avian bones. Later these finds were lost. Whereabouts of the remains are unknown (Boev, 1996).

8. Sofia - 2 (42.39 N, 23.17 E; UTM grid GN 02). The Juzhen Park of Sofia City (Sofia City District; W Bulgaria). 600 m a. s. l. The find comes from at 6,00 - 6,50 m depth. Early Pliocene (Ruscinian, MN 14; 5,0 - 4,5 mya).

9. Dorkovo (42.05 N, 24.08 E; UTM grid KG 65). Vicinity (1 km S of the Dorkovo village; Pazardzhik District; CS Bulgaria). 850 m a. s. l. Early Pliocene (Ruscinian; MN 14; 5,0 - 4,5 mya) (Thomas *et al.*, 1986).

10. Varshets (43.13 N, 23.17 E; UTM grid: FN 89). A ponor in a rocky hill, 6 km NNE of the town of Varshets (Montana District; NW Bulgaria). 650 m a. s. l. Late Pliocene (Middle Villafranchian; Villanyian; MN 17) (Spasov, 1997; V. Popov, pers. comm.).

11. Slivnitsa (42.48 N, 23.05 E; UTM grid: FN 64). A destroyed cave in a rocky hill, now a stone quarry, 3 km WNW from the town of Slivnitsa (Sofia District;

W Bulgaria). 650 m a. s. l. Late Pliocene (the final of the Middle Villafranchian; Villanyian; first half of MNQ 18 a; ca. 1, 85 mya (Spasov, 1998).

12. Balsha (42.52 N, 23.17 E; UTM grid: FN 84). A stone quarry in the vicinity of the Balsha village (Sofia District; W Bulgaria). 600 m a. s. l. Late Pliocene (the end of the Middle Villafranchian /Villanyian) - the beginning of the Early Pleistocene (Late Villafranchian /Biharian; MNQ 18-19) (N. Spasov, pers. comm).

Evolutionary, Paleornithogeographical and Paleoecological Implications

The complete taxonomic list of the Neogene birds from Bulgaria is given in Table 2. Several papers described a series of new avian taxa (Burchak-Abramovich and Nikolov, 1984; Boev, 1995, 1997, 1998a, b, c, d, e, 1999a, b, c, d, e, f, g, 2000a, b, c; Boev and Kovachev, 1999) listed in Table 2. Here we provide a short comment on the significance of the newly described taxa in phylogeny, zoogeography and paleoecology.

The relationships among different species of the genus *Geronticus* Wagler, 1832 are insufficiently known. Having in mind the former distribution of *G. eremita* Linnaeus, 1758 in S and C Europe until 18th century (including the Balkan Peninsula) we suggest that the Middle Villafranchian Balkan Bald Ibis (*Geronticus balcanicus* Boev, 1998) was possibly a

more primitive sister taxon to the recent *G. eremita* and that it was extinct in the Pleistocene (Boev, 1998b, 2000a). There is no convincing paleornithological data to consider the genus *Geronticus* to be of an African origin. Its presence in Europe has been well documented from the Middle Miocene, through the end of the Upper Pliocene, Early Holocene, to present time.

The finds of *Cygnus verae* Boev, 2000 and *Silurus serdicensis* Toulou, 1877-1878 indicates that there existed a large water basin in the present day Sofia Kettle (Boev, 2000b).

The occurrence of dabbling ducks indicates the presence of large water bodies with open surface of steady or slow-moving water at the site of Dorkovo. The find of *Balcanas pliocaenica* Boev, 1998 indicates that a water basin existed along the stream of the Palaeo-Mutnitsa river, which flows in the vicinity of the site (Boev, 1998c).

The find of *Accipiter* sp. ex gr. *gentilis* represents the oldest record of the genus *Accipiter* Brisson, 1760 and provides the second fossil species of that genus. This taxon possibly lies on the same evolutionary lineage as the recent *A. gentilis* and may be considered an ancestor of the Goshawk (Boev, 2001).

The find of *Buteo spassovi* Boev, 1999 from Hadzidimovo represents the second record in Europe (and the Western Palearctic). At the same time, it constitutes the second European fossil species of the genus *Buteo* Lacepede, 1799 (Boev and Kovachev, 1999). The two Miocene sites (La Grive-Saint-Alban and Hadzidimovo) now mark the S European distribution of the genus *Buteo* throughout the Miocene of Europe.

The fossil history of falcons in Europe and all over the world is very scanty. The only yet known sites of Neogene finds of the genus *Falco* Linnaeus, 1758, lie in the C and SE Europe and they together provide the only fossil record of falcons on the continent during the whole Tertiary. Only two fossil species of *Falco* have been described in the Western Palearctic. They represent two different groups - the "*tinnunculus*" group (from the Miocene) and the "*cherrug*" group (from the Pleistocene). Regardless of the southern origin of the genus, it is clear that by the beginning of the Neogene, the falcons roamed widely the southern parts of the European continent (Boev, 1999b).

The finds of *Gyps* sp. n. are the first fossil record of the genus *Gyps* Savigny, 1809 from Europe. They mark its presence at least from the Late Pliocene (Villanyian).

The finds of *Tetrao partium* (Kretzoi, 1962) from Bulgaria provide further data about the geographical and stratigraphical distribution of this galliform. The remains from Varshets show that the species occurred not only in the West and Central Europe, but also in the Eastern part of the continent in the Middle Villafranchian. The record from Bulgaria is the earliest find of the species on the Balkans and marks the southern limit of its range (Boev, 1999e).

The find of *Tetrao rhodopensis* Boev, 1998 from Bulgarian Ruscinian of Dorkovo enriches our knowledge of the origin and distribution of Tetraonids in general. Summary data of Janossy (1991) indicate that up to all the 1991 tetraonid fossils were younger than the end of Ruscinian. The genus *Tetrao* Linnaeus, 1758 ("*urogallus*" lineage) is indicative of a forest landscape and it occurs mainly in the coniferous and mixed coniferous-deciduous forest zone in the mountains of Southern Palearctic. The presence of *Tetrao* among the fossils of Dorkovo (Boev, 1998c) confirms the proposal that a forest landscape might have occurred in the region of the site (Thomas *et al.*, 1986).

The Bulgarian find of *Lagopus* aff. *atavus* Janossy, 1974 is among the oldest records of the genus *Lagopus* Brisson, 1760, and it marks the southernmost distribution of *Lagopus* in the Tertiary (Boev, 2001). The fact that the genera *Lagopus* and *Pavo* Linnaeus, 1758 coexisted in the Early Pliocene of SE Europe is most interesting. It reveals an association that so far has been unknown (Boev, 1998d). The numerous remains of *L. balcanicus* Boev, 1995 confirm the forested savanna-forest or forest-steppe origin of the genus *Lagopus* (Boev, 1995).

The Bulgarian finds of the peafowl suggest that *Pavo bravardi* (Gervais, 1849) inhabited the South-European forests, both in the West and the East of the continent, but possibly not later than the Late Miocene - Early Pliocene (Boev, 2001).

Numerous remains (over 1160 bones and bone fragments from at least 49 individuals) of an unknown small phasianid of *Perdicinae* have been described as a new genus and species - *Chauvireria balcanica* Boev,

1997. This Villanyian galliform is closely related to the genus *Palaeocryptonyx* Deperet, 1892 (Boev, 1997).

The South-Asian region is possibly the center of speciation for the genus *Porzana* Vieillot, 1816. It seems that the genus appeared in the Western Palearctic (Europe) in the Late Pliocene. The recorded taxa (2 fossil species) from Bulgaria added new data to the Neogene fauna of Rallidae. We consider *Porzana* sp. n. from Varshets to be a possible ancestor, or (most probably) a fossil sister species to *Porzana porzana*. *Porzana* sp. n. belongs to the *P. porzana* lineage, clearly distinguished from the *P. pusilla* lineage. The second rallid, *Gallinula balcanica* Boev, 1999 from the Middle Villafranchian (Villanyian), is considered to be a direct ancestor of the recent *G. chloropus* Linnaeus, 1758 (Boev, 1999c).

The presence of remains of *Otis* aff. *khosatzkii* Bochenski and Kurochkin, 1987, indicates an open land habitat with grass vegetation and scant bushes or scattered trees. The medium-sized Khosatzkiy's bustard probably was widespread throughout S and E Europe in the Late Pliocene before the first Pleistocene glaciations. According to the available data, its range encompassed the peri-Carpathian region, marking (South-) East-European distribution (Boev, 1999f).

Until now, the earliest finds of the genus *Actitis* Illiger, 1811 was from the Late Pleistocene. The find of *Actitis balcanica* Boev, 1998 constitutes the earliest record of *Actitis*. As the major part of the breeding range of this genus lies in the Palearctic region, and the earliest finds originate from Europe, we consider the genus *Actitis* to have evolved in the Pliocene S-European fresh-water shore habitats. It is quite possible that *A. balcanica* was the direct ancestor of recent Palearctic *A. hypoleucos* Linnaeus, 1758 (Boev, 1998a).

The Pliocene swiftlet *Apus baranensis* Janossy, 1977, was spread at least in Central (S Hungary) and Southeastern (W Bulgaria) Europe. We may expect further finds of this species in other southern regions of the continent - other countries of the Balkan Peninsula, France and Italy (Boev, 2000b).

Regulus bulgaricus Boev, 1999 is the only known fossil kinglet. The postglacial origin of the coniferous forest belt in the Northern Hemisphere makes it possible that *R. bulgaricus* is the ancestor of *R. ignicapillus* (Temminck, 1820). *R. regulus* (Linnaeus,

1758) is more 'boreal', inhabiting chiefly the coniferous massifs of the Temperate zone at present, a habitat that obviously did not exist in the surroundings of the site before the end of the Pliocene (Boev, 1999d).

The record of *Corvus* aff. *praecorax* (Deperet, 1890) could be the first proof for the existence of that species in the very end of the Pliocene on the Balkans (Boev, 1999a).

Possibly, the Middle Villafranchian crossbill *Loxia patevi* Boev, 1999, of the Balkan Mountains has inhabited the light mixed open broadleaf forests of park type, which have grown on the lots alternating with the steppe grassland lots. At present the genus *Loxia* Linnaeus, 1758 is an indicator of a forest habitat (Boev, 1999g).

Coccothraustes balcanicus Boev, 1998, is considered as the Late Pliocene direct ancestor of recent hawfinches (*C. coccothraustes* Linnaeus, 1758) in W Palearctic. A taxonomical identity of *C. balcanicus* and *C. simeonovi* Boev, 1998, cannot be excluded - both date from the end of SE European Middle Villafranchian. Because of the lack of analogous skeletal remains from both sites, and the chronological difference (about 0,5 my), we distinguished the finds from Slivnitsa and Varshets as two different species until additional homologous remains are collected (Boev, 1998e). In any case, the late Pliocene finds from Varshets and Slivnitsa provide the earliest known record of the genus *Coccothraustes* Brisson, 1760. Both species mark the distribution of a forested landscape in the vicinities of the sites during the Villanyan (Boev, 1998e).

Conclusions

A complete list of the Neogene birds from Bulgaria is presented for the first time. A total of 96 taxa are established, 17 of them are new to science. Two taxa belong to new genera, also described from the Bulgarian Neogene.

The Neogene avian record of Bulgaria includes 12 orders (Pelecaniformes, Ciconiiformes, Anseriformes, Accipitriformes, Falconiformes, Galliformes, Gruiformes, Charadriiformes, Columbiformes, Strigiformes, Apodiformes, and Passeriformes), represented by 24 recent families. The chronostratigraphical distribution of the number of families is as

follows: Middle Miocene - 1, Late Miocene - 5, Early Pliocene - 6, and Late Pliocene - 22.

Six fossil species, known from other parts of Europe, have been first identified from Bulgaria and the Balkans, respectively: *Tetrao partium*, *Lagopus* aff. *atavus*, *Pavo bravardi*, *Otis khosatzkii*, *Apus baranensis*, and *Corvus* aff. *praecorax* (Boev, 1999a).

In addition, 2 new genera (*Balcanas* and *Chauvireria*) and 16 new species have been described on the basis of the Neogene avian finds from Bulgaria: *Phalacrocorax serdicensis* Burchak-Abramovich, Nikolov, 1984, *Geronticus balcanicus*, *Anser thraceiensis* Burchak-Abramovich, Nikolov, 1984, *Balcanas pliocaenica*, *Cygnus verae*, *Buteo spassovi*, *Falco bakalovi*, *Tetrao rhodopensis*, *Lagopus balcanicus*, *Chauvireria balcanica*, *Gallinula balcanica*, *Actitis balcanica*, *Regulus bulgaricus*, *Coccothraustes simeonovi*, *Coccothraustes balcanicus*, and *Loxia patevi*.

The Bulgarian Neogene avian record is an integrated and important part of the Neogene bird fauna of Europe and significantly contributes to our understanding of the avian evolution in Europe. The site of Varshets is not only the richest Neogene site of Bulgaria, but also the richest known Late Pliocene (Villanyian) site of Europe.

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