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Paleobiodiversity of the Vrachanska Planina Mountains in the Villafranchian: a case study of the Varshets (Dolno Ozirovo) Early Pleistocene locality of fossil fauna and flora

ZLATOZAR BOEV

Abstract. The paper summarizes all data on the fossil biota established from the richest Bulgarian paleontological site. Data for a total of 166 taxa (ca. 7000 identifiable findings) of higher plants and invertebrate and vertebrate animals are presented. Their importance to the science and the paleoecology of the SE Europe is discussed. Records: Magnoliophyta (2 orders, 3 families, 5 taxa), Mollusca (1 order, 2 taxa), Amphibia (2 orders, 5 families, 10 taxa), Reptilia (2 orders, 8 (9) families, 13 taxa), Aves (10 orders, 22 families, 66 taxa), Mammalia (8 orders, 19 families, 70 taxa). Number of new taxa, described from the site: 1 species and 4 subspecies of trees and shrubs (flowering plants), 17 birds (1 genus, 16 species) and 2 mammals. A forest-steppe savannah-like landscape dominated about 2.25 mya in the region of the site.

Key words: Early Pleistocene fauna; Villafranchian biota; Biodiversity; Paleofauna, Fossil birds; Bulgaria; Balkans.

Bulgaria as a country at the crossroads of three continents (Europe, Asia and Africa), located in a region between the four seas (Black, Marmara, Aegean and Adriatic). It is a unique area in terms of paleozoogeography and paleoecology. The country has revealed unique paleontological localities and the locality near Varshets heads the row. At least 102 species of vertebrates from the Early Pleistocene (Middle Villafranchian, 2.25 million years ago) have been found so far there. They represent a unique fauna, so far unknown anywhere in the world. With this diversity, the site ranks first among the sites of that type and age in the world.

The Varshets (Dolno Ozirovo) Early Pleistocene locality of fossil fauna and flora is located in the northwestern foothills of the Vrachanska Mountain It was discovered in 1987 and until 2015 a considerable number of taxa have been identified (Table 1): 1 species and 4 subspecies of trees and shrubs (flowering plants), 16 birds and 2 mammals. One hundred and sixteen taxa have been recorded for the first time for Bulgaria: 5 plants, 10 amphibians, 6 reptiles, 36 birds and 59 mammals.

For a period of 20 years (1995-2015) over 7000 identifiable bone/teeth remains and snail shells and plant seeds have been collected. Among them the absolute dominant is a pardgige-like bird (new genus and species) - *Chauvireria* Boev, 1997 (Partridge of Cécile Mourer-Chauviré), a small phasianid, sized between modern quail and grey partridge, consisting of at least 16.44 % of the collected material (Table 1). The most complete list of the avifauna of the locality has been published by Boev (2007), although a series new taxa have been described since (Table. 1).

Furthermore, new records for the country are some fossil species described by other areas of Europe: partial grouse (*Tetrao partium*), Hozatski's bustard (*Otis khosatzkii*), Beremend Swift (*Apus baranensis*), as well as a kind of a large predatory mammal - megantereon (*Megantereon cultridens*) – mid-sized representative of the family of the saber-toothed felids. Also the site provides the first records of the European jaguar (*Panthera gombaszogensis*) and the giant cheetah (*Acinonyx pardinensis*), as well as over 50 other species of mammals. It is notable that 17 carnivore mammals (over 10 % of the taxa identified) have been recorded in the site. In addition, two new species have been described here among mammals - the small carnivorous (mustelid) mammal Balkan baranogale (*Baranogale balcanica*) and the primitive bank vole (*Clethrionomys primitivus*). Diurnal (and nocturnal) avian raptors (8 taxa) are also well presented.

The composition of the paleoavifauna of Varshets allows to formulate the hypothesis of the savannah, not the boreal forest origin of a whole family of birds - grouses (Tetraonidae) (Boev, 1995a). In the site once coexisted Rock Ptarmigan and bustards – an association which was unknown. Unique is the coexistence of the "openland"/savannah (rhinoceros, cheetahs, horses, antelopes) and "woodland"/ forest (deer, bears, jaguars, lynxes) species of large mammals. Similar is the faunal diversity of birds: The "woodland" hawfinches, bullfinches, chaffinches, woodlarks, and tits, coexisted with the "openland" bustards, ptarmigans, goldfinches, skylarks and crested larks. That is why the locality of Varshets provides best example for the s. c. "mixed" faunas in the Villafranchian. Such a faunal diversity (coexistance) is unknown among all the modern faunas of Europe, Asia and elsewhere.

The most numerous of all bone remains are the small mammals (soricomorph, erinaceomorph, rodents and lagomorphs), followed by those of birds (mainly those of Perdicinae subfamily). Most diverse are the remains of mammals (70 taxa), followed by birds (66 taxa). Among birds, the features of the bone morphology of the starling, magpie, etc. suggests new species also.

The five established (trees and shrubs) – Prebalkan hackberry (*Celtis praebalcanica*), and new hitherto unknown fossil forms of 4 species of shrubs (1) Steppe cherry (*Prunus fruticosa*), (2) Small-flowered black hawthorn (*Crataegus pentagyna*), (3) Scarlet firethorn (*Pyracantha coccinea*) and (4) Blood-twig dogwood (*Swida* [present *Cornus*] *sanguinea*) have been classified by Prof. Emanuil Palamarev as hemixerophytes (Palamarev, 2004). This excellently completes the faunal variety in small and large mammals, birds, and even reptiles and amphibians.

General habitat preferences of the established species (Table 2), "openland", "woodland", intrazonal "rock", and "aquatic" habitats, surprisingly shows an almost equal representation of the former two (openland and woodland) habitats, followed by three to four times less represented s. c. "intrazonal" habitats (rock or aquatic) ones. Thus, the established land fauna and flora shows that forest-steppe landscape, similar to the modern African savannah forest once prevailed in the area (Boev, 1995b; 1999g; 2013a). Obviously, the climate was warmer and drier than today. The present-day climate of the Vrachanska Mnt. is much more temperate-continental and the dominant landscapes are much less plain and open as 2.25 mya ago.

Table 1. Taxonomic list of the fossil plants and animals found in the Early Pleistocene locality near Varshets.

No	Scientific name	English name	Number of finds	New taxon of science	New taxon for the fossil record of Bulgaria	Source
PLANTAE Haeckel, 1866						
MAGNOLIOPHYTA Cronq., Takht. & W. Zimm., 1966						
ROSALES Perleb (1826)						
Ulmaceae Mirbel, 1815						
1	*Celtis praebalcanica* Palamarev, 2004	Prebalkan hackberry	60	+	+	Palamarev (2004)
Rosaceae Jussieu (1789)						
2	*Prunus fruticosa* Pallas, 1784 *fossilis* Palamarev, 2004	Fossil European dwarf cherry	2	+	+	Palamarev (2004)
3	*Crataegus pentagyna* Waldst. & Kit. ex Willdenow, 1800 *fossilis* Palamarev, 2004	Fossil small-flowered black hawthorn	2	+	+	Palamarev (2004)
4	*Pyracantha coccinea* Roemer, 1847 *fossilis* Palamarev, 2004	Fossil scarlet firethorn	6	+	+	Palamarev (2004)
CORNALES Dumort. (1829)						
Cornaceae Bercht. & J. Presl (1825)						
5	*Swida sanguinea* Linnaeus (1753) *fossilis* Palamarev, 2004	Fossil blood-twig dogwood	2	+	+	Palamarev (2004)
						Subtotal: 72[1]

[1] The number of the collected seeds of *Celtis praebalcanica* exceeds 350 (Boev, 1999).

ANIMALIA Linnaeus, 1758						
MOLLUSCA Linnaeus, 1758						
GASTROPODA Cuvier, 1795						
6	Gastropoda terrestria indet. - 1	Land snail - 1	>3			Boev (1991; 2013a)
7	Gastropoda terrestria indet. - 2	Land snail - 2	>3			Boev (1991; 2013a)
						***Subtotal:* >6**
CHORDATA Haeckel, 1874[1][						
AMPHIBIA Blainville, 1816						
CAUDATA Fischer von Waldheim, 1813						
Salamandridae Goldfuss, 1820						
8	*Triturus* Rafinesque, 1815 sp.	Crested newt			+	M. Böhme – unpubl. data
9	Salamandridae sp. indet.	Salamanders/Newts			+	N. Tzankov – unpubl. data
10	*Lissotriton* Bell, 1839 sp.	(Newt)			+	N. Tzankov – unpubl. data
ANURA Fischer von Waldheim, 1813						
Palaeobatrachidae Cope, 1865						
11	Palaeobatrachidae sp. indet.	(Paleobatrachid)			+	M. Böhme – unpubl. data
Pelobatidae Bonaparte, 1850						
12	*Eopelobates* Parker, 1929 sp.	(Eopelobates)			+	M. Böhme – unpubl. data
Ranidae Batsch 1796						
13	*Pelophylax* Fitzinger, 1843 sp.	Water Frog	~		+	M. Böhme – unpubl. data

14	*Rana temporaria* Linnaeus, 1758	Common frog	~		+	M. Böhme – unpubl. data
15	*Rana* cf. *graeca* Boulenger, 1891	Greek stream frog	~		+	M. Böhme – unpubl. data
Bufonidae Gray, 1825						
16	*Bufo* cf. *bufo* (Linnaeus, 1758)	Common toad			+	M. Böhme – unpubl. data
17	*Bufo viridis* (Laurenti, 1768)	European green Toad			+	M. Böhme – unpubl. data
						Subtotal: > 500
REPTILIA Laurenti, 1768						
SQUAMATA Oppel, 1811						
Scincidae Gray, 1825						
18	*Mabuya* (*Trachylepis* cf. *aurata* (Linnaeus, 1758)	Golden grass mabuya			+	M. Böhme – unpubl. data
19	*Mabuya* Fitzinger, 1826 sp.	Mabuya			+	M. Böhme – unpubl. data
Lacertidae Oppel, 1811						
20	*Lacerta* s. l. sp. - 1	(Lizard – 1)				M. Böhme – unpubl. data
21	*Lacerta* s.l. sp. - 2	(Lizard – 2)				M. Böhme – unpubl. data
Anguidae Gray, 1825						
22	*Anguis fragilis* Linnaeus, 1758	Slow Worm			+	M. Böhme – unpubl. data
23	*Pseudopus* aff. *apodus* (Pallas, 1775)	European glass lizard			+	M. Böhme – unpubl. data
Colubridae Oppel, 1811						
24	Colubrinae sp. - 1	(Rat snakes/ etc. - 1)				M. Böhme – unpubl. data

25	Colubrinae sp. - 2	(Rat snakes/ etc. - 2)				M. Böhme – unpubl. data
Natricinae Bonaparte, 1838						
26	Natricinae sp.	(European grass snakes etc.)				M. Böhme – unpubl. data
Viperidae Oppel, 1811						
27	Viperidae sp.	(Vipers)			+	M. Böhme – unpubl. data
Boidae Gray, 1825						
28	? Erycinae Bonaparte, 1831 sp.	(Sand boas etc.)			+	M. Böhme – unpubl. data
TESTUDINES Linnaeus, 1758						
Testudinidae Batsch, 1788						
29	*Testudo* Linnaeus, 1758 sp.	(Tortoises)				M. Böhme – unpubl. data
Emydidae Rafinesque, 1815						
30	*Emys* Duméril, 1805 sp.	(Pond turtles)				N. Tzankov – unpubl. data
Subtotal: > 1500						
AVIALE Gauthier, 1986						
AVES Linnaeus, 1758						
ANSERIFORMES (Wagler, 1831)						
Anatidae Vigors, 1825						
31	Anatinae gen.	Dabbling ducks	1			Boev (2007)
ACCIPITRIFORMES Vieillo1816						
Accipitridae (Vieillot, 1816)						
32	*Gyps bochenskii* Boev, 2010	Gryffon of Zygmunt Bocheński	6	+	+	Boev (2010)
33	*Aquila kurochkini* Boev, 2013b	Eagle of Evgeniy Kurochkin	8	+	+	Boev (2013b)
34	*Circaetus haemusensis* Boev, 2015a	Haemus Mountain Snake-eagle		+		Boev (2015a)

35	*Buteo* sp.	Buzzard	1		+	Boev (2002; 2007)
36	*Accipiter* sp.	Goshawks/ sparrowhawk	2		+	Boev (1996; 2002; 2007)
37	Acctpitndae gen.	(Hawks etc.)	1			Boev (2002; 2007)
FALCONIFORMES (Sharpe, 1874)						
Falconidae Vigors, 1824						
38	*Falco bakalovi* Boev, 1999a	Falcon of Petar Bakalov	27	+	+	Boev (1999a; 2011)
GALLIFORMES Temminc1820						
Tetraonidae Vigors, 1825						
39	*Lagopus balcanicus* Boev, 1995a	Balkan ptarmigan	41	+	+	Boev (1994; 1995a)
40	*Tetrao partium* (Kretzoi, 1962)	Partial grouse	15		+	Boev (1994; 1999b 2002)
41	*Tetrao/Lagopus*	Grouse/Ptarmigan	3			Boev (1994; 1996; 2002)
Phasianidae Vigors, 1825						
42	*Chauvireria balcanica* Boev, 1997	Balkan Partridge of Cécile Mourer-Chauviré	1138	+		Boev (1997)
43	cf. *Perdix* sp.	Grey partridge	13			Boev (1991)
44	Perdicinae gen. indet.	Partidge	1			Boev (2002; 2007)
45	Phasianidae gen. indet.	Phasianid	15			Boev (2007)
GRUIFORMES Coues, 1884						
Rallidae Reichenbach, 1882						
46	*Gallinula balcanica* Boev, 1999c	Balkan Moorhen	1	+	+	Boev (1999c)
47	*Porzana botunensis* Boev, 2015b	Crake of Botunya River)	1	+	+	Boev (2007; 2015b)

Otitidae Gra1845						
48	*Otis* cf. *khosatzkii*	Khosatzkii's bustard	5		+	Boev (1999d)
49	Otididae gen. indet.	Bustard	2			Boev (1996; 1999d; 2002; 2007)
CHARADRIIFORMES Huxley, 1867						
Scolopacidae Vigors, 1825						
50	*Actitis balcanica* Boev, 1998a	Balkan sandpipper	1	+	+	Boev (1998a)
51	Charadriiformes fam. indet.	(Waders etc.)	1			Boev (2002; 2007)
COLUMBIFORMES (Latham, 1790)						
Columbidae (Illiger, 1811)						
52	*Columba* sp. - 1	Wood-pigeon	2		+	Boev (1997; 2002; 2007)
53	*Columba* sp. - 2	Wood-pigeon	4		+	Boev (1997; 2002; 2007)
54	*Streptopelia* sp.		3		+	Boev (2002; 2007)
STRIGIFORMES (Wagler, 1830)						
Strigidae Vigors, 1825						
55	*Athene* sp.	Little owl	1		+	Boev (2002; 2007)
APODIFORMES Peters, 1940						
Apodidae (Hartert, 1897)						
56	*Apus baranensis* Janossy, 1977		9		+	Boev (2000)
PASSERIFORMES (Linnaeus, 1758)						
Alaudidae (Vigors, 1825)						
57	*Alauda xerarvensis* Boev, 2012	Dry-field skylark	4	+	+	Boev (2012)
58	*Galerida bulgarica* Boev, 2012	Bulgarian crested lark	2	+	+	Boev (2012)

59	*Eremophila prealpestris* Boev, 2012	Pre-Alpine horned lark	2	+	+	Boev (2007; 2012)
60	*Lullula balcanica* Boev, 2012	Balkan woodlark	1	+	+	Boev (2007; 2012)
61	*Melanocorypha donchevi* Boev, 2012	Steppe lark of Stefan Donchev	3	+	+	Boev (2007; 2012)
Motacillidae Vigors, 1825						
62	*Anthus* sp.	Pipit	3		+	Boev (1996; 1997; 2002; 2007)
63	*Motacilla* sp.	Wagtail	1		+	Boev (1997; 2002; 2007)
Fringillidae Vigors, 1825						
64	*Coccothraustes simeonovi* Boev, 1998b	Hawfinch of Simeon Simeonov	6	+	+	Boev (1998b)
65	*Loxia patevi* Boev, 1999e	Crossbill of Pavel Patev	5		+	Boev (1999e)
66	*Fringilla* cf. *coelebs*	Common chaffinch	8		+	Boev (1994; 2007)
67	*Fringilla* sp.	Finch	4			Boev (2007)
68	*Carduuelis* cf. *carduelis*	European goldfinch	5		+	Boev (2007)
69	*Carduelis* sp.	Finches/ Linnets/ Serins	7			Boev (1997; 2007)
70	*Pyrrhula* sp.	Bullfinch				Boev (1997)
71	Fringillidae gen. indet.	Finches	8			Boev (2007)
Paridae Boie, 1826						
72	*Parus* sp. ex gr. *major*	Great tit	3		+	Boev (2002; 2007)
73	*Parus* sp.	Tit	5			Boev (1997; 2002; 2007)
74	Paridae gen.	Tits	1			Boev (2002; 2007)

Sylviidae (Vigors, 1825)						
75	cf. Sylviidae gen.	Old World Warblers	1			Boev (2002; 1997)
Regulidae, Vigors, 1825						
76	*Regulus bulgaricus* Boev, 1999f	Bulgarian kinglet	1	+	+	Boev (1999f)
Muscicapidae Vigors, 1825						
77	cf. *Muscicapa* sp.	Flycatcher	1			Boev (1996; 2002; 1997)
Corvidae Vigors, 1825						
78	*Pyrrchocorax* cf. *pyrrhocorax*	Red-billed chough	1			Boev (2002; 2007)
79	*Pyrrhocorax* cf. *graculus*	Yellow-billed chough	12			Boev (1991; 1994; 2002)
80	*Pyrrhocorax* sp.	Chough	20			Boev (1996; 2002; 2007)
81	*Nucifraga* sp.	Nutcracker	1		+	Boev (2002; 2007)
81	*Pica* sp.	Magpie	14		+	Boev (2002; 2007)
81	*Corvus* cf. *monedula*	Western jackdaw	34			Boev (1991; 2002)
84	*Corvus* sp.	Crow/Rook	4			Boev (1997; 2002)
85	Corvidae gen. indet.	Corvids	3			Boev (2002; 2007)
Sturnidae Vigors, 1825						
86	*Sturnus* sp.	Starling	3		+	Boev (1994; 1996; 2002; 2007)

Turdidae Bonaparte, 1838						
87	*Turdus* sp. ex gr. *merula*	Blackbird	2		+	Boev (2002; 2007)
88	*Turdus* sp.	Trush	2			Boev (1997; 2002; 2007)
89	*Turdus* sp. ex gr. *philomelos*	Song trush	3			Boev (2002; 2007)
90	*Turdus* cf. *iliacus*	Redwing	1		+	Boev (2002; 2007)
91	*Erilhacus* sp.	Robin	1		+	Boev (2002; 2007)
92	Turdidae gen. indet.	Trushes	1			Boev (2002; 2007)
Emberizidae Vigors, 1831						
93	*Emberiza* sp.	Bunting	4		+	Boev (1996; 1997; 2002; 2007)
94	Emberizidae gen. indet.	Buntings	2			Boev (2002; 2007)
Aves indet.						
95	Oscines fam. indet.	Song birds	7			Boev (2002; 2007)
96	Aves ordo indet.	Birds	156			Boev (2007)
						Subtotal: 1589
MAMMALIA Linnaeus, 1758						
SORICOMORPHA Gregory, 1910						
Soricidae G. Fischer, 1814						
97	*Beremendia fissidens* (Petenyi, 1864)	(Red-toothed shrew)	218		+	Popov (2004b); Rzebik-Kowalska, Popov (2005)

98	*Asoriculus gibberodon* (Petenyi, 1864)	(Red-toothed shrew)	256		+	Popov (2004b); Rzebik-Kowalska, Popov (2005)
99	*Asoriculus kubinyii* (Kormos, 1934)[2]	(Red-toothed shrew)			+	Popov (2004b)
100	*Petenyia hungarica* Kormos, 1934	Hungarian petenyia shrew	>45		+	Popov (2004b); Rzebik-Kowalska, Popov (2005)
101	*Mafia* cf. *csarnotensis* Reumer, 1984	Csarnota mafia shrew			+	Popov (2004b); Rzebik-Kowalska, Popov (2005)
102	*Sorex* cf. *minutus* Linnaeus, 1766	Eurasian pygmy shrew	39		+	Popov (2004b); Rzebik-Kowalska, Popov (2005)
103	*Sorex runtonensis* Hinton, 1911	Runton's shrew	22		+	Popov (2004b); Rzebik-Kowalska, Popov (2005)
ERINACEOMORPHA Gregory, 1910						
Erinaceidae Fischer von Waldheim, 1817						
104	*Erinaceus* sp.	Hedgehog				Popov (2004a)
105	*Erinaceus* cf. *lechei* Kormos, 1934	Leche's hedgehog	9		+	Popov (2004a); Rzebik-Kowalska, Popov (2005)

[2] Recently considered as *Asoriculus gibberodon* (Petenyi, 1864) (Mészáros, L. G. 1999).

Talpidae Fischer von Waldheim, 1817						
106	*Talpa* cf. *levantis* Thomas, 1906	Levant mole	59			Popov (2004a); Rzebik-Kowalska, Popov (2005)
107	*Talpa* cf. *csarnotana* Kretzoi, 1959	Csarnota mole			+	Popov (2004a)
108	*Talpa* sp.	Mole				Popov (2004a)
109	*Scalopoides* cf. *copernici* (Skoczen, 1980)	Copernicus' SCALOPINE	4		+	Popov (2004a); Rzebik-Kowalska, Popov (2005)
110	*Quyania polonica* (Skoczen, 1980)[3]	Polish neurotrichus mole	6		+	Popov (2004a); Rzebik-Kowalska, Popov (2005)
111	*Desmana* cf. *polonica* Pashkov et Topachevskyj, 1990	Polish desman	4		+	Popov (2004a); Rzebik-Kowalska, Popov (2005)
LAGOMORPHA Brandt, 1855						
Leporidae Fischer, 1817						
112	*Trischizolagus* sp.					Popov (2004b)
CHIROPTERA Blumenbach, 1779						
Rhinolophidae Gray, 1825						
113	*Rhinolophus* cf. *lissiensis* (Mein, 1964)	(Horseshoe bat)			+	Popov (2004b)
114	*Rhinolophus* ex gr. *ferrumequinum* (Schreber, 1774)	Greater horseshoe bat				Popov (2004b)
Vespertilionidae Gray, 1821						
115	*Vespertilio* sp.	(Evening bat)			+	Popov (2004b)
116	*Myotis* cf. *blythii* Tomes, 1857	Lesser mouse-eared bat			+	Popov (2004b)

[3] Recently considered as *Neurotrichus polonicus* Skoczeń, 1980 (Rzebik-Kowalska, B. 2014).

117	*Myotis* cf. *gundersheimensis* Heller, 1936	Estramos mouse-eared bat			+	Popov (2004b)
118	*Myotis estramonensis* Topal, 1983	Shaub's mouse-eared bat			+	Popov (2004b)
119	*Myotis* cf. *shaubi* Kormos, 1934	Mouse-eared bat			+	Popov (2004b)
120	*Myotis* cf. *exillis* He1ler, 1936	Mouse-eared bat			+	Popov (2004b)
121	*Plecotus* cf. *crassidens* Kormos, 1930	Long-eared bats			+	Popov (2004b)
122	*Miniopterus schreibersii* (Kuh1, 1819)	Common bent-wing bat				Popov (2004b)
RODENTIA Bowdich, 1821						
Cricetidae J. Fischer, 1817						
123	*Cricetus runtonensis* (Newton, 1909)	Runton's hamster			+	Popov (2004b)
124	*Ungaromys nanus* Kormos, 1933	Lesser Hungarian vole			+	Popov (2004b)
125	*Clethrionomys primitivus* Popov, 2001[4]	Primitive red-backed vole	547	+	+	Popov (2004b)
126	*Cseria opsia* Rabeder, 1981	(Cseria vole)	23		+	Popov (2004b)
127	*Borsodia petenyii* (Mehely, 1914)	Petenyi's vole	5		+	Popov (2004b)
128	*Villanyia exilis* Kretzoi, 1956	Slender villany vole			+	Popov (2004b)
129	*Villanyia petenyii*	Petenyii's villany vole			+	Popov (2004b)
130	*Villanyia altisomosa*	(Villanyi vole)			+	Popov (2004b)
131	*Castillomys* sp.	(Castile mouse)			+	Popov (2004b)
132	*Mimomys pliocaenicus* Forsyth Major, 1902	Pliocene vole	790		+	Petrov (1992); Popov (2001; 2004b)
133	*Mimomys* (*Pusillomimus*) *reidi* Hinton, 1910	Reid's vole	483		+	Popov (2001; 2004b)
134	*Mimomys* (*Pusillomimus*) *stenokorys* Rabeder, 1981	(Stenokorys vole)	385		+	Petrov (1992; 2001; 2004b)
Muridae Illiger, 1811						
145	*Sylvaemus dominans* Kretzoi, 1959				+	Popov (2004b)
136	*Rhagapodemus* sp.				+	Popov (2004b)
Gliridae Muirhead in Brewster, 1819						
137	*Myomimus* sp.	Mouse-tailed dormouse			+	Popov (2004b)

[4] Recently the genus *Clethrionomys* Tilesius, 1850 is considered as *Myodes* Pallas, 1811 (Musser, Carleton. 2005).

138	*Glis minor* Kowalski, 1956	Lesser edible dormouse			+	Popov (2004b)
139	*Glis* cf. *sackdillingensis* (Heller, 1930)	Sakdillingen edible dormouse			+	Popov (2004b)
Spalacidae Gray, 1821						
140	*Pliospalax compositodontus* (Topachevskyi, 1969)	(Pliocene subterranean mole-rat)			+	Popov (2004b)
CARNIVORA Bowdich, 1821						
Canidae G. Fischer de Waldheim, 1817						
141	*Canis* ex gr. *etruscus* Major, 1877	Etruscan jackal			+	
142	*Vulpes alopecoides* F. Major, 1877	Bald fox	2		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
143	*Nyctereutes* cf. *tingi* Tedford et Qiy, 1991	Ting's raccoon dog	>3		+	Spassov (1997] 2000); Spassov, Cregut-Bonnoure (1999)
Ursidae G. Fischer de Waldheim, 1817						
144	*Ursus* cf. *wenzensis* Stach, 1953	Weze bear			+	
145	*Ursus minimus* D. de Chabriol, Bouillet, 1827 - *U. etruscus* Cuv. 1823	Lesser bear			+	Spassov (1997); Spassov, Cregut-Bonnoure (1999)
Mustelidae G. Fischer de Waldheim, 1817						
146	*Martes wenzensis* Stach, 1959 - *M. vetus* Kretzoi, 1942	Weze martin	1		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)

147	*Pannonictis ardea* (Bravard, 1828)	(Pannonictis mustelid)	1		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
148	*Vormela petenyii* Kretzoi, 1942	Petenyi's marbled polecat	2		+	Spassov (2000; 2001); Spassov, Cregut-Bonnoure (1999)
148	*Meles thorali* Viret, 1951	Thoral's badger	2		+	Spassov (1997; 2000)
150	*Baranogale balcanica* Spassov, 2001	Balkan baranogale		+	+	Spassov (2000; 2001)
		Hyaenidae Gray, 1821				
151	Hyaenidae gen. (non P. *breviroslris*)	(Hyaena)	3			Spassov (2000)
152	*Pliocrocuta perrieri* (Croizet, Jobert, 1828)	Perrier's hyaena	1		+	Spassov (1997; 2000) ; Spassov, Cregut-Bonnoure (1999)
		Felidae Waldheim, 1817				
153	*Lynx issiodorensis issiodorensis* (Croizet, Jobert, 1828)	Issoire lynx			+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
154	*Panthera* cf. *gombaszogensis* (Kretzoi, 1938)[5]	European jaguar			+	

[5] Recently considered as *Panthera onca gombaszoegensis* (Kretzoi, 1938) (Moll et al., 2011).

155	*Acinonyx pardinensis* Croizet, Jobert, 1828	Giant cheetah	>4		+	Spassov (1997; 2000; 2011); Spassov, Cregut-Bonnoure (1999)
156	*Viretailurus* aff. *schaubi* (Hemmer, 1964)[6]	Owen's panther	>2		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
157	*Megantereon cultridens* (Cuvier, 1824)	Long-toothed megantereon	2		+	Boev (2008)
ARTIDACTYLA Owen, 1848						
Cervidae Goldfuss, 1820						
158	cf. *Cervus philisi* Schaub, 1941[7]	Philis' deer	>3		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
159	*Eudadoceros* cf. *senezensis seneszensis*[8] (Deperet, 1910)	(Senez well-branched antler Deer)			+	Popov (2004)
160	*Eudadoceros senezensis* cf. *vireti* Heintz, 1970	(Senez well-branched antler deer)	~		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
161	*Eucladoceros ctenoides*	Well-branched antler				Spassov (2005)
162	Cervidae gen. et sp. indet.	Deers	>2			Spassov (1997; 2000)

[6] Recently considered as *Puma pardoides* (Owen, 1846).

[7] Recently considered as *Metacervoceros rhenanus* (Dubois, 1904).

[8] After Nikolay Spassov (NMNHS) this subspecies is not found in the locality.

Bovidae Gray, 1821						
163	*Megalovis* aff. *latifrons* Schaub, 1923	Wide-fronted megalovis	>2		+	Spassov (1997; 2000); Spassov, Cregut-Bonnoure (1999)
164	*Gazellospira* sp.	Spiral-horned gaszella/antelope	1			Spassov (1997); Spassov, Cregut-Bonnoure (1999)
PERISSODACTYLA Owen, 1848						
Rhinocerotidae Gray, 1820						
165	cf. *Stephanorhinus etruscus*	Etruscan rhinoceros				Spassov (2005)
Equidae Gray, 1821						
166	*Equus stenonis vireti* Prat, 1964	Stenon's horse	>2		+	Spassov (1997; 2000)
						Subtotal: >2976
						Total: >6921

Table 2. Habitat distribution of the established taxa from the Early Pleistocene locality near Varshets.

No	Scientific name	Open-land	Wood-land	Rock	Aquatic
1	*Celtis praebalcanica*	+			
2	*Prunus fruticosa fossilis*	+			
3	*Crataegus pentagyna fossilis*	+			
4	*Pyracantha coccinea fossilis*	+			
5	*Swida sanguinea fossilis*	+			
6	Gastropoda terrestria indet. - 1				
7	Gastropoda terrestria indet. - 2				
8	*Triturus* sp.				+
9	Salamandridae sp. indet.				+
10	*Lissotriton* sp.				+
11	Palaeobatrachidae sp. indet.				
12	*Eopelobates* sp.	+			
13	*Pelophylax* sp.				+
14	*Rana temporaria*				+
15	*Rana* cf. *graeca*				+
16	*Bufo* cf. *bufo*		+		
17	*Bufo viridis* [1]			+	
18	*Mabuya* (*Trachylepis* cf. *aurata*)				
19	*Mabuya* sp.				
20	*Lacerta* s. l. sp. - 1				
21	*Lacerta* s.l. sp. - 2				
22	*Anguis fragilis*		+		
23	*Pseudopus* aff. *apodus*	+			
24	Colubrinae sp. - 1				
25	Colubrinae sp. - 2				
26	Natricinae sp.				+
27	Viperidae sp.				
28	? Erycinae	+			
29	*Testudo* sp.	+			
30	*Emys* sp.				+
31	Anatinae gen.				+
32	*Gyps bochenskii*	+			
33	*Aquila kurochkini*		+		
34	*Circaetus haemusensis*	+			
35	*Buteo* sp.		+		
36	*Accipiter* sp.		+		
37	Acctpitndae gen.		+		
38	*Falco bakalovi*	+			
39	*Lagopus balcanicus*	+			
40	*Tetrao partium*		+		
41	*Tetrao/Lagopus*				
42	*Chauvireria balcanica*	+			
43	cf. *Perdix* sp.	+			
44	Perdicinae gen. indet.				
45	Phasianidae gen. indet.				
46	*Gallinula balcanica*				+
47	*Porzana botunensis*				+
48	*Otis* cf. *khosatzkii*	+			

49	Otididae gen. indet.	+			
50	*Actitis balcanica*				+
51	Charadriiformes fam. indet.				+
52	*Columba* sp. - 1				
53	*Columba* sp. - 2				
54	*Streptopelia* sp.	+			
55	*Athene* sp.	+			
56	*Apus baranensis*			+	
57	*Alauda xerarvensis*	+			
58	*Galerida bulgarica*	+			
59	*Eremophila prealpestris*	+			
60	*Lullula balcanica*		+		
61	*Melanocorypha donchevi*	+			
62	*Anthus* sp.	+			
63	*Motacilla* sp.				+
64	*Coccothraustes simeonovi*		+		
65	*Loxia patevi*		+		
66	*Fringilla* cf. *coelebs*		+		
67	*Fringilla* sp.		+		
68	*Carduuelis* cf. *carduelis*	+			
69	*Carduelis* sp.	+			
70	*Pyrrhula* sp.		+		
71	Fringillidae gen. indet.				
72	*Parus* sp. ex gr. *major*		+		
73	*Parus* sp.		+		
74	Paridae gen.		+		
75	cf. Sylviidae gen.		+		
76	*Regulus bulgaricus*		+		
77	cf. *Muscicapa* sp.		+		
78	*Pyrrchocorax* cf. *pyrrhocorax*			+	
79	*Pyrrhocorax* cf. *graculus*			+	
80	*Pyrrhocorax* sp.			+	
81	*Nucifraga* sp.		+		
82	*Pica* sp.		+		
83	*Corvus* cf. *monedula*	+			
84	*Corvus* sp.				
85	Corvidae gen. indet.				
86	*Sturnus* sp.		+		
87	*Turdus* sp. ex gr. *merula*		+		
88	*Turdus* sp.		+		
89	*Turdus* sp. ex gr. *philomelos*		+		
90	*Turdus* cf. *iliacus*		+		
91	*Erilhacus* sp.		+		
92	Turdidae gen. indet.				
93	*Emberiza* sp.	+			
94	Emberizidae gen. indet.	+			
95	Oscines fam. indet.				
96	Aves ordo indet.				
97	*Beremendia fissidens*		+		
98	*Asoriculus gibberodon*		+		
99	*Asoriculus kubinyii*		+		
100	*Petenyia hungarica*		+		

101	*Mafia* cf. *csarnotensis*		+		
102	*Sorex* cf. *minutus*		+		
103	*Sorex runtonensis*		+		
104	*Erinaceus* sp.		+		
105	*Erinaceus* cf. *lechei*		+		
106	*Talpa* cf. *levantis*		+		
107	*Talpa* cf. *csarnotana*		+		
108	*Talpa* sp.		+		
109	*Scalopoides* cf. *copernici*				
110	*Quyania polonica*				
111	*Desmana* cf. *polonica*				+
112	*Trischizolagus* sp.	+			
113	*Rhinolophus* cf. *lissiensis*		+		
114	*Rhinolophus* ex gr. *ferrumequinum*			+	
115	*Vespertilio* sp.	+			
116	*Myotis* cf. *blythii*			+	
117	*Myotis* cf. *gundersheimensis*			+	
118	*Myotis estramonensis*			+	
119	*Myotis* cf. *shaubi*			+	
120	*Myotis* cf. *exillis*			+	
121	*Plecotus* cf. *crassidens*			+	
122	*Miniopterus schreibersii*			+	
123	*Cricetus runtonensis*	+			
124	*Ungaromys nanus*	+			
125	*Clethrionomys primitivus*	+			
126	*Cseria opsia*	+			
127	*Borsodia petenyii*	+			
128	*Villanyia exilis*	+			
129	*Villanyia petenyii*	+			
130	*Villanyia altisomosa*	+			
131	*Castillomys* sp.	+			
132	*Mimomys pliocaenicus*	+			
133	*Mimomys* (*Pusillomimus*) *reidi*	+			
134	*Mimomys* (*Pusillomimus*) *stenokorys*	+			
135	*Sylvaemus dominans*		+		
136	*Rhagapodemus* sp.				
137	*Myomimus* sp.		+		
138	*Glis minor*		+		
139	*Glis* cf. *sackdillingensis*		+		
140	*Pliospalax compositodontus*	+			
141	*Canis* ex gr. *etruscus*	+			
142	*Vulpes alopecoides*	+			
143	*Nyctereutes* cf. *tingi*	+			
144	*Ursus* cf. *wenzensis*		+		
145	*Ursus minimus - U. etruscus*		+		
146	*Martes wenzensis - M. vetus*		+		
147	*Pannonictis ardea*	+			
148	*Vormela petenyii*	+			
149	*Meles thorali*		+		
150	*Baranogale balcanica*	+			
151	Hyaenidae gen. (non P. *breviroslris*)	+			
152	*Pliocrocuta perrieri*	+			

153	*Lynx issiodorensis issiodorensis*		+		
154	*Panthera* cf. *gombaszogensis*		+		
155	*Acinonyx pardinensis*	+			
156	*Viretailurus* aff. *schaubi*	+			
157	*Megantereon cultridens*	+			
158	cf. *Cervus philisi*		+		
159	*Eudadoceros* cf. *senezensis seneszensis*		+		
160	*Eudadoceros senezensis* cf. *vireti*		+		
161	*Eucladoceros ctenoides*		+		
162	Cervidae gen. et sp. indet.		+		
163	*Megalovis* aff. *latifrons*	+			
164	*Gazellospira* sp.	+			
165	cf. *Stephanorhinus etruscus*	+			
166	*Equus stenonis vireti*	+			
	Total	**(59)**	**(56)**	**(13)**	**(15)**

[1] At present the scientific name of that species is *Bufotes viridis* (Laurenti, 1768).

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Author's address:
ZLATOZAR BOEV
National Museum of Natural History, Bulgarian Academy of Sciences, Tsar Osvoboditel 1, 1000 Sofia, Bulgaria, boev@nmnhs.com; zlatozarboev@gmail.com

Палеобиоразнообразието на Врачанска планина през вилафранка: примерно изследване на ранно-плейстоценското находище Вършец (Долно Озирово) на фосилна фауна и флора

ЗЛАТОЗАР БОЕВ

(Резюме)

Обобщени са всички данни за фосилната биота, установени в най-богатото палеонтологично находище в България. Представени са данните за общо 166 таксона (ок. 7000 определяеми останки) от висши растения и безгръбначни и гръбначни животни. Анализирано е тяхното значение за палеоекологията на Югоизточна Европа. Установени са: Magnoliophyta (2 разреда, 3 семейства, 5 таксона), Mollusca (1 разред, 2 таксона), Amphibia (2 разреда, 5 семейства, 10 таксона, Reptilia (2 разреда, 8 (9) семейства, 13 таксона), Aves (10 разреда, 22 семейства, 66 таксона), Mammalia (8 разреда, 19 семейства, 70 таксона). Брой на новите за световната наука таксони, описани от находището: 1 вид и 4 подвида дървета и храсти, 17 птици (1 род, 16 вида) и 2 вида бозайници. Съставът доказва доминирането на лесостепен саваноподобен ландшафт в околностите на находището преди около 2,25 млн. г. в условията на по-топъл и по-сух климат от съвременния в района.