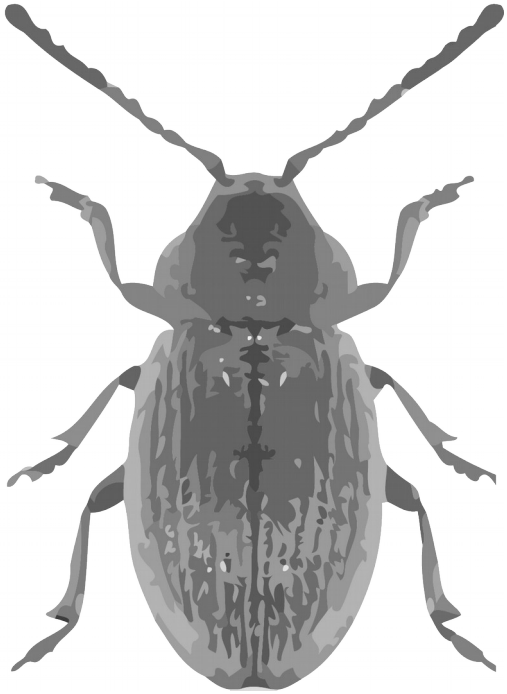
Bulletin of the Natural History Museum - Plovdiv

Volume 3
December 2018



REGIONAL NATURAL HISTORY MUSEUM – PLOVDIV
UNIVERSITY OF PLOVDIV PUBLISHING HOUSE

International Standard Serial Number
Online ISSN 2534-9635; Print ISSN 2534-9627

Bulletin of the Natural History Museum – Plovdiv" (Bull. Nat. Hist. Mus. Plovdiv) is the official scientific bulletin of the Natural History Museum – Plovdiv, published by Plovdiv University Press. The journal accepts submissions of original studies in the field of paleontology, natural history, geology and speleology, zoology, botany, ecology, biogeography, museology, history of natural studies, information about museum collections, etc.

The official language of the journal is English. Exceptions are possible, certain manuscript may be published in Bulgarian language, with extensive abstract in English.

Periodicity: Annually – one issue per year (December).

Type: Open Access, hard copy and electronically. Free of charge to publish.

About the Journal

In 1970, the Natural History Museum - Plovdiv issues Volume 1 of the journal "Bulletin of the Natural Science Museum Plovdiv". In 1973 Volume 2 was released.

Before the release of the independent journal of the Natural History Museum - Plovdiv, researchers at the museum published their articles in "Annuals of the Museums in the Plovdiv Region" and from 1975 in "Bulletin of the museums in Southern Bulgaria", which was published until 1995 (a total of 21 volumes).

With the creation of the Bulletin of the Natural History Museum - Plovdiv, the Regional Museum of Natural History - Plovdiv resumed issuing its scientific journal. In the magazine accepted for posting short messages (up to 4 pages), original research papers (from 4 to 10 pages) and review articles (over 10 pages) in the above mentioned fields and shaped according to the instructions for authors.

The logo of the journal is the paleoendemic beetle *Rhodopaea angelovi* Gruev & Tomov, 1968[1], known only from a small area in the Rhodope Mountains, south of Plovdiv. The species is named after Professor Emeritus Pavel Angelov, one the first directors of the museum, who collected the type specimens.

From the Editorial Board

[1] Gruev B., V. Tomov. 1968. A new genus and species *Rhodopaea angelovi* gen. et sp. n. (Coleoptera, Chrysomelidae) from Bulgaria. Rev. Ent. URSS, XLVII(3):553-555 (in Russian with English summary).

Editorial Board

Contact Publisher

Regional Natural History Museum – Plovdiv

34 Hrysto G. Danov Str., Plovdiv 4000,
BULGARIA; Phone: +359 32 626683;
E-mail: bnhm_plovdiv@abv.bg
Web: http://rnhm.org/en/

University of Plovdiv Publishing House

24 Tsar Assen Str., 4000 Plovdiv, BULGARIA

Open Access Policy

Bulletin of the Natural History Museum - Plovdiv provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Open Access in journal publishing means:
* Direct, barrier-free, online dissemination of scientific results at no charge for readers Authors retain the copyright of their articles,
* Open Access papers may be copied, downloaded, and used for text- and data-mining purposes, provided that such uses are fully attributed on a non-commercial basis,
* High visibility of the work – anyone can read your article at no charge,
* Higher citation rates due to higher visibility,
* Quick publishing as pre-prints published immediately upon acceptance,
* Articles are archived and searched through several major OA repositories

Peer review process

All articles included in "Bulletin of the Natural History Museum - Plovdiv" are peer reviewed. Submitted manuscripts are sent to two or three independent peer reviewers, unless they are either out of scope or below threshold for the journal. These manuscripts will generally be reviewed by experts with the aim of reaching a first decision as soon as possible. The journal uses the double anonymity standard for the peer-review process.

Abstracting & Coverage

- Index Coupernicus (ICv2016= 46.77)
- Academic Research Index (Research Bible)
- Journal Factor
- Academic Keys
- Journal Impact Factor
- Scientific Indexing Services
- International Innovative Journal Impact Factor (IIJIF)
- Google Scholar Search Engine and others.

Bulletin of the Natural History Museum – Plovdiv

2018, Volume 3 - Contents

Research Articles

Short notes

Miscellaneous

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 1-5

Bulgarian Names of Domestic Animals in the Balkan Peninsula and Their Correspondences in the Scientific Literature

Zlatozar N. Boev*

National Museum of Natural History, Bulgarian Academy of Sciences,
1 Blvd. Tsar Osvoboditel, 1000 Sofia, BULGARIA
* Corresponding author: boev@nmnhs.com; zlatozarboev@gmail.com

Abstract. The names of twenty-two domestic forms and their wild progenitors of birds and mammals are given in three languages – Bulgarian, English and Russian, as well as their scientific Latin names. The names of some species of wild mammals, which are often mistakenly referred to in the Bulgarian language literature, are also given, along with the separate names of their adult male, female and juvenile (young) individuals.

Key words: Names of domestic animals, Zoological terminology, Domestic animals of Balkans, Domestic birds, Domestic mammals.

Introduction

Over the past 20-30 years, the share of archaeological research in Bulgaria has grown significantly. As interdisciplinary in nature, they created and shaped the archaeozoological field as (almost) an integral part of the complex studies of the numerous archaeological sites in the country. A number of specialists appeared who competently and extensively examined the animal (mainly bone) material. Every year in the dozens of prehistoric (Paleolithic – Iron Age) monuments, tens of thousands of bones of domestic animals are revealed, the share of which is steadily increasing with the reduction in the age of the objects.

Some of the specialists come from the biological circles, others from the medical ones. Both zoologists and veterinarians, however, need a precise expression through commonly accepted and clearly defined concepts when they present their results in scientific literature.

The parallels of zoological terminology proposed here refer to the most common vertebrate domestic animals (birds and mammals) in the Balkan area (LARSON & FULLER, 2014). Also included are some wild species that are often misinterpreted, especially individuals of both sexes or young (juvenile) individuals. Besides the Latin scientific names, the names of the animals are also given in Bulgarian, English and Russian, i. e. in the main languages in which the most voluminous scientific literature in this field was created and and continues to be created. Bulgarian archeologists are most often familiar with the concepts of these two languages, which is why they are chosen to compile this short terminological glossary. In addition, the share of translated popular science literature (mainly from English into Bulgarian) has increased rapidly in recent years. Due to the lack of specialized dictionaries, the mistakes made in such translations are too common. This article could help to fix them in the future.

Material and Methods

The names of the wild progenitor animals, the domestic animal originated from him and

respectively the names of the adult male, the adult female and the young (newborn without a named sex) are given. The domestic animals of the Western Hemisphere and the Asian Far East are intentionally omitted and remain beyond our considerations.

We follow taxonomic nomenclature of GENTRYA *et al.* (2004) for the progenitor species and corresponding derivative forms of mammals.

Results and Discussion

Names of domestic animals

See Table 1.

Table 1. Scientific names of the domestic birds and mammals in the Balkan Peninsula, their male, female and juvenile individuals. *Abbreviations:* English - EN, Bulgarian - BG, Latin - LT, Russian - RU.

Lan-guage	Species of the wild animal (Progenitor species)	Form of the domestic animal (Derivative form)	Adult male individual	Adult female individual	Juvenile (young) individual
		DOMESTIC BIRDS			
		1. Кокошка			
BG	банкивска кокошка (червен джунглов петел)	домашна кокошка	кокошка (квачка)	петел	пиленце
RU	банкивская джунглевая курица	домашняя курица	курица	петух	цыплёнок
EN	Red junglefowl	Domestic chicken	rooster	hen	chick
LT	*Gallus gallus bankiva* Temminck, 181 3	*Gallus gallus domesticus* (Linnaeus, 1758)	-	-	-
		2. Пуйка			
BG	дива пуйка	домашна пуйка	пуяк	пуйка	пуяче
RU	дикая индейка	домашняя индейка	индюк	индейка	индюшёнок
EN	Wild turkey	Domestic turkey	stag (tom)	hen	poult (turkeyling)
LT	*Meleagris gallopavo* (Linnaeus, 1758)	*Meleagris gallopavo* (Linnaeus, 1758)	-	-	-
		3. Паун			
BG	Индийски (син) паун	Домашен паун	паун	паунка	паунче
RU	Обыкновенный (индийский) павлин	Домашний павлин	павлин	пава	павлинчик (павча)
EN	Indian peafowl	Domestic peafowl	peacock	peahen	peachick
LT	*Pavo cristatus*	*Pavo cristatus domestica*	-	-	-
		4. Гъска			
BG	сива гъска	домашна гъска	гъсок	гъска	гъсе
RU	серый гусь	домашный гусь	гусак	гусь	гусёнок
EN	Greylag goose and Swan goose	Domestic goose	gander	goose	gosling
LT	*Anser anser* (Linnaeus, 1758) and *Anser cygnoides* (Linnaeus, 1758)	*Anser anser domesticus* and *Anser cygnoides domesticus*	-	-	-

		5. Лебед			
BG	Ням лебед	домашен лебед	мъжки лебед	женски лебед	лебедче
RU	Лебедь-шипун	Домашний лебедь	Лебедь	Лебедка (лебедиха)	лебеденок (лебедыш)
EN	Mute swan	Domestic swan	cob	pen	cygnet
LT	*Cygnus olor* (Gmelin, 1789, 1758)		-	-	-
		6. Патица			
BG	зеленоглава патица	домашна патица	паток	патица	патенце
RU	кряква	домашняя утка		утка	утёнок
EN	Mallard (Wild duck)	Domestic duck	drake	hen (duck)	duckling
LT	*Anas platyrhynchos* Linnaeus, 1758	*Anas platyrhynchos domestica* Linnaeus, 1758	-	-	-
		7. Гълъб			
BG	скален гълъб	домашен гълъб	гълъб	гълъбица	гълъбче
RU	сизый голубь	домашный голубь	голубь	голубка	голубёнок
EN	Rock dove (Rock pigeon)	Domestic pigeon	cock dove	hen dove	doveling (dovelet)
LT	*Columba livia* Gmelin, 1789	*Columba livia domestica* Gmelin, 1789	-	-	-
		DOMESTIC MAMMALS			
		8. Кон			
BG	див кон	домашен кон	жребец	кобила	конче
RU	дикая лошадь	домашный конь (домашняя лошадь)	жеребец	кобыла	жеребёнок
EN	Russian wild horse (tarpan)	Domestic horse	stallion	mare	foal
LT	*Equus ferus* Boddaert, 1785	*Equus caballus* Linnaeus, 1758	-	-	-
		9. Магаре			
BG	диво магаре	домашно магаре	магаре	магарица	магаренце
RU	осел	домашный осел	осёл	ослица	ослёнок
EN	North African wild ass	Donkey	jack	jenny	foal
LT	*Equus africanus* Heuglin and Fitzinger, 1866	*Equus asinus* Linnaeus, 1758	-	-	-
		10. Говедо			
BG	тур (диво говедо)	домашно говедо	бик	крава	теле
RU	тур	домашный бык	бык	корова	телёнок
EN	Aurochs	Common cattle	bull	caw	calf
LT	*Bos primigenius* Bojanus, 1827	*Bos taurus* Linnaeus, 1758	-	-	-
		11. Бивол			
BG	индийски бивол	Домашен бивол	бивол	биволица	биволче

RU	азиатский (индийский) буйвол	Домашний буйвол	бык	корова	буйволенок
EN	Indian water buffalo (Arni)	Domestic water buffalo	bull	caw	calf
LT	*Bubalus arnee* (Kerr, 1792)	*Bubalus bubalis* (Linnaeus, 1758)	-	-	-
		12. Коза			
BG	безоаров козирог (същинска дива коза)	домашна коза	козел (пръч)	коза	козле (яре)
RU	безоаровый козел	домашняя коза	козёл	коза	козлёнок
EN	Bezoar of the Middle East (Wild goat; bezoar ibex)	Domestic goat	buck (billy)	doe (nanny)	kid
LT	*Capra aegagrus* Erxleben, 1777	*Capra hircus* Linnaeus, 1758	-	-	-
		13. Овца			
BG	дива овца (муфлон)	домашна овца	овен (коч)	овца	агне
RU	дикий баран (муфлон)	домашняя овца	баран	овца	агнёнок
EN	Mouflon of Western Asia	Domestic sheep (including European mouflon)	ram	ewe	lamb
LT	*Ovis orientalis* Gmelin, 1774	*Ovis aries* Linnaeus, 1758	-	-	-
		14. Свиня			
BG	дива свиня (глиган)	домашна свиня	нерез	свиня	прасенце
RU	кабан	домашняя свинья	хряк	свинья	поросёнок
EN	Wild boar of Europe, Asia and North Africa	Domestic pig (swine; hog)	boar	sow	pig
LT	*Sus scrofa* Linnaeus, 1758	*Sus domesticus* Erxleben, 1777	-	-	-
		15. Куче			
BG	сив вълк	куче	пес	кучка	кученце
RU	серый волк	собака	пёс	сука	щёнок
EN	Grey wolf	Dog (including dingo)	dog	bitch	puppy
LT	*Canis lupus* Linnaeus, 1758	*Canis familiaris* Linnaeus, 1758	-	-	-
		16. Котка			
BG	дива котка	домашна котка	котарак	котка	коте
RU	дикая кошка (лесной кот)	домашняя кошка	кот	королева	котёнок
EN	Wild cat (Wildcat)	Domestic cat	tom (tomcat) sir (размножил се мъжки)	dam (раждала женска котка)	kitten
LT	*Felis silvestris* Schreber, 1777	*Felis catus* Linnaeus, 1758	-	-	-
		17. Благороден елен			
BG	благороден елен	-	рогач	кошута	еленче

RU	благородный олень	-	олёнь	лань	олёнок
EN	red deer	Domestic red deer	stag	hind	hart
LT	*Cervus elaphus* Linnaeus, 1758	*Cervus elaphus* Linnaeus, 1758	-	-	-
		18. Елен лопатар			
BG	елен лопатар	-	рогач	кошута	еленче
RU	лань	-	олёнь	лань	олёнок
EN	Fallow deer	Domestic fallow deer	stag	hind	hart
LT	*Dama dama* (Linnaeus, 1758)	*Dama dama* (Linnaeus, 1758)	-	-	-
		19. Сърна[1]			
BG	сърна	-	сръндак	сърна	сърне
RU	косуля	-	гуран	косуля	косулёнок
EN	Roe deer	-	buck	doe	fawn
LT	*Capreolus capreolus* (Linnaeus, 1758)	*Capreolus capreolus* (Linnaeus, 1758)	-	-	-
		20. Див заек[2]			
BG	див заек	-	заек	зайкиня	зайче
RU	заяц-русак	-	заяц	зайчиха	зайчонок
EN	European hare	-	buck	doe	kitten (kit)
LT	*Lepus europaeus*	-	-	-	-
		21. Заек-подземник			
BG	заек-подземник	домашен заек	заек	зайкиня	зайче
RU	дикий кролик	домашный кролик	кролик	крольчиха	крольчонок
EN	European rabbit	Domestic rabbit	buck	doe	kitten (kit)
LT	*Oryctolagus cuniculus* (Linnaeus, 1758)	*Oryctolagus cuniculus* (Linnaeus, 1758)	-	-	-
		22. Дива коза[3]			
BG	дива коза	-	див козел	дива коза	диво козле
RU	серна (черный козел)	-	самец серны	самка серны	сернёнок
EN	Chamois	-	male chamois	female chamois	?
LT	*Rupicapra rupicapra* (Linnaeus, 1758)	-	-	-	-

References

GENTRY A., J. CLUTTON-BROCK, C. GROVES. 2004. The naming of wild animal species and their domestic derivatives. *Journal of Archaeological Science*, 31: 645–651.

LARSON G., D. FULLER. 2014. The Evolution of Animal Domestication. *Annual Review of Ecology, Evolution and Systematics*, 66 :115-36.

Accepted: 17.02.2018
Published: 20.04.2018

[1] Not domesticated, but often mistakenly named in Bulgarian.
[2] Not domesticated, but often mistakenly named in Bulgarian.
[3] Not domesticated, but often mistakenly named in Bulgarian.

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 7-13

Subfossil Fauna from "Forum Serdica" (Sofia City, Bulgaria) of Antiquity (2nd – 4th century AD) and Ottoman Epoch (15th –18th century AD) (Excavations 2017)

Zlatozar N. Boev*

National Museum of Natural History, Bulgarian Academy of Sciences,
1 Blvd. Tsar Osvoboditel, 1000 Sofia, BULGARIA
* Corresponding author: boev@nmnhs.com; zlatozarboev@gmail.com

Abstract. Third year of excavations of "Forum Serdica" (Sofia City; 2017) provided new abundant (10 564 finds) animal remains of 44 taxa: 1 mollusk, 3 bony fish, 15 birds and 25 mammals, one of them (Aurochs) extinct. Domestic cattle were brachycerous, while domestic chicken were of three size-groups. Numerous were bantam breeds, both in the Antiquity and Ottoman epochs.

Key words: Archaeozoology, Sofia, Antiquity, Ottoman, wildlife, Aurochs.

Introduction

The highly diversified animal remains of "Forum Serdica" in Sofia City have been subject of three publications so far (BOEV, 2016a, b, 2017). As the wide-scaled excavations continued unexpectedly in the summer of 2017, additional very abundant faunal material has been collected and consecutively handed again for archeozoological examination.

The project was the same, "Archaeological excavations and exploration of "St Nedelya Circus". As in 2015-2016 the excavations have been carried out by the Sofia Municipality by the same team of the National Archaeological Institute and Museum of the Bulgarian Academy of Sciences NAIM-BAS), leaded by Assist. Prof. Dr. Veselka Katsarova.

The present paper deals with the new animal remains, collected in 2017.

Material and Methods

The archaeological excavations in 2017 continued on new squares of the site and reached ca. 6 m depth. A total of 10 564 animal remains have been collected, 4044 of them unidentified because of their high fragmentariness. For the first time the archaeozoological finds have been collected chronostratigraphically separately. Part of them came from the layers of Antiquity (2nd – 4th century AD), but the majority was dated Ottoman Epoch (15th –18th century AD). In addition, a total of 2864 finds remained undated.

Results

A total of 44 taxa (icl. modern man) have been established: 1 mollusk, 3 bony fish, 15 birds and 24 mammals (Tables 1, 2).

The composition of animals in antiquity material is about 1/3 poorer (25 vs 38 taxa) than in the medieval one. Data on cuniculture (rabbit-farming) is available only in the material from the Ottoman period. Since then, there have been finds of 3 species of valuable large freshwater fish - catfish (Fig 1.), pike and carp (Table 2). Few extremely rare species today are presented with single finds. In the antiquity, these are the Griffon Vulture, the Little bustard and the Eurasian wigeon (Table 1), and in the Middle Ages they were represented by the Lesser White-fronted Goose, the Great Bustard, the Long-legged Buzzard, the Northern Goshawk, the Northern Long-eared/Short-eared Owl and the Wildcat (Table 2).

There are also 2 remnants of medieval age of the aurochs (Fig. 2). As before, the domestic

Regional Natural History Museum – Plovdiv
University of Plovdiv Publishing House

cattle was represented by brachycerous forms (Fig. 3). Domestic chicken were of three size-groups. Numerous were bantam breeds, both in the Antiquity and Ottoman deposits. In the Ottoman period 12 % of chicken were bantam.

There can be no significant differences in the representation of the roe deer, the wolf and the wild boar. In the Middle Ages, the relative share of small ruminants (sheep and goats) was growing. Domestic mammals during the Antiquity account for 54.2% of all mammalian remains in the site, while and in the Middle Ages they reached up to 83.5%. The domestic duck and the rabbit are found only among the medieval remains.

The proportion of bones with traces of cut or cut or drilling (Figs. 4, 5) is almost the same - 0.3% in antiquity and 0.4% in the Middle Ages. The proportion of burned bones in the antiquity is almost three times higher than in the Middle Ages - 3.2% vs. 1.2%, respectively.

Third year of the excavations of this extremely important site in Sofia City complete in much the information from the previous years (2015-2016). They confirm the wide and intensive exploitation of animals, both wild and domestic, including presence of big fish in the rivers, vultures and some other raptors, bustards, deer, and etc. in the Sofia Valley and/or the foothills of the neighboring mountains.

Table 1. Distribution of the collected archaeozoological material of Forum Serdica (pr. Sofia City) of the Antiquity Epoch (2nd – 4th century AD) in 2017.

No	Taxa	Total number of finds	Number of processed finds	Number of burnt finds
		OSTEYCHTHYES		
		Siluriformes		
1.	*Silurus glanis*	3		
	Total	3		
	Osteychthyes total	3		
		AVES		
		Anseriformes		
2.	*Anas penelope*	1		
3.	*Anser anser domestica*	6		2
4.	*Anser anser / fabalis*	1		
5.	*Anser* cf. *erythropus*	1		1
	Anseriformes total	9		3
		Galliformes		
6.	*Gallus gallus domestica*	90		18
	Galliformes total	90		18
		Accipitriformes		
7.	*Gyps fulvus*	1	1	
	Accipitriformes total	1	1	
		Otidiformes		
8.	*Tetrax tetrax*	1		
	Otidiformes total	1		
	Aves total	101	1	21
		MAMMALIA		
		Lagomorpha		
9.	*Lepus europaeus*	2		
	Lagomorpha total	2		
		Carnivora		
10.	*Vulpes vulpes*	2		
11.	*Canis familiaris*	8	1	
12.	*Canis lupus/familiaris*	2		
14.	*Canis lupus*	3		
13.	*Felis catus/silvestris*	1		
	Carnivora total	16	1	

		Artiodactyla		
15.	*Sus scrofa domestica*	541	2	47
16.	*Sus scrofa scrofa*	49		
17.	*Capra hircus*	105	1	
18.	*Ovis aries*	121	3	16
19.	*Ovis / Capra*	68		
20.	*Bos taurus*	519	1	1
21.	*Cervus elaphus*	13		
22.	*Capreolus capreolus*	4		
	Artiodactyla total	1500	7	64
		Perissodactyla		
23.	*Equus caballus*	32		
24.	*Equus asinus*	8		
	Perissodactyla total	40		
		Primates		
25.	*Homo sapiens*	1		
	Primates total	1		
	Mammalia indet. – bone splinters	1006		
	Mammalia total	2565	7	64
	Vertetebrata total	2669		
	Animalia total	2670	9	85

Table 2. Distribution of the collected archaeozoological material of Forum Serdica (pr. Sofia City) of the Ottoman Epoch (15th –18th century AD) in 2017.

No	Taxa	Total number of finds	Number of processed finds	Number of burnt finds
		MOLLUSCA		
		Gastropoda		
		Heterobranchia		
1.	*Helix lucorum*	1		
	Mollusca total	1		
		OSTEYCHTHYES		
		Siluriformes		
2.	*Silurus glanis*	1		
	Siluriformes total	1		
		Cypriniformes		
3.	*Cyprinus carpio*	1		
	Cypriniformes total	1		
		Esociformes		
4.	*Esox lucius*	1		
	Esociformes total	1		
	Osteychthyes total	3		
		AVES		
		Anseriformes		
5.	*Anas platyrhynchos domestica*	3		
6.	*Anas platyrhynchos*	2		
7.	*Anser anser domestica*	27		7
8.	*Anser erythropus*	1		
9.	*Anser* cf. *erythropus*	1		
10.	Anatinae gen.	1		

	Anseriformes total	35		7
		Galliformes		
11.	*Gallus gallus domestica*	206	1	43
	Galliformes total	206	1	43
		Accipitriformes		
12.	*Buteo rufinus*	1		
13.	*Accipiter gentilis*	3		
	Accipitriformes total	4		
		Strigiformes		
14.	*Asio otus / flammeus*	1		
	Strigiformes total	1		
		Otidiformes		
15.	*Otis tarda*	2		
	Otidiformes total	2		
	Aves total	248	1	43
		MAMMALIA		
		Lagomorpha		
16.	*Lepus europaeus*	1		
17.	*Oryctolagus cuniculus*	3		
	Lagomorpha total	4		
		Carnivora		
18.	*Lutra lutra*	1		
19.	*Vulpes vulpes*	5		
20.	*Canis familiaris*	41		
21.	*Canis lupus/familiaris*	5		
22.	*Canis familiaris/aureus*	1		
25.	*Canis lupus*	7		
23.	*Felis silvestris*	1		
24.	*Felis catus*	37		
	Carnivora total	98		
		Artiodactyla		
26.	*Sus scrofa domestica*	406	1	4
27.	*Sus scrofa scrofa*	69		
28.	*Capra hircus*	756	2	3
29.	*Ovis aries*	889		
30.	*Ovis / Capra*	303		
31.	*Bos taurus*	1292	16	8
32.	*Bos primigenius*	1		
33.	*Bos taurus/primigenius*	1		
34.	*Cervus elaphus*	13		
35.	*Capreolus capreolus*	17		
	Artiodactyla total	3727	19	15
		Perissodactyla		
36.	*Equus caballus*	50		
37.	*Equus asinus*	23		
	Perissodactyla total	73		
		Primates		
38.	*Homo sapiens*	20		
	Primates total	20		
	Mammalia indet. – bone splinters	2867		
	Mammalia total	4789	19	15
	Vertetebrata total	5040	20	58
	Animalia total	5041	20	58

.

Fig. 1. *Silurus glanis* – vertebra, "Forum Serdica" (Sofia City, Bulgaria), Ottoman Epoch (15th –18th century AD). Photo Z. Boev.

Fig. 2. *Bos primigenius* – atlas, "Forum Serdica" (Sofia City, Bulgaria), Ottoman Epoch (15th –18th century AD). Photo Z. Boev.

Fig. 3. *Bos taurus* – skull, "Forum Serdica" (Sofia City, Bulgaria), Ottoman Epoch (15th –18th century AD). Photo Z. Boev

Fig. 4. *Capra hircus* – horn sheet, "Forum Serdica" (Sofia City, Bulgaria), Ottoman Epoch (15th –18th century AD). Photo Z. Boev

Fig. 5. *Equus caballus* – scapula, "Forum Serdica" (Sofia City, Bulgaria), Ottoman Epoch (15th –18th century AD). Photo Z. Boev

References

BOEV Z. 2016a. Subfossil Vertebrate Fauna from Forum Serdica (Sofia, Bulgaria), 16-18th Century. *Acta Zoologica Bulgarica*, 68(3): 415-424.

BOEV Z. 2016b. [Biodiversity of vertebrates in Sofia Valley based on their bone remains in "Forum Serdica" in the center of Sofia City (16th-18th century AD)]. *Journal of the Bulgarian Academy of Sciences*, 3:16-22. (In Bulgarian).

BOEV Z. 2017. New data on the subfossil fauna from "Forum Serdica" (Sofia City, Bulgaria; 3-19th century A. D.). *Historia Naturalis Bulgarica*, 24: 179-186.

Accepted: 07.04.2018
Published: 02.05.2018

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 15-26

New Palaeobotanical Data From The Satovcha Graben (Southwest Bulgaria)

Vladimir S. Bozukov*[1], Ognyan B. Todorov[2], Daniela S. Georgieva[1]

1 - Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Acad. G. Bonchev Str, bl. 23, 1113 Sofia, BULGARIA
2 - Regional Natural History Museum – Plovdiv, 34 Hristo G. Danov Str, 4000 Plovdiv, BULGARIA
* Corresponding author: vladimir_bozukov@yahoo.com

Abstract. As a result of the contract cooperation between Regional Natural History Museum – Plovdiv and Institute of Biodiversity and Ecosystem Research-BAS over the past three years a field and cameral activity were done. The aim was to create a museum palaeobotanical collection and to present a phytofossil exposition in the Paleontology hall of the museum. Field researches were committed on the Neogene florabearing deposits close to Satovcha Village (Western Rhodopes Mts.). The research was funded by RNHM-Plovdiv. Forty fife fossil taxa were defined from new extracted material. Seven of them are new for this local palaeoflora. These are *Cornus buchii*, *Cyclolobium* aff. *brasiliense*, *Distylium* aff. *racemosa*, *Litsea primigenia*, *Picea* aff. *schrenkiana*, *Pinus peuce* foss., *Viburnum* aff. *sempervirens*. In the course of determining activity and in compliance with modern perception for the fossil species *Betula macrophylla*, it was revised as *B. dubiosa*. Registration of the taxon *Distylium* aff. *racemosa* in this locality helped to determine the ancients forest from Yakushima island (South Japan) as a model for the vegetation and climate reconstruction in the Rhodopes Mts through the middle Miocene. The fossil flora from the region of the Satovcha Village is characterized by its great diversity. It contains over 100 fossil species. This is the richest local palaeoflora in Bulgaria. Though, the ascertainment of new cited taxa shows that an enrichment of its taxonomic composition is possible by future research in the area. This opportunity should be used and studies should continue.

Key words: museum collection, Neogene, palaeoflora, Plovdiv, Rhodopes, Satovcha Village.

Introduction

Palaeobotanical studies in Bulgaria have almost 90 years of history. The beginnings of these studies have been made by the prominent Bulgarian botanists, the academicians Nikolay Stoyanov and Boris Stefanov (STOJANOFF & STEFANOFF, 1929) with an in-depth study of the palaeoflora from the village of Kurilo (now Novi Iskar). However, in our country the palaeobotany, as a part of the palaeontology that examines fossil plants, doesn't enjoy the popularity of palaeozoology, which explores the animal world in the past geological eras. The joint activity of the Regional Natural History Museum (RNHM) - Plovdiv and Institute of Biodiversity and Ecosystem Research (IBER) - BAS, aims at to exploring the numerous fossil flora sites in Southern Bulgaria, to collecting new scientific data and to popularizing the palaeobotany among the public.

The first object of that collaboration is the local palaeoflora from the Satovcha Graben. It is located northeast of the Satovcha Village, Blagoevgrad District (Fig.1) and covers area

about 10 km^2. The age of the fossil flora from Satovcha is defined in the Middle Miocene or about 15 million years (BOZUKOV, 2002). The study of this site has began in the middle of the last century (STEFANOV & GANCHEV, 1951), but intensive studies on the macrophytoremains have taken place only at its end (PALAMAREV *et al*., 1991, BOZUKOV & PALAMAREV, 1992, 1995; PALAMAREV & BOZUKOV, 1992; BOZUKOV & IVANOV, 1995; BOZUKOV, 1996, 1998ab, 1999ab, 2000, 2001). New data was published after a certain stagnation by BOZUKOV & IVANOVA (2015).

The Satovcha fossil flora is characterized by its species diversity, which amounts to more than 100 fossil species. It is the richest local palaeoflora in Bulgaria. The establishment of new taxa in it, as a result of recent published studies, suggests that future research in the area may enrich its taxonomic composition. This will most likely lead to the enrichment of the Bulgarian fossil flora.

Material and Methods

The studied material originates from the flora-bearing sediments of the Sivik Formation (VATSEV & PIRUMOVA, 1983), which is part of the Satovcha Graben. The material is imprints of plant parts on diatomites with different quality and quantity of admixtures. The imprints are mostly of leaves, but they are found such of cones, cone scales and inflorescences. The total number of fossils is 164. They are provided to the RNHM-Plovdiv by a joint team of the museum and IBER-BAS and they are part of its paleontological fund.

The determination of leaf types followed the scheme for leaf morphology of the angiosperms plants of DILCHER (1974). The photos were taked with a digital camera Pentax Optio E70L.

The arrangement of the corresponding taxa in the systematic part of the article follows the scheme for Magnoliophyta of TAKHTAJAN (1987).

Results

A part of the results of the three-year-olds paleobotanical studies financed by the RNHM - Plovdiv have been published. These are researches over higher plant parts saved in the sedimentary rocks of the Graben (TODOROV *et al*. 2017a), as well as the determination of the species composition of diatomic algae forming the flora-bearing diatomites (TODOROV *et al*. 2017b).

On the basis of collected and studied fossil plant material, 45 taxa were defined (Table 1). Thirty seven of them represent fossil species and seven of them are presented as taxonomic combinations, which refer the fossil material to recent species with similar leaf morphology. A cone scale is defined to the genera. This paper will present descriptions of fossil taxa established during cameral and field research, which have special importance to the local palaeoflora which they are part.

Division Pinophyta, Class Pinopsida,

Family Pinaceae, Genus *Picea*

Picea aff. *schrenkiana* Fisch. & C.A. Mey. (Plate I, Fig. 2)

Material: imprint of a twig with needle-shaped leaves.

1935. STEFANOV & JORDANOV, p. 14, Text-fig. 9.

P.p. 2017a. *Pinus* aff. *thunbergii* Parl.; TODOROV *et al*., p. 75.

Description: Needle-shaped leaves with a rhombic section. Evidence of this is the presence of a canal in the middle of the leaf imprint which is formed by a leaf margin. Dimensions of preserved leaves: length - 4.5 cm, width - 1.5-2.0 mm. Length of the preserved twig - 7 cm.

Comparison: A similar fossil material with a detailed description is known in the Bulgarian palaeoflora of the area of Podgumer Village (STEFANOFF & JORDANOFF, 1935). The authors report the needle-shaped leaf with a length of 3.0 cm and a winged seed. They define their material as *Picea* sp. aff. *P.* aff. *schrenkiana*. Our material is distinguished only by the longer size of leaves. Another representative of the genus *Picea* with the longer than 2.0 cm leaves is *P. smithiana* (Wall.) Boiss. The range of this size is 3.0-5.0 cm, but the distribution of this species at 2400 to 3600 m a.s.l. renders it inappropriate for a recent analogue in the considered palaeoflora. *P.* aff. *schrenkiana* occurs in Central Asia in the range of 1 200 to 3 500 m a.s.l., making it an acceptable choice. In addition, a winged seed with morphology similar to that described by STEFANOFF & JORDANOFF (1935) has already

been found in the Satovcha plaeoflora (BOZUKOV, unpublished data). Based on the above, we use the combination *Picea* aff. *schrenkiana* for identification of our fossil material.

Geographic and stratigraphic distribution: On the territory of Bulgaria the fossil taxon is known only from deposits close to Podgumer Village (W Bulgaria) (STEFANOFF & JORDANOFF, 1935). The flora-bearing sediments belong to the Novi Iskar Formation, which is defined as a middle Pontian – early Dacian (KAMENOV & KOJUMDGIEVA, 1983). The new find of this taxon extends its stratigraphic range to a range of Middle Badenian - Lower Dacian. The taxon is new to the Satovcha fossil flora.

Genus *Pinus*

Pinus peuce Griseb. foss. (Plate II, Fig. 2)

1935. STEFANOFF & JORDANOFF, p. 17, Pl. 3, Figs 1-5; Text-Fig. 14.

1984. KITANOV, p. 47, Figs. 4.3-4.

2017a. TODOROV *et al*., p. 75.

Material: imprint of a cone scale.

Description: The shape of the scale is obovate. The apophysis does not stand out clearly on the imprint, but ends with a well-expressed apical, rounded umbo. In the upper half of the scale there are fine furrows. Dimensions: length - 17 mm, width - 9 mm.

Comparison: In shape, the cone scale is identical to that of the recent *P. peuce*, which is a Balkan endemic species. STEFANOFF & JORDANOFF (1935) reported about cones of this type and scales of them with exceedingly variable size.

Geographic and stratigraphic distribution: The fossil form of the species is a new taxon for the Satovcha palaeofora. The stratigraphic range of the fossil form is expanding in Bulgaria from Middle Miocene to Lower Pliocene according this find. So far, it has been known from palaeofloras aged as late Miocene – early Pliocene (STOJANOFF & STEFANOFF, 1929; STEFANOFF & JORDANOFF, 1934, 1935; KITANOV, 1984).

Division Magnoliophyta, Class Magnoliopsida

Family Lauraceae, Genus *Litsea*

Litsea primigenia (Ung.) Takht. (Plate II, Fig. 1)

1963. TAKHTAJAN, p. 202, Pl. 6, Fig. 9.

1987. PALAMAREV & PETKOVA, p. 39, Pl. 9, Figs 2, 4; Pl. 10, Fig. 9.

1850. *Laurus primigenia* Unger; UNGER p. 38, Pl. 40, Figs 1-4.

Material: leaf imprint.

Description: Detailed description of the fossil species have been made by PALAMAREV & PETKOVA (1987).

Comparison: Our material is distinguished only by its larger dimensions from the materials known so far from Bulgaria, but the difference is within the indicated by UNGER (1850) species variability. TAKHTAJAN (1963) points recent Southeast Asia species *L. cubeba* (Lour.) Pers. and *L. aciculata* Bl. as nearest living relatives of the fossil one.

Geographic and stratigraphic distribution: *L. primigenia* is new species established for the Satovcha palaeoflora. The geographic area of the fossil species covers Southwest, Central, East and Southeast Europe, as well as Southwest Asia. The stratigraphic range of the species covers Lower Eocene to Upper Miocene. The species is extremely widespread and its discovery in the Satovcha palaeoflora is expected.

Family Hamamelidaceae, Genus *Distylium*

Distylium aff. *racemosa* Sieb. & Zucc. (Plate II, Fig. 3)

Material: leaf imprint.

Description: The shape of the leaf lamina is elliptic. Leaf lamina base is acute decurrent. The apex is acuminate. The leaf lamina margin is entire. The venation is brochidodromous. The primary vein is slightly arciform. Secondary veins are in 5 pairs, alternate, curved, at an angle of 60° towards primary vein. Secondary veins are joining superadjacent ones at right angle. Intersecondary and tertiary veins are not visible. The charred remains of thick evergreen leaf lamina hinder observation. Dimensions: length – 3.0 cm, width – 1.3 cm.

Comparison: The material we have described has the morphology of the recent evergreen species *D. racemosa*, which is distributed in Southeast China, Korea and Southeast Japan. The genus *Distylium* is known in the Bulgarian palaeoflora with its representative *D. fergusonii* Knobl. & Kvač., which is established in the Ruzhintsi middle Miocene flora by cuticle (UZUNOVA, 1995).

The above facts give us grounds to refer the described fossil material to this genus and a specific species.

Geographical and stratigraphic distribution: The genus is established for the first time in the Satovcha fossil flora. Its stratigraphic distribution in Bulgaria is Middle Miocene.

Family Betulaceae, Genus *Betula*

Betula dubiosa Hollik (Plate I, Fig. 3)

1936. HOLLIK, p. 92.

2017a. TODOROV *et al*., p. 76.

1855. *Alnus macrophylla* Göpp.; GÖPPERT, p. 12, Pl. 4, Fig. 6; Pl. 5, Fig. 1.

1868. *Betula macrophylla* (Göpp.) Heer; HEER, p. 146, Pl. 25, Figs. 11-19.

1999. BOZUKOV, p. 9, Pl. 5, Fig. 2.

Material: leaf imprint.

Description: The fossil material is described in detail by BOZUKOV (1999) as *Betula macrophylla* in the Satovcha palaeoflora composition. This article accepts HOLLIK's (1936) position on the taxonomic status of this fossil species. BUDANTSEV (1982) maintains the same opinion with the relevant arguments. On this basis, we make the necessary change to the existing concept over the species *B. macrophylla* in Bulgaria and it has been revised as *B. dubiosa*.

Comparison: Two East Asia species have been accepted for nearest living relatives of this fossil species. These are *B. carpinifolia* Seeb. & Zucc., which is widespread in Japan and the Chinese species *B. luminifera* H. Wilnker.

Geographic and stratigraphic distribution: The geographic range of the fossil species covers Central, Eastern and Southeast Europe and Western Siberia. Its stratigraphic range is broad and ranges from Upper Oligocene to Pliocene.

Family Fabaceae, Genus *Cyclocobium*

Cyclolobium aff. *brasiliense* Benth. (Plate I, Fig. 4)

2017. TODOROV *et al*., p. 76.

Material: leaf imprint.

Description: The shape of the leaf lamina is ovate. Leaf lamina base is not preserved. Probably it is normally obtuse or obtuse cuneate. The apex is acute. The leaf lamina margin is entire. The venation is brochidodromous. The primary vein is slightly arciform. Secondary veins are in 12 pairs, alternate, curved, at an angle of 60-70° towards the primary vein. Secondary veins connect to each other with higher grade loop-forming branches. There are no intersecondary veins. Tertiary veins are AA type where they are visible. Dimensions: Length of the preserved part - 10.0 cm (the entire leaf lamina length is probably 11 cm); width - 6.5 cm.

Comparison: The morphological features of this newly discovered leaf imprint lead to the conclusion of kinship with representatives of the family Fabaceae. As closest genus and species we allow *C. brasiliense*, which is a tree widespread in Brazil, Bolivia and Paraguay. As a morphologically closest fossil species we accept *Palaeolobium radobojense* Unger (UNGER, 1850) known from the late Miocene flora of Radoboj (Chroatia). The existing differences in the shape of the leaf lamina and the number of secondary veins in both fossil materials however, give us reason to prefer the combination *Cyclolobium* aff. *brasiliense*. It is possible for further excavations to find better traces of this taxon. Then we can offer a final taxonomic solution.

Geographic and stratigraphic distribution: This fossil taxon is known only from the Satovcha Middle Miocene flora.

Family Cornaceae, Genus *Cornus*

Cornus buchii Heer (Plate I, Fig. 1)

1859. HEER, p. 26, Pl. 105, Figs 6-9.

1964. PALAMAREV, p. 30, Text-Fig. 42.

2017. TODOROV *et al*., p. 76.

Material: leaf imprint.

Description: The fossil species is described in detail by PALAMAREV (1964) in the Chukurovo middle Miocene flora.

Comparison: Our material has no deviations from the type. The fossil species is registered for the second time in the Bulgarian palaeoflora. The recent species *C. sanguinea* L. and *C. foemina* Mill., the first widespread in Europe and West Asia and the second in the eastern and southeast parts of the United States have been accepted as nearest living relatives.

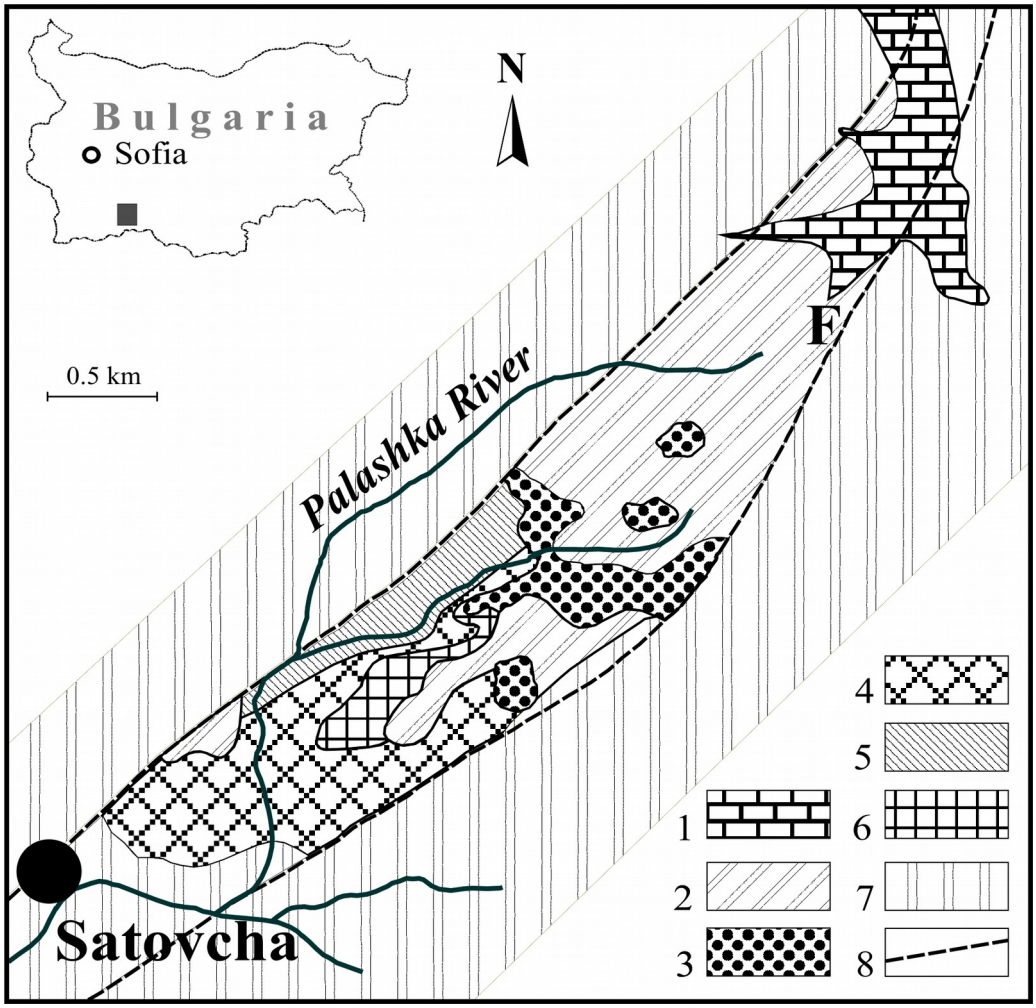


Fig. 1. Geological map of Satovcha Graben (after VATSEV & PIRUMOVA, 1983) and the location of the fossil site (**F**). Legend: 1 - Breccia and conglomerates (Quaternary), 2 - Sivik Formation (Miocene), 3 - Rhyolites and Rhyodacites (Oligocene), 4 - Satovcha Formation (Oligocene), 5 - Stamatitsa Member of Satovcha Formation (Sands), 6 - Palashka Member of Satovcha Formation, 7 - Bedding of Satovcha Formation (Proterozoic metamorphic rocks), 8 – Faults.

Table 1. An alphabetical list of taxa; their nearest living relatives (NLR) / geographical areal; NLR vertical distribution (VD); biological type (BT).

№	Fossil taxa	NLR /areal	VD (m)	BT
1	*Acer tricuspidatum* A. Br. & Agass.	*A. rubrum* L. / East and Central N America	0-900	tree
2	*Alnus crebrinervis* E. Kovács	*A. sinuata* (Reg.) Rydb. / West N America	0-2000	shrub
3	*A. palaerhodopaea* Bozukov & Palam.	*A. firma* Sieb. et Zucc. / Japan	No data	tree
4	*Alnus* aff. *subcordata* C.A. Mey.	*A. subcordata* C.A. Mey. / Caucasus	No data	tree

5	*Amentotaxus gladifolia* (Ludw.) Ferg., Jähnich. & Alvin	*A. argotaenia* (Hance) Pilger var. *argotaenia* / SE China, N Vietnam	300-1100	small tree or shrub
6	*Ampelopsis* aff. *cordata* Michx.	*A. cordata* Michx. / USA	0-1000	liana
7	*Betula dubiosa* Holl.	*B. grossa* Sieb. & Zucc. (= *B. carpinifolia* Sieb. & Zucc.) / Japan; *B. luminifera* H. Winkl. / China	No data	tree
8	*Carpinus grandis* Ung.	*C. betulus* L. / Central, East and South Europe, W Asia	0-600	tree
9	*C. suborientalis* Sap.	*C. orientalis* Mill. / SE Europe, SW Asia	0-1300	tree
10	*Cornus buchii* Heer	*C. sanguinea* L. / Europe and W Asia; *C. foemina* Mill. / East and Southeast USA	0-1500 0-1500	shrub shrub
11	*Cryptomeria rhenana* Kilpp.	*C. japonica* D. Don / E China, Japan	300-2050	tree
12	*Cyclolobium* aff. *brasiliense* K. Koch.	*Cyclolobium brasiliense* K. Koch. / Bolivia, Brasilia, Paraguay	No data	tree
13	*Daphnogene bilinica* (Ung.) Kvač. & Knobl.	*Cinnamomum japonicum* Sieb., *Cryptocarya australlis* Benth., *Neolitsea lanuginosa* (Nees) Gamble / SE Asia	300-1000	tree
14	*Distylium* aff. *racemosa* Sieb. & Zucc.	*D. racemosa* Sieb. & Zucc. / SW China, Korea, S Japan	1000-1300	shrub
15	*Eotrigonobalanus furcinervis* (Rossm.) Walth. & Kvač.	*Castanopsis*, *Lithocarpus*, *Trigonobalanus* / E Asia	-	tree
16	*Gordonia hradekensis* (Kvač. & Buz.) Bozukov & Palam.	*Polyspora balansae* (Pit.) Hu / E Asia	No data	shrub
17	*G. stefanovii* Palam. & Bozukov	*G. lasianthus* Ell. / SE USA	0-200	small tree or shrub
18	*Hartia palaeorhodopensis* Bozukov & Palam.	*H. yunnanensis* Hu (= *Stewartia calcicola* T. L. Ming & J. Li / E Asia	900-1700	tree
19	*Juglans acuminata* A. Br.	*J. regia* L. / SE Europe, Central Asia, W China	600-3000	tree
20	*Litsea ocoteifolia* (Ett.) Imkhan.	*L. angustifolia* (Wall.) Hook. (= *Actinodaphne angustifolia* (Blume) Nees) / India	0-1300	tree
21	*L. primigenia* (Ung.) Takht.	*L. cubeba* (Lour.) Pers. / SE Asia	300-3200	small tree or shrub
22	*Macclintockia basinervis* (Rossm.) Knobl.	Unknown	No data	No data
23	*Myrica lignitum* (Ung.) Sap.	*M. californica* Loisel. / W USA	0-1000	srub
24	*Neolitsea palaeosericea* Takht.	*N. sericea* (Blume) Koidz. / SE Asia, Japan	0-1000	tree
25	*Ostrya angustifolia* Andr.	*O. carpinifolia* Scop. / Europe	0-900	tree
26	*Ostrya* aff. *carpinifolia* Scop.	*O. carpinifolia* Scop. / Europe	0-900	tree
27	*Periploca graeca* L. foss.	*P. graeca* L. / S Europe, Middle East	0-150	liana
28	*Persea braunii* Heer	*P. americana* Mill. / Mexico	0-800	tree
29	*Picea* aff. *schrenkiana* Fisch. & C.A. Mey.	*P.* aff. *schrenkiana* Fisch. & C.A. Mey. / Central Asia, W China	1200-3500	tree
30	*Pinus brevis* Ludw.	*P. mugo* Turra / Europe	1000-2200	srub
31	*P. neptuni* (Ung.) Palam.	*P. pinaster* Ait. / Mediterranean	0-600	tree
32	*P. peuce* Griseb. foss.	*P. peuce* Griseb. / Balkan penn.	1000-2200	tree
33	*Pinus* aff. *thunbergii* Parl.	*P. thunbergii* Parl. / Japan	0-1000	tree
34	*Pinus* sp.	-	-	-

35	*Populus populina* (Brongn.) Knobl.	*P. deltoides* var. *occidentalis* Rydb. /S Canada, USA, N Mexico	50-2200	tree
		P. fremontii Wats. / WS USA, N Mexico	0-1500	tree
36	*P. zaddachii* Heer	*P. cathayana* Rechd. / China	800-3000	tree
		P. trichocarpa Hook. / W USA	0-2100	tree
37	*Quercus lyellii* Heer	*Q. imbricaria* Michx. / Central USA	100-700	tree
		Q. laurifolia Michx. / SE USA	0-150	tree
38	*Q. sosnowskyi* Kolak.	*Q. suber* L. / Mediterraneaen	0-800	tree
		Q. alnifolia Poech / Cyprus	400-1800	tree
39	*Stewartia submonadelpha* Tanai & Onoe	*S. monadelpha* Sieb. & Zucc. / Japan, Korea	600-1300	small tree or shrub
40	*Tetraclinis wandae* Zabl.	*Taiwania cryptomerioides* Hayata / E Asia	1750-2900	tree
41	*Thuja saviana* Gaud.	*Thuja occidentalis* L. /S Canada, N USA	0-900	tree
42	*Trigonobalanopsis rhamnoides* (Rossm.) Kvac. & Walth.	*Trigonobalanus* sp. / S America, SE Asia		tree
43	*Typha angustifolia* L. foss.	*T. angustifolia* L. / cosmopolitan	0-2000	grass
44	*T. latissima* A. Br.	*T. latifolia* L. / cosmopolitan	0-2300	grass
45	*Viburnum* aff. *sempervirens* K. Koch	*V. sempervirens* K. Koch / SE China	100-1800	shrub

Family Adoxaceae, Genus *Viburnum*

Viburnum aff. *sempervirens* K. Koch (Plate II, Fig. 4)

Material: leaf imprint.

Description: The shape of the leaf lamina is elliptic. Leaf lamina base is acute cuneate. The apex is not preserved. Probably it is acute or acuminate. The leaf lamina margin is entire. The venation is brochidodromous. The primary vein is straight, much thicker than the secondary veins. There is a pair of veins that look like basal type. They are a bit shorter than the first pair of secondary veins. Three pairs of secondary veins are visible. The secondary veins are alternate, curved. The first pair of them at an angle of 20° towards the primary vein; the second pair - 40 , the third - 50. Secondary veins are joining superadjacent ones at obtuse angle. The interval between pairs of secondary veins greatly decreases towards the apex. There are no intersecondary veins. Tertiary veins are not visible. Dimensions: length of the preserved part - 4.5 cm (the whole leaf lamina length is 11 cm probably); width - 2.3 cm.

Comparison: Our material is very similar to the Chinese species *V. sempervirens*. It is a shrub that is spread in rare or dense forests (JIA-QI & PING-CHENG, 1988). The genus *Viburnum* is represented by five taxa in the Bulgarian Neogene flora, one of which is known from the palaeoflora from Satovcha (PALAMAREV *et al*., 2005)

Geographic and stratigraphic distribution: So far this fossil taxon is known only from the Satovcha Middle Miocene flora.

Discussion

The data obtained from the current studies confirm the existing knowledge on the Satovcha palaeoflora. The main distinctive feature of this local palaeoflora is its exceptional richness, which combines different types species as presented in the recent Bulgarian flora ones, fossil exotic species, and even extinct plant genera (BOZUKOV, 2001). Taxa identical to the species that are currently distributed on the territory of Bulgaria as *P. peuce, Ostrya* aff. *carpinifolia, Typha angustifolia* L. foss., *Periploca graeca* L. foss., as well as allochthonous genera *Persea, Stewartia, Myrica, Gordonia, Cyclolobium, Neolitsea, Litsea, Hartia, Distylium* and also extinct ancient genera *Macclintockia, Eotrigonobalanus, Tetraclinis, Trigonobalanopsis, Daphnogene* were registered again (Table 1).

The reasons for such species variety are two. One is the geographic location of the studied deposit and the other is the suitable climate. The Rhodopes Mts. always played an important role in the migration of plant species between the territories of Europe, Asia and Africa during the different geological eras. Whether they existed as a mountain massif or as an archipelago, they have enabled the species to migrate, and have also been an extremely

active species-forming center (PALAMAREV, 2003). The second reason is climatic conditions in the middle Miocene in the Rhofopes region. They were characterized by a lack of freezing temperatures in winter in low-altitude areas and relatively high rainfall (BOZUKOV, 2001). Both new data (in Table 1) and past studies (BOZUKOV, 2001) show that fossil species with NLR from East and SE Asia predominate. A credible analogy between paleoclimate and paleoavegetation in the Satovcha area can be made with today's vegetation and climatic conditions on the South Japan island of Jakushima due to the following facts. The highest elevations on this island is a mountain pick with a height of 1,935 meters, which suggests the development of different height belts vegetation. Ancient Yakushima's forests in the upper hilly zone between 600-700 m and 1,200 m a.s.l., as well as in the lower mountain region, between 1,200 m and 1,600-1,700 m a.s.l. are known by the presence of the Japanese endemic species *Cryptomeria japonica* (NUMATA, 1974). It has been accepted as a NLR to the fossil *C. rhenana*, which is widespread in the Satovcha palaeoflora. The recent South Japan forest vegetation here is a mixed evergreen forest with about 50% of *Cryptomeria*. It has covered evergreen angiosperm trees such as *Trochodendron aralioides, Distylium racemosum, Camellia japonica, C. sasquana, Daphniphyllum* spp., *Michelia compressa, Myrica rubra, Quercus* spp., *Ilex* spp., and Lauraceae (THOMAS *et al*., 2013). The presence of *Distylium* aff. *racemosum* as established by the new data (Table 1), as well as the presence of genera *Myrica*, *Quercus* and *Ilex* and families Lauraceae and Theaceae also known in Satovcha palaeoflora by previously published data (BOZUKOV, 1998b, 1999ab, 2000) are important facts for the comparison between the recent and palaeovegetations disputing here. The gymnosperm species *Abies firma*, *Tsuga sieboldii, Chamaecyparis obtusa*, and *Torreya nucifera* are characteristic for the forests of the Yakushima (THOMAS *et al*., 2013). The presence of the genus *Tsuga* in the Satovcha Middle Miocene flora (BOZUKOV, 1998a) and the fossil form *Chamaecyparis obtusa* foss. in the Melnik Late Miocene flora (PALAMAREV, 1982) which is situated not so far from the Satovcha Graben proves the similarity between the Satovcha palaeovegetations and recent Yakushima vegetation once again. There are representatives of the genus *Acer*, and Theaceae species *Stewartia monadelpha* in between deciduous angiosperm trees of the island (THOMAS *et al*., 2013). An analogy with the presence of the genus *Acer* and *Stewartia submonadelpha* in the Satovcha paleoflora can be made again, according to the data presented in Tab. 1 and those of BOZUKOV (1999b). In the varied shrub floor of the recent flora mentioned here, there is also a common genus with the fossil one and this is *Rhus* (BOZUKOV, 1999b). Considering that similar flora have developed in similar conditions, we can assume the climatic parameters in the Rhodope region during the middle Miocene. Yakushima has a humid subtropical climate with warm, humid summers and mild winters, known as *Cfa* classification (KÖPPEN, 1931). Precipitation is extremely heavy, with at least 250 millimeters in each month and as much as 773 millimeters in June. The annual precipitation in Yakushima is one of the world's highest at 4,000 to 10,000 mm. There are drier periods in autumn and winter, while the heaviest rains occur in spring and summer. It is the southernmost place in Japan, where is snow in the mountains, often for months, while the ocean temperature is never below 19°C (www.climate-charts.com/Locations/j/JP47836.php).

Conclusions

According to the above, it can be assumed that the forests of the Yakushima Island are a good model for representing the Satovcha Middle Miocene vegetation. This is a suitable way to reconstruct the palaeoclimate in the Rhodope region during the middle Miocene. The most reliable reconstruction models should be sought exactly in the regions of East and Southeast Asia, as most fossil species NLR of the Satovcha palaeoflora are from the regions of East and Southeast Asia were the climate is *Cfa* type.

Getting new data from this fossil flora locality will surely lead to greater objectivity of the comparative analysis between the fossil material and recent models of vegetation and climate. The study of the Salovcha palaeoflora should continue as it also contributes to the enrichment of the Bulgarian palaeoflora.

References

BOZUKOV V. 1996. *Macclintockia basinervis* (Rossm.) Knobloch in the fossil flora of the Satovcha Graben in the Western Rhodopes. *Fitologiya*, 48: 68-72.

BOZUKOV V. 1998a. Miocene macroflora of the Satovcha Graben (Western Rhodopes). I. Systematics. 1. Equisetophyta, Polypodiophyta, Pinophyta. *Phytol. Balcan*., 4(1-2): 3-12.

BOZUKOV V. 1998b. Miocene macroflora of the Satovcha Graben (Western Rhodopes). I. Systematics. 2. Lauraceae, Magnoliaceae, Cercidiphyllaceae, Hamamelidaceae, Ulmaceae, Moraceae. *Phytol. Balcan*., 4(3): 3-12

BOZUKOV V. 1999a. Miocene macroflora of the Satovcha Graben (Western Rhodopes). I. Systematics. 3. Fagaceae, Betulaceae. *Phytol. Balcan*., 5(1): 3-13.

BOZUKOV V. 1999b. Miocene macroflora of the Satovcha Graben (Western Rhodopes). I. Systematics. 4. Myricaceae, Juglandaceae, Theaceae, Salicaceae, Ericaceae, Myrsinaceae, Tiliaceae, Sterculiaceae, Fabaceae, Meliaceae, Anacardiaceae, Rutaceae, Aceraceae, Sapindaceae, Styracaceae, Cornaceae. *Phytol. Balcan*., 5(2-3): 47-62.

BOZUKOV V. 2000. Miocene macroflora of the Satovcha Graben (Western Rhodopes). I. Systematics. 5. Magnoliophyta: Araliaceae, Aquifoliaceae, Celastraceae, Rhamnaceae, Vitaceae, Apocynaceae, Caprifoliaceae, Convolvulaceae, *Macclintockia*; Smilacaceae, Cyperaceae, Sparganiaceae, Typhaceae. *Phytol. Balcan*., 6(1): 15-29.

BOZUKOV V. 2001. Miocene macroflora of the Satovcha Graben (Western Rhodopes). II. Paleofloristic, paleoecological and phytogeographical analysis. *Phytol. Balcan*., 7(1): 13-33.

BOZUKOV V. 2002. Miocene macroflara of the Satovcha Graben (Western Rhodopes). III. Comparative analysis of the Satovcha paleoflora with benchmark European macrofloras. Geological age of the paleoflora. *Phytol. Balcan*., 8(2): 165-180.

BOZUKOV V., D. IVANOV. 1995. *Davallia haidingeri* Ett. a new species to Bulgarian flora - a leaf impression and spores *in situ. Phytol. Balcan*., 1(2): 15-18.

BOZUKOV V., R. IVANOVA. 2015. New taxonomic data on the palaeoflora from the Satovcha Graben (SW Bulgaria). *C. R. Acad. Bulg. Sci.*, 68(5): 623-630.

BOZUKOV V., E. PALAMAREV. 1992. Taxonomiche Zusammensetzung der Gattungen *Populus* L. und *Alnus* Gaertn. in der fossilen Flora von Satovca Graben in West-Rhodopen (Bulgarien). *Doc. Nat*., 76: 10-19.

BOZUKOV V., E. PALAMAREV, 1995. On the Tertiary History of the Theaceae in Bulgaria. *Fl. Medit*., 5: 177-190.

BUDANTSEV L. 1982. Genus *Betula* L. Species established by leaves. *In*: Takhtajan, A. (Ed.), *Magnoliophyta Fossilia URSS, Vol. 2. Ulmaceae – Betulaceae*. Nauka, Leningrad, pp. 137-142.

Climate-Charts.com. 2007. Yakushima, Japan. Available at: [https://www.climate-charts.com/Locations/j/JP47836.php] (Accessed on 27 Mach 2018).

DILCHER D. 1974. Aproaches to the identification of Angiosperm leaf remains. *Bot. Rev.*, 40(1): 1-157.

GÖPPERT H.R. 1855. Die tertiäre Flora von Schossnitz in Schlesien. Gorlitz.

HEER O. 1859. Flora tertiaria Helvetiae. III. Winterthur.

HEER O. 1868. *Flora fossilis arctica.* I. Zürich.

HOLLIK, A. 1936. The Tertiary floras of Alaska. *U.S. Geol. Survey Prof. Paper* 182, 185 p.

JIA-QI H., H. PING-SHENG. 1988. *Sambucus* and *Viburnum*. *In:* PING-SHENG H. (Ed.), *Fl. Republ. Popularis Sin.*, 72: 4-104.

KAMENOV B., E. KOJUMDGIEVA. 1983. Stratigraphy of Neogene in the Sofia Basin. *Paleont. Stratigr. Lithol.*, 18: 69-85 (in Bulgarian, English summary).

KITANOV G. 1984. Pliocene Flora Composition in the Gotce Delchev Region. *Fitologiya*, 25: 41-70 (in Bulgarian, English summary).

KÖPPEN W. 1931. *Grundriss der Klimakunde*. De Gruyter, Berlin, 388 p.

NUMATA M. 1974. *The Flora and Vegetation of Japan*. Kodasha Limited, Tokyo, 294 p.

PALAMAREV E. 1964. Paläobotanische Untersuchungen des Čukurovo-

Kohlebeckens. *Izv. Bot. Inst. (Sofia)*, 13: 5-80 (in Bulgarian, German summary).

PALAMAREV E. 1982. The Neogene Carpoflora from Melnik Basin. *Paleontol. Stratigr. Lithol.*, 16: 3-43 (in Bulgarian, English summary).

PALAMAREV E. 2003. Paleorhodopean Orogenic System: an evolutionary and paleoecological pattern in the history of the Balkan paleoflora. *Phytol. Balcan*., 9(3): 347-360.

PALAMAREV E., V. BOZUKOV. 1992. On the Tertiary history of genus *Acer* Linnaeus in Bulgaria. *Geol. Balcan*., 22(5): 61-70.

PALAMAREV E., V. BOZUKOV, K. UZUNOVA, A. PETKOVA, G. KITANOV. 2005. Catalogue of the Cenozoic plants of Bulgaria (Eocene to Pliocene). *Phytol. Balcan*., 11(3): 215-364.

PALAMAREV E., A. PETKOVA 1987. La macroflore du Sarmatien. *In:* TZANKOV, V. (Ed.), Les fossiles de Bulgarie, Vol. 8(1), Bulg. Acad. Sci., Sofia, pp. 3-275. (in Bulgarian, French summary).

STEFANOV B., A. GANCHEV, 1951. *Stewartia* L. and *Gordonia* Ellis (Theaceae) in the Pliocene Flora of Bulgaria. *Izv. Bot. Inst. (Sofia),* 2: 163-174 (in Bulgarian, German summary).

STEFANOFF B., D. JORDANOFF, 1934. Weitere Materialien zur Kenntnis der fossilen Flora des Pliozän bei dem Dorf Kurilo (Bez. Sofia). *God. Sofiisk. Univ. Agric. & Forest. Fak*., 2: 1-55 (in Bulgarian, German summary).

STEFANOFF B., D. JORDANOFF. 1935. Studies upon the Pliocene Flora of the Plain of Sofia (Bulgaria). *Abh. Bulg. Akad. Wiss.*, 29: 3-150.

STOJANOFF N., B. STEFANOFF. 1929. Beitrag zur Kenntnis der Pliozänflora der Ebene von Sofia. *Spis. Bulg. Geol. Druzh*., 1(3): 4-120.

TAKHTAJAN A.1963. The Neogene flora of the Goderdzi Pass. I. *Paleobotanika*, 4: 189-204 (in Russian).

TAKHTAJAN A. 1987. *Systema Magnoliophytorum*. Nauka, Leningrad, 439 p.

THOMAS P., T. KATSUKI, A. FARJON. 2013. *Cryptomeria japonica*. *The IUCN Red List of Threatened Species 2013*: e.T39149A2886821. DOI: 10.2305/IUCN.UK.2013-1.RLTS.T39149A2886821.en (Accessed on 27 Mach 2018).

TODOROV O., V. BOZUKOV, D. GEORGIEVA. 2017a. New research on the fossil flora from Satovcha Graben (SW Bulgaria). *BalkanBio 4th Balkan Scientific Conference on Biology, Programme & Book of Abstracts*, p. 74-77.

TODOROV O., N. OGNJANOVA-RUMENOVA, V. BOZUKOV. 2017b. New data on biostratigraphy and palaeoecological development of the Satovcha Graben (SW Bulgaria). *BalkanBio 4th Balkan Scientific Conference on Biology, Programme & Book of Abstracts*, p. 78-81.

UNGER F. 1850. Die fossile Flora von Sotzka. *Ak. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr*., 2: 131-197.

UZUNOVA 1995. Some new and interesting species for Sarmatian flora of Bulgaria. *Doc. Nat.*, 93: 1-15.

VATSEV M., PIRUMOVA. 1983. Lithostratigraphy of Tertiary sediments from the Satovcha Graben. *Ann. Book High Inst. Mining & Geol., Sofia,* 29(2): 169-179 (in Bulgarian, English summary).

Accepted: 11.05.2018
Published: 10.09.2018

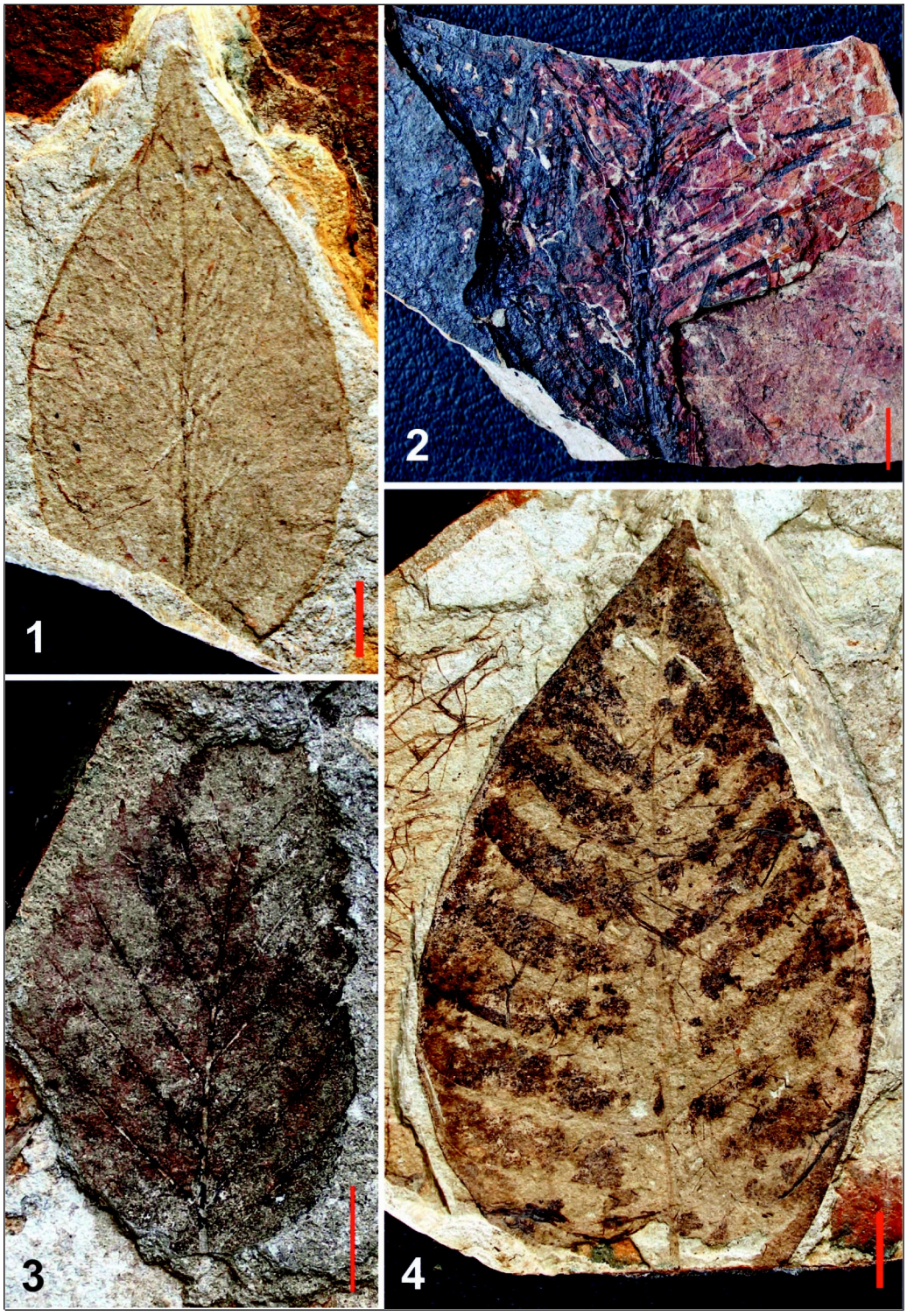


Plate I. 1 – *Cornus buchii*, 2 – *Picea* aff. *schrenkiana*, 3 – *Betula dubiosa*, 4 – *Cyclolobium* aff. *brasiliense*. Scale bar – 1 cm.

Plate II. 1 – *Litsea primigenia*, 2 – *Pinus peuce* foss., 3 – *Distylium* aff. *racemosa*, 4 – *Viburnum* aff. *sempervirens*. Scale bar – 1 cm.

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 27-31

New Information on the Psocoptera fauna of the Bulgarian Black Sea Coast

Dilian G. Georgiev[*1,2], Ognyan B. Todorov[2]

1 - University of Plovdiv, Faculty of Biology, Department of Ecology and Environmental Conservation, 24 Tzar Assen Str., BG-4000 Plovdiv, BULGARIA
2 - Regional Natural History Museum – Plovdiv, Hristo G. Danov Str., 34, BG-4000 Plovdiv, BULGARIA
*Corresponding author: diliangeorgiev@abv.bg

Abstract. New distributional data are reported for 18 Psocoptera species. Four of them are new records for Bulgaria, and one (*Aaroniella badonneli* (Danks, 1950)) is a new record for the Balkan Peninsula.

Key words: insecta, barkfly, species, Black Sea Coast, distribution.

Introduction

The very first barkfly record from the Bulgarian Black Sea coastal area was given by MEINANDER (1978), describing the species *Trimerocaecilius popovi* Meinander, 1978.

Thirty nine years later GEORGIEV (2017) reported some information on the species diversity of the Psocoptera fauna of the same region. The following species were reported:

- North Black Sea Coast: *Cerobasis guestfalica* (Kolbe, 1880), *Liposcelis bostrychophila* Badonnel, 1931, *Ectopsocus briggsi* McLachlan, 1899, *Ectopsocus meridionalis* Ribaga, 1904, *Trichopsocus dalii* (McLachlan, 1867), *Metylophorus nebulosus* (Stephens, 1836);

- South Black Sea Coast: *Stenopsocus immaculatus* (Stephens, 1836), *Ectopsocus briggsi* McLachlan, 1899, *Ectopsocus meridionalis* Ribaga, 1904, *Peripsocus didymus* Roesler, 1939, *Trimerocaecilius popovi* Meinander, 1978 (resampled from the type locality), *Trichopsocus dalii* (McLachlan, 1867), *Trichadenotecnum majus* (Kolbe, 1880), *T. innuptum* Betz, 1983.

GEORGIEV & TODOROV (2017) added a new locality of *Ectopsocus briggsi*, near Tsarevo, and recently GEORGIEV & IVANOVA (2018, see this issue) reported *Psyllipsocus ramburii* Selys-Longchamps, 1872 from a cave near Bolata Beach, N Black Sea Coast.

In this paper we give additional information about the Psocoptera species of the Bulgarian Black Sea Coast, with some of them as new records for the country and one for the Balkan Peninsula.

Material and Methods

The barkflies were collected during 2017 and 2018, by following methods: 1. Actively searched in proper habitats or around light during night, and collected by a wet brush or grass straw; 2. Sieving with 1 mm mesh width sieve of detritus or crushed tree bark particles above white plastic container; 3. Beating the vegetation above white plastic container; 4. Checking for dead individuals below windows, in lamps, in spider webs or pools, and various tanks full with water; 5. Sweep netting of vegetation; 6. Trapping by white plastic containers placed below lamps. Specimens were then stored in ethanol and after processing, deposited in the collection of the first author. After identification they were preserved in ethanol, acetic acid and/or glycerin. Species identifications, taxonomical order and

nomenclature follow LIENHARD (1998) and LIENHARD & SMITHERS (2002). As supporting sources, MEINANDER (1978) and SAVILLE (2008) were also used.

Results

Family Trogiidae

Cerobasis guestfalica (Kolbe, 1880)

Material examined: 24.06.2018, 2 ♀, South Black Sea Coast, Tsarevo town, near Popski Beach, ruderal vegetation, from brunches of *Cupressus* sp., N42 10 28.0 E27 50 38.4, 23 m a.s.l., collected by beating the vegetation, D. Georgiev leg.

Lepinotus reticulatus Enderlein, 1905

Material examined: 18.6.2017, 2 ♀nymphs, South Black Sea Coast, near Sozopol town, *Pinus silvestris* plantation, in detritus of *P. silvestris*, N42 24 31.3 E27 41 47.9, 35 m a.s.l., collected by sieving, D. Georgiev leg.; 25.6.2017, 1 ♀, South Black Sea Coast, near Tsarevo town, mixed forest plantation dominated by *Quercus rubra* and *Pinus* spp., under bark of live *Pinus pinaster*, collected by sieving, D. Georgiev leg.; 15.8.2017, 1 ♀, North Black Sea Coast, near Kavarna town, *Pinus nigra* plantation, in detritus of *P. nigra*, N43 24 54.8 E28 21 27.8, 87 m a.s.l., collected by sieving, D. Georgiev leg.

Family Liposcelididae

Liposcelis decolor (Pearman, 1925)

Material examined: 27.8.2017, 1 ♀, South Black Sea Coast, near Sinemorets town, *Quercus* sp. forest, in dead trunk of *Quercus* sp., N42 03 30.1 E27 58 49.7, 27 m a.s.l., collected by sieving, D. Georgiev leg.; 23.6.2018, 1 ♀, South Black Sea Coast, Tsarevo town, found living among dead insects in a lamp (Fig. 1a), N42 10 11.0 E27 50 21.6, 51 m a.s.l., collected by brush, D. Georgiev leg.

Liposcelis pearmani Lienhard, 1990

Material examined: 18.6.2017, 1 ♀, South Black Sea Coast, near Sozopol town, *Pinus silvestris* plantation, in detritus of *P. silvestris*, N42 24 31.3 E27 41 47.9, 35 m a.s.l., collected by sieving, D. Georgiev leg.

Family Caeciliusidae

Valenzuela flavidus (Stephens, 1836)

Material examined: 25.6.2017, 1 ♀, South Black Sea Coast, near Tsarevo town, mixed forest plantation dominated by *Quercus rubra* and *Pinus* spp., N42 10 21.8 E27 50 27.4, 52 m a.s.l., collected by beating the vegetation, D. Georgiev leg.; 25.8.2017, 1 ♀, South Black Sea Coast, at the estuary of Veleka River, grass and shrubs, from brunches of *Ulmus minor*, N42 03 53.5 E27 58 18.0, 4 m a.s.l., collected by beating the vegetation, and 26.8.2017, 2 ♀, same area, *Fraxinus* sp. forest, found dead in a paddle, D. Georgiev leg.

Valenzuela burmeisteri (Brauer, 1876)

Material examined: 26.6.2017, 2 ♀, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, from brunches of *Cupressus* sp., N42 10 11.0 E27 50 21.6, 51 m a.s.l., collected by sweep netting, D. Georgiev leg.; 26.6.2017, 2 ♂, South Black Sea Coast, Tsarevo town, near Popski Beach, ruderal vegetation, from brunches of *Cupressus* sp., N42 10 28.0 E27 50 38.4, 23 m a.s.l., collected by sweep netting, D. Georgiev leg.; 24.06.2018, 1 ♀, same locality and habitat, D. Georgiev leg.; 16.8.2017, 1 ♀, North Black Sea Coast, Kavarna town, city park, from brunches of *Taxus* sp., N43 26 9.36 E28 20 26.9, 125 m a.s.l., collected by beating the vegetation, D. Georgiev leg.; 19.8.2017, 1 ♀, North Black Sea Coast, Kavarna town, Sveti Georgi hotel, N43 24 57.6 E28 21 19.2, 35 m a.s.l., found dead below window of a door, D. Georgiev leg.

Valenzuela piceus (Kolbe, 1882)

Material examined: 26.6.2017, 1 ♂, South Black Sea Coast, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, from brunches of *Cupressus* sp., N42 10 11.0 E27 50 21.6, 51 m a.s.l., collected by sweep netting, D. Georgiev leg.

Family Stenopsocidae

Graphopsocus cruciatus (Linnaeus, 1768)

Material examined: 27.6.2017, 1 ♀, South Black Sea Coast, near Lisovo Dere River, *Fraxinus* sp. forest, from brunches of *Fraxinus*

sp., N42 09 16.0 E27 50 56.1, 13 m a.s.l., collected by sweep netting, D. Georgiev leg.; 24.8.2017, 1 ♀, South Black Sea Coast, near Sinemorets town, broad leaf forest, from brunches of *Quercus* sp., N42 03 11.1 E27 59 04.1, at the sea level, collected by beating the vegetation, D. Georgiev leg.

Family Lachesillidae

Lachesilla pedicularia (Linnaeus, 1758)

Material examined: 18 and 19.8.2017, 5 ♀, 1♂, North Black Sea Coast, Kavarna town, Sveti Georgi hotel, N43 24 57.6 E28 21 19.2, 35 m a.s.l., found dead below windows and in spider webs, D. Georgiev leg.

Family Peripsocidae

Peripsocus didymus Roesler, 1939

Material examined: 23 and 26.6.2018, 1 ♀, 8 ♂, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, found dead inside lamps in the park, and from white plastic collector situated below lamp (Fig. 1b), N42 10 11.0 E27 50 21.6, 51 m a.s.l., D. Georgiev leg.; 26.6.2018, 1 ♂, South Black Sea Coast, near Tsarevo town, foothills of Strandzha Mts., shrub and grass vegetation, from brunches of *Crataegus* sp., N42 10 07.4 E27 50 13.4, 41 m a.s.l., collected by beating the vegetation, D. Georgiev leg.

Peripsocus phaeopterus (Stephens, 1836)

Material examined: 26.6.2017, 1 ♀, South Black Sea Coast, Tsarevo town, near Popski Beach, ruderal vegetation, from brunches of *Cupressus* sp., N42 10 28.0 E27 50 38.4, 23 m a.s.l., collected by sweep netting, D. Georgiev leg.; 23.6.2018, 1 ♂, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, N42 10 11.0 E27 50 21.6, 51 m a.s.l., found dead inside a lamp in the park, D. Georgiev leg.

Family Pseudocaeciliidae

Trimerocaecilius cf. *becheti* Meinander, 1978

Material examined: 22.6.2018, 2 ♀ (macropterous), South Black Sea Coast, vicinities of Tsarevo town, *Quercus rubra* plantation, on a bark of live *Q. rubra*, N42 10 13.2 E27 50 23.6, 47 m a.s.l., collected during night by head torch, and using a dry grass straw and saliva, O. Todorov leg.

Note: Both females were macropterous, having intense brown pigmentation on the forewings, darker vertex around the compound eyes forming medial triangle with its tip at the ocelli and a subgenital plate with V – shaped dark sclerification. The abdomen was yellowish with brown apex.

Some of the specimens reported by GEORGIEV (2017) as *T. popovi* Meinander, 1978 from the area of Sinemorets (type locality) belong to *T. becheti*, after secondary examination, considering the original descriptions by MEINANDER (1978). Some of those specimens have an intermediate morphology between both species – presence/absence of brown patches on the forewing, pale abdomen, subgenital plate with V – shaped dark sclerification, and darker vertex around the compund eyes forming medial triangle with its tip at the ocelli. However all female specimens were macropterous which is typical for *T. popovi*. Further research is needed to clear their status as separate species. If *T. becheti* is a separate species, our find is a new record to Bulgaria.

Trimerocaecilius popovi Meinander, 1978

Material examined: 26.6.2018, 1 ♀, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, under stones, N42 10 11.0 E27 50 21.6, 51 m a.s.l., collected by brush, D. Georgiev leg.; 26.6.2018, 1 ♀, South Black Sea Coast, near Tsarevo town, foothills of Strandzha Mts., shrub and grass vegetation, from brunches of *Corylus avellana*, N42 10 07.4 E27 50 13.4, 41 m a.s.l., collected by beating the vegetation, D. Georgiev leg.

Note: Both females were macropterous, having just slight yellowish pigmentation on the forewings, dark uniformly brown vertex and a lack of V – shaped dark sclerification of the subgenital plate. The whole body was uniformly dark brown.

Family Trichopsocidae

Trichopsocus dalii (McLachlan, 1867)

Material examined: 22.6.2018, 1 ♂, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, N42 10 11.0 E27 50 21.6, 51 m a.s.l., O. Todorov leg.

Family Elipsocidae

Elipsocus hyalinus (Stephens, 1836)

Material examined: 23.6.2018, 1 ♀, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, N42 10 11.0 E27 50 21.6, 51 m a.s.l., in white plastic collector situated below lamp (Fig. 1b), D. Georgiev leg.

Note: New record for Bulgaria.

Cuneopalpus cyanops (Rostock, 1876)

Material examined: 26.6.2018, 1 ♀, South Black Sea Coast, near Tsarevo town, mixed forest plantation dominated by *Quercus rubra* and *Pinus* spp., N42 10 13.2 E27 50 23.6, 47 m a.s.l., collected still living from a plastic remain full with rain water, D. Georgiev leg.

Family Philotarsidae

Aaroniella badonneli (Danks, 1950)

Material examined: 22.6.2018, 1 ♀ (Fig. 2), South Black Sea Coast, vicinities of Tsarevo town, *Quercus rubra* and *Pinus* spp. plantation, on a bark of live *Q. rubra*, N42 10 13.2 E27 50 23.6, 47 m a.s.l., collected during night by head torch, and using a dry grass straw and saliva, O. Todorov leg.; 24.6.2018, 1 ♀, same locality and habitat, collected by brush, D. Georgiev leg.; 23.6.2018, 1 ♀, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, N42 10 11.0 E27 50 21.6, 51 m a.s.l., in white plastic collector situated below lamp (Fig. 1b), and 26.6.2018, 1 ♀, same locality, under stones, collected by brush, D. Georgiev leg.; 26.6.2018, 1 ♀, South Black Sea Coast, near Tsarevo town, foothills of Strandzha Mts., shrub and grass vegetation, from brunches of *Crataegus* sp., N42 10 07.4 E27 50 13.4, 41 m a.s.l., collected by beating the vegetation, D. Georgiev leg.

Note: The species was known from Georgia (Suchumi is the species type locality), Russia, Italy, Azores, USA and Canada. First record of the species for the Balkan Peninsula, and first record of the family Philotarsidae for Bulgaria.

Fig. 1. Methods of collecting Psocoptera used (yard of the base of Plovdiv University):
a – lamp in a park: searching for dead individuals and living *Liposcelis* spp.,
b - plastic container placed below a lamp over night.

Fig. 2. Female *Aaroniella badonneli* from the vicinities of Tsarevo town (S Black Sea Coast): first record of the species for the Balkan Peninsula.

Blaste conspurcata (Rambur, 1842)

Material examined: 26.6.2018, 1 ♀, South Black Sea Coast, near Tsarevo town, foothills of Strandzha Mts., shrub and grass vegetation, from brunches of *Crataegus* sp., N42 10 07.4 E27 50 13.4, 41 m a.s.l., collected by beating the vegetation, D. Georgiev leg.; 26.6.2018, 1 ♀, South Black Sea Coast, Tsarevo town, yard of the base of Plovdiv University, park vegetation – various grass, shrubs and trees, N42 10 11.0 E27 50 21.6, 51 m a.s.l., found dead inside a lamp in the park, D. Georgiev leg.

Note: The species was previously reported from the slopes of Strandzha Mts. near Ravadinovo vill., close to the coastal area (GEORGIEV, 2017).

Loensia variegata (Latreille, 1799)

Material examined: 22.6.2018, 1 ♀, South Black Sea Coast, vicinities of Tsarevo town, *Quercus rubra* plantation, on a green leaf of live *Q. rubra*, N42 10 13.2 E27 50 23.6, 47 m a.s.l., collected during night by head torch, and using a dry grass straw and saliva, O. Todorov leg.

Note: First record for Bulgaria.

References

GEORGIEV D. 2017. Little known and newly recorded species of Psocoptera in Bulgaria. *Ecologica Montenegrina*, 11: 74-79.

GEORGIEV D., TODOROV O. 2017. Reports of *Caecilius fuscopterus* (Latreille, 1799) and *Lachesilla quercus* (Kolbe, 1880) in Bulgaria with some Additional Barkfly Records (Insecta: Psocoptera). *Bulletin of the Natural History Museum – Plovdiv*, 2: 31-32.

LIENHARD C. 1998. *Psocoptères euro-méditerranées*. Faune de France 83, Fédération Francaise des Sociétés de Sciences Naturelles, Paris, 517 p.

LIENHARD, C., SMITHERS, C. 2002. *Psocoptera (Insecta): world catalogue and bibliography*. Instrument Biodiversitatis V. Muséum d'histoire naturelle, Genève, Switzerland, 745 p.

MEINANDER M. 1978. Two new species of Pseudocaeciliidae (Psocoptera) from SE Europe. *Entomologica Scandinavica*, 9: 1-6.

SAVILLE B. 2008. *National Barkfly Recording Scheme (Britain and Ireland).* Available from: https://www.brc.ac.uk [accessed 5 September 2018].

Accepted: 11.09.2018
Published: 28.09.2018

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 33-37

Нови материали за флората на България

Илия Чешмеджиев[1], Юлиан Маринов[*2]

1 – Аграрен университет - Пловдив, бул. "Менделеев" 12, 4000 Пловдив, БЪЛГАРИЯ
2 – Регионален Природонаучен Музей - Пловдив, ул. "Христо Г. Данов 34, Пловдив, БЪЛГАРИЯ
*Кореспондиращ автор: julianmarinov@abv.bg

Abstract. The paper presents data about 15 taxa vascular plants, collected from different floristic regions in the Bulgaria. New for the Bulgarian flora are: two varieties (*Cyclamen hederifolium* Aiton var. *polii* (Delle Chiaje) Giardina & Raimondo и *Asparagus verticillatus* L. var. *tricarinatus* Miscz.). A new form is described (*Scutelaria orientalis* L. subsp. *pinnatifida* (Rchb.) Edmonds. f. *kaliakrae*). New chorological date concerning seven taxa are reported: *Colchicum turcicum* Janka, *Duchesnea indica* (Andrews) Foske, *Melica transsilvanica* Schur., *Mercurialis perennis* L., *Picea abies* (L.) Karsten f. *erytrocarpa* (Purk.) Rehd., *Sambucus ebulus* L. var. *citrina* Češchm. and *Veronica orbelica* (Peev) Peev. Two outcast species are found: *Artemisia dracunculus* L., *Eruca vesicaria* (L.) Cav. subsp. *sativa* (Mill.) Thell. Some critical notes concerning *Eleusine indica* L. are made.

Key words: flora, varietas, taxon, chorology, Bulgaria.

Въведение

Нови за флората на България са две разновидности. Описана е една нова форма. Съобщават се нови находища за осем таксони и се правят някои критични бележки. Посочват се два подивяли вида. Материалите са събирани от различни флористични райони на страната през последните двадесет години.

Материал и Методи

Характеристиката на видовете е направена по живи и хербаризирани материали. Прегледани са хербариите образци депозирани в хербариума на Института по биоразнообразие и екосистемни изследвания при БАН (SOM), Софийския университет (SO) и Аграрния университет в Пловдив (SOA). Изследваните материали се съхраняват в SOA. Разпространението на видовете е дадено с GPS – координати в координатна система WGS84 .

Резултати и Дискусия

сем. Pinaceae

Picea abies (L.) Karsten f. *erytrocarpa* (Purk.) Rehd.

Средна Стара планина: Местност „Почивалото" над гр. Сопот, по пътя на въжената линия (лифта) 21.06. 1997 г., N 42.664886; E 24.747033 ИЧ, (SOM 062339). Тази форма е съобщена за Боровец и Беглика (ЧЕРНЯВСКИ и кол., 1959). Отличава се от типа по виненочервените, а не жълтозеленикави шишарки и по-тъмните листа. Нова форма за Централна Стара планина.

сем. Asteraceae

Artemisia dracunculus L.

Тракийска низина: Пловдив пустеещо тревисто място между МОЛ Пловдив, бул. „Свобода“ и улиците „Владивосток“ и „Кр. Раковски“. Събрано на 07.06.2017 г. преди цъфтеж. 169 м.н.в. N 42.14155; E 24.72083 ИЧ, ЮМ, (SOA 062326). Растението е етеричномаслено, лечебно и подправно, отглеждано рядко в градини (Гусев, 2012). За първи път у нас се посочва като подивяло. На това място расте и *Tanacetum balsamita* L., известно градинско растение, отглеждано като декоративно и етеричномаслено. За него Кузманов (2012) пише „рядко на места почти подивяло“, което с тази находка се потвърждава. ИЧ, ЮМ (SOA 062346).

сем. Brassicaceae

Eruca vesicaria (L.) Cav. subsp. *sativa* (Mill.) Thell.

Тракийска низина: Пловдив пустеещо тревисто място между МОЛ Пловдив, бул. „Свобода“ и улиците „Владивосток“ и „Кр. Раковски“. Събрано на 07.06.2017 г. на прецъфтяване с единични цветове. 169 м.н.в. N 42.14129; E 24.72192 ИЧ, ЮМ (SOA 062327). На мястото някога е имало казарми (9-ти пехотен полк).

Сред тревното разнообразие се срещат и някои подивяли представители: *Foeniculum vulgare* Miller, *Cannabis sativa* L., *Armoracia rusticana* (Lam.) B. Mayer & Schreber, *Artemisia dracunculus* L., и др. Видът *E. vesicaria* subsp. *sativa* се среща у нас в пет флористични района (Асьов & Петрова, 2012), а подивял се съобщава за първи път. Отглежда се като зеленчукова култура.

сем. Euphorbiaceae

Mercurialis perennis L.

Черноморско крайбрежие (южно): Ропотамо, влажна сенчеста гора. 01.04.2000 г., N 42.324432; E 27.757446 ИЧ, (SOA 062340). Известен за страната от 13 флористични райони и „посочен“ за Дунавската равнина (Асьов & Петрова, 2012). Нов за Черноморското крайбрежие.

сем. Lamiaceae

Scutellaria orientalis L. subsp. *pinnatifida* (Rchb.) Edmonds. f. *kaliakrae* Češchm. f. n. Bractea immixtus cum sesselis glands. Corolla cum capillos glandulosus. Typus: Ad Pontum, in herbidis siccis prope pagum Balgarevo ante reservatum „Kaliakra“. 05.05.2000. N 43.373570; E 28.462550, Leg. И. Чешмеджиев (SOM 062345). *Scutellaria orientalis* е силно изменчив вид (Edmondson, 1982), представен в българската флора със subsp. *pinnatifida* (Пеев, 1993). Растенията от „Калиакра“ се отличават по наличието на приседнали жлези по прицветниците и къси жлезисти власинки по венчето.

сем. Primulaceae

Cyclamen hederifolium var. *hederifolium f. albiflorum* (Jord.) Grey-Wilson.

Cyclamen ed. 1: 174 (1997); *Cyclamen albiflorum* Jordan, Fl. Eur. 3: 20, 1903.

Цветовете бели понякога венчелистчетата в основата бледорозови. При типичната форма венчелистчетата са розови или пурпурни с тъмно петно в основата.

Тракийска низина: с. Храбрино Пловдивско, широколистна гора.

N 42.03467; E 24.62466 (Фиг. 1). Нова форма за Българската флора. Отличава се от типичната форма по баграта на цветовете - бели понякога венчелистчетата в основата бледорозови.

Cyclamen hederifolium var. *polii* (Delle Chiaje) Giardina & Raimondo Bocconea 20: 260 2007**;** *C. neapolitanum* Ten. var. *polii* (Delle Chiaje) Ces.

Листата езичести или яйцевидни с уховидна основа или 3 рядко 5-делни с подълъг и по-тесен среден дял, до два пъти подълги отколкото широки.

При типовата разновидност листата са 5-7-ъгълни до неясно многоъгълни с уховидна основа и със среден дял с еднаква ширина и дължина.

Тракийска низина: с. Храбрино Пловдивско, широколистна гора 03.04. 2002

N 42.02645; E 24.61880 ИЧ, ЮМ (SOA 062329; 062330) (Фиг. 2). Нова разновидност за българската флора.

сем. Rosaceae

Duchesnea indica (Andrews) Foske

Тракийска низина: Пловдив, по тревисти места в града и саксийно в цветарски магазини. Събрано с цветове и плодове на 10.10. 2014 г., N 42.124122; E 24.728429 ИЧ,

Фиг. 1. *Cyclamen hederifolium* var. *hederifolium f. albiflorum* от района на с. Храбрино Пловдивско.

Фиг. 2. *Cyclamen hederifolium* var. *polii* от района на с. Храбрино, Пловдивско.

(SOA 069446). Среща си и в двореца в Кричим по тревисти и храсталачни места. Известен у нас от Северното Черноморие и Софийско (Асьов & Петрова, 2012). Декоративно растение. Родината на вида е югоизточна Азия.

сем. Sambucaceae
Sambucus ebulus L. var. *citrina* Česchm.
Черноморско крайбрежие (северно): местност „Тузлата“, по тревисти места край езерото. 29.07.1998 г., N 43.400020; E 28.223545 ИЧ (SOA 062332) и в гр. Каварна, до градския музей 27.07.1998 N 43.432079; E 28.339871 ИЧ (SOA 062333). Известна у нас от 13 флористични района (Маркова, 1995). Нова разновидност за северното Черноморие.

сем. Scrophulariaceae
Veronica orbelica (Peev) Peev
Североизточна България, област Добричка: край с. Оногур по тревисти места 06.05. 2000 г. N 43.820361; E 27.582501 ИЧ (SOM 062336); при Сухата река под с. Воднянци 06.05. 2000 г. ИЧ (SOM 062335); по пътя край гората между селата Балик и Пчелник 06.05. 2000 г. N 43.786855; E 27.592657 ИЧ (SOM 062334). Известен от 7 флористични района (Асьов & Петрова, 2012). Видът е нов за Североизточна България.

сем. Asparagaceae
Asparagus verticillatus L. var. *tricarinatus* Miscz.
Черноморско крайбрежие (северно): резерват „Калиакра“, по тревисти места и сред храсти. 27.07.1993 г. N 43.371529; E 28.464260 ИЧ, (SOA 062344). Отличава се от типичната разновидност по късите филокладии (до 1,5, а не 3-6 см. дълги). Нова разновидност за българската флора.

сем. Cyperaceae
Carex pendula Huds.
Тракийска низина: Пловдив, по тревисти площи пред жилищен блок на бул. „Ал. Стамболийски“. Събиран на 20.05.2018 г. с цветове и плодове. 166 м.н.в. N 42.12126; E 24.73158 ИЧ, ЮМ (SOA 062328).
Известен за страната от 8 флористични района (Асьов & Петрова, 2012). Нов за Тракийска равнина. Може да се използва като декоративно.

сем. Melanthiaceae
Colchicum turcicum Janka
Черноморско крайбрежие (южно): Приморско, близо до почивната станция „Кокиче“ недалеч от ММЦ, в гора заедно с *Nectaroscordum siculum* (Ucria) Lindley *Cyclamen coum* Miller. 02.04.2000 г. N 42.247534; E 27.747393 ИЧ, (SOA 062331). Нов вид за Черноморското крайбрежие, известен за страната от Дунавска равнина, Североизточна България, Стара планина (Централна и Източна), Родопи (Средни и Източни), Тракийска низина, Западни гранични планини. (Асьов & Петрова, 2012).

сем. Poaceae
Eleusine indica (L.) Gaertner
Тракийска низина: Пловдив, по улиците, между паветата и по сухи тревисти места. 28.08.2016 г., N 42.02645; E 24.61880 в цъфтеж. ИЧ, ЮМ (SOA 062341- 062343). Растенията имат по 1-5 (6) класовидни клонки в едно съцветие, което съответства на описанието на вида. Според Ганчев (1963) у нас се среща само var. *pummila* Asch. & Graebn., при който съцветието е с една рядко две класовидни клонки.

Melica transsilvanica Schur.
Тракийска низина: Пловдив, по буренливи места до глухата жп. линия на 200-300 м. от бул. „Ал. Стамболийски“ - 05.06.2009 г., N 42.123622; E 24.724729 в цъфтеж. ИЧ (SOA 062337; 062338) и по сухи каменливи места на Младежкия хълм (Джендем тепе) – 24.05. 2009 ИЧ (SOA 57474). Според Асьов & Петрова (2012) видът се среща в 16 флористични района, а за Тракийската низина се „посочва“. За този флористичен район видът се потвърждава.

Литература

Асьов Б., А. Петрова 2012. Конспект на висшата флора на България. Хорология и флорни елементи. БФБ, София, 490 с.

Ганчев И. 1963. Род *Eleusine* Gaertner. – В: Флора на НР България, т. 1, Издателство на БАН, Софияр с. 328.

Гусев Ч. 2012. Род *Artemisia* L. – В: Флора на Р България, т. 11, Академично Издателство „Проф. М. Дринов“, София, с. 388-411.

Кузманов Б. 2012. Род *Tanacetum* L. – В: Флора на Р България, т. 11, Академично Издателство „Проф. М. Дринов“, София, с. 374-382.

Маркова М. 1995. Род *Sambucus* L. – В: Флора на Р България, т. 10, Академично Издателство „Проф. М. Дринов“, София, с. 364-370.

Пеев Д. 1989. Род *Scutellaria* L. – В: Флора на НР България, т. 9, Издателство на БАН, София, с. 467-474.

Чернявски П., С. Недялков, Л. Площакова, И. Димитров 1959. Дървета и храсти в горите на България: 24. Държавно Издателство за Селскостопанска Литература, София, 399 с.

Edmondson J. R. 1982. Gen. *Scutellaria* L. – *In:* Davis P. H. (Eds.). Flora of Turkey, *Vol. 7*, Edinburgh University Press, pp. 89-99.

Accepted: 12.09.2018
Published: 28.09.2018

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 39-40

Short note

Psocoptera Records from Caves of Bulgaria

Dilian G. Georgiev[*1,2], Veselina I. Ivanova[3]

1 - University of Plovdiv, Faculty of Biology, Department of Ecology and Environmental Conservation, 24 Tzar Assen Str., BG-4000 Plovdiv, BULGARIA
2 - Regional Natural History Museum – Plovdiv, Hristo G. Danov Str., 34, BG-4000 Plovdiv, BULGARIA
3 - Professional High School "Atanas Damyanov", Osvobozhdenie Str. 2, Nikolaevo, BULGARIA
*Corresponding author: diliangeorgiev@abv.bg

Abstract. We give the results of a survey of six caves in various regions of Bulgaria, reporting three troglophilous Psocoptera species. All barkly finds are new records to these caves: *Lepinotus reticulatus* (East Rhodopes Mts., Dupkata Cave), *Prionoglaris* cf. *stygia*, only nymphs: (Stara Planina Mts., Kilyikite Cave; East Rhodopes Mts., Dupkata Cave, small cave near the road just above the Gouk In Cave, Gouk In Cave; West Rhodopes Mts., Kaleto Cave), *Psyllipsocus ramburii* (East Rhodopes Mts., small cave near the road just above the Gouk In Cave; North Black Sea Coast, near Bolata Beach, cave № 53(212)).

Key words: troglophiles, subterranean, insects.

Introduction

The insects from the order Psocoptera are poorly known from the Bulgarian caves. Representatives of the family Psyllipsocidae were firstly supposed to inhabit some of the caves in the country by BERON (2015) and later the species *Psyllipsocus ramburii* Selys-Longchamps, 1872 was found in the Andaka Cave (GEORGIEV, 2016). After this report, Georgiev (2018 – in press) published the first locality of *Prionoglaris* nymphs in Svinskata Dupka Cave, near Lakathik.

In this short note we represent the results of our survey of six caves in various regions of Bulgaria, reporting three troglophilous Psocoptera species. All barkly finds are new records to these caves.

Material and Methods

Specimens were collected by both authors, by hand using a brush, or by sieving. Then they were killed with diethyl-ether in small plastic vials, and after preserved in ethanol and glycerin. The species were determined using the monograph published by LIENHARD (1998). For the authorities of the family-group names we follow LIENHARD & YOSHIZAWA (2018). The material was deposited in the collection of the first author.

Results

Family Trogiidae Enderlein, 1911

Lepinotus reticulatus Enderlein, 1905

Material examined: 2 ♀, 14.04.2017, East Rhodopes Mts., South of village of Svirachi, Dupkata Cave, on the cave floor, among leaf detritus of *Quercus* sp., collected by sieving, N41 28 15.0 E26 07 02.4, 226 m a.s.l.

Family Prionoglarididae Karny, 1930

Prionoglaris cf. *stygia* Enderlein, 1909

Material examined: 5 nymphs, 02.04.2017, Stara Planina Mts., near village of Stanchov Han, Kilyikite Cave, on the cave wall near the entrance, collected by hand and a brush, N42 48 09.6 E25 34 43.4, 555 m a.s.l.; 1 nymph,

Regional Natural History Museum – Plovdiv
University of Plovdiv Publishing House

14.04.2017, East Rhodopes Mts., South of village of Svirachi, Dupkata Cave, on the cave floor, under a stone, collected by hand and a brush, N41 28 15.0 E26 07 02.4, 226 m a.s.l.; 1 nymph, 15.04.2017, East Rhodopes Mts., North of village of Oreshari, small cave near the road just above the Gouk In Cave, on the cave wall near the entrance, collected by hand and a brush, N41 36 28.2 E25 43 04.2, 213 m a.s.l.; 2 nymphs, 15.04.2017, East Rhodopes Mts., North of village of Oreshari, Gouk In Cave, on the cave wall near the entrance, collected by hand and a brush, N41 36 21.4 E25 43 05.6, 212 m a.s.l.; 7 nymphs, 13.05.2017, Stara Planina Mts., near village of Stanchov Han, Mecha Dupka Cave, on the cave wall (only observed); 10 nymphs, 20.05.2017, West Rhodopes Mts., near village of Koshnitsa, Kaleto Cave, on the cave wall and under stones, collected by hand and a brush, N41 30 34.2 E24 41 13.9, 936 m a.s.l.

Family Psyllipsocidae Kolbe, 1884

Psyllipsocus ramburii Selys-Longchamps, 1872

Material examined: 1 ♀ (micropterous), 15.04.2017, East Rhodopes Mts., North of village of Oreshari, small cave near the road just above the Gouk In Cave, among dry goat excrements and gravel, collected by sieving, N41 36 28.2 E25 43 04.2, 213 m a.s.l.; 1 ♀ (micropterous) and 1 nymph, 18.08.2017, North Black Sea Coast, near Bolata Beach, cave № 53(212), among dry goat excrements, clay particles and gravel, collected by sieving, N43 23 10.1 E28 28 19.5, 24 m a.s.

References

BERON P. 2015. *Cave fauna of Bulgaria*. East-West & National Museum of Natural History Publ., 434 pp.

GEORGIEV D. 2016. *Psyllipsocus ramburii* Selys-Longchamps, 1872 (Insecta: Psocoptera) from Andaka Cave – first record of the species from Bulgaria. *Historia Naturalis Bulgarica*, 23: 179-181.

GEORGIEV D. 2018. A case study on the Barkfly fauna of Vrachanski Balkan Nature Park (Insecta: Psocoptera). ZooNotes, Special Issue, in press.

LIENHARD C. 1998. *Psocoptères Euro-Méditerranéens*. Faune de France 83. Fédération Francaise des Sociétés de Sciences Naturelles, Paris, France, 517 p.

LIENHARD C., YOSHIZAWA K. 2018. Authorities for family-group names of Trogiomorpha (Insecta: Psocodea: 'Psocoptera'). *Psocid News*, 20: 1-3.

Accepted: 11.09.2018
Published: 28.09.2018

Bulletin of the Natural History Museum - Plovdiv

Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 41-44

Short note

First record of Aspius aspius Linnaeus, 1758 (Pisces: Cyprinidae) for the Sazliyka River's Ichthyofauna

Zhivko M. Zhelev[1*], Mladen V. Angelov[2]

1 - University of Plovdiv "Paisii Hilendarski", Faculty of Biology, Department of Human Anatomy and Physiology, 24 Tsar Assen Str., 4000 Plovdiv, BULGARIA
2 - East Aegean River Basin Directorate, 35 "Yanko Sakazov" Str., Plovdiv 4000, BULGARIA
*Corresponding author: zhivko-m@uni-plovdiv.bg

Abstract. Eight specimens of a cyprinid fish (Cyprinidae) were captured in the lower course of Sazliyka River, Southern Bulgaria. The fish were captured in June and July 2018 with cast net in two sites near the town of Galabovo. The specimens were identified according to their morphological characteristics as Asp (*Aspius aspius*). This is the first finding of this fish species in the Sazliyka River's ichthyofauna.

Key words: Asp, cyprinid fish, new locality, polluted habitat, catchment area of the Maritsa River.

Sazliyka River (145.4 km total length from the spring to the estuary) is a typical Bulgarian internal river, left tributary of the Maritsa River and belongs to the rivers of the Aegean Sea catchment area. The river is exposed to an intense anthropogenic impact, which worsens the parameters of its environment (see ZHELEV *et al.,* 2015a, 2015b, 2016). The entire ecosystem of Sazliyka River (from the source to the mouth) is classified based on the order RD-970/28.07.2000 as an environmentally sensitive area under Directive 91/271/EEC. It is also included in the protected area of the Ecological Network NATURA 2000 (code: BG0000425) under Directive 92/43/EEC as well as in the River Basin Management Plan in the East-Aegean Region 2016-2021 (see ZHELEV *et al.,* 2015a, 2015b).

The composition of the ichthyofauna of the lower course of Sazliyka River consists of 21 fish species from 8 families. The Cyprinidae family possesses the highest number of species – 12 (see ZHELEV *et al.,* 2018).

In June and July 2018 seven fish specimens were caught from two different sites labeled A and B (labeling of the sites same as described in ZHELEV *et al.,* 2018) located along the lower course of the Sazliyka River: Site A (42.1626°N, 25.9019°E, 100 m a.s.l.) – near the sluices carrying off water to TPP "Brikel"; Site B (42.1320°N, 25.8799°E, 98 m a.s.l.) – near the mouth of Sokolitsa River, south of the town of Galabovo Town (see physical map presented in ZHELEV *et al.,* 2018 and Fig. 1). The fishing was done with fishing net (cast net) with mesh size 10.0–12.0 mm (permission certificate 17/05.04.2018 for the period 05.04.2018–31.12.2018 issued by the Executive Agency for Fisheries and Aquaculture, Republic of Bulgaria). The fish were identified according to KOTTELAT & FREYHOF (2007) and KARAPETKOVA & ZHIVKOV (2010). Specimens were measured (TL: total length) with great precision to 1 mm and weighed (BW: total weight) to 0.1 g and photographed.

The specimens were identified as Asp (*Aspius aspius*) as two of the fish were captured in site A (12.06.2018), the rest five in site B (14.06.2018 and 10.07.2018). Total length was measured from 14.3 cm to 27.6 cm and individual weight from 23.2 g to 165.7 g respectively. All specimens were young, non-spawning individuals (Fig. 2).

Regional Natural History Museum – Plovdiv
University of Plovdiv Publishing House

Fig. 1. Photos from the sites of the Sazliyka River where *Aspius aspius* specimens were captured in summer 2018. *Legend:* Site A – near the sluices carrying off water to TPP "Brikel"; Site B – near the mouth of Sokolitsa River, south of the town of Galabovo.

Fig. 2. Photos of the *Aspius aspius* specimens, from the Sazliyka River. *Legend:* a) General view of the specimens; b) View of the head; 1 (TL = 14.3 cm, BW = 23.4 g); 2 (TL =14.4 g, BW = 23.2); 3 (TL = 21.2 cm, BW = 86.6); 4 (TL = 17.3 cm, BW = 34.3 g); 5 (TL = 22.2 cm, BW = 86.4 g); 6 (TL = 27.6 cm, BW = 165.7 g); 7 (TL = 16.3 cm, BW = 31.2 g).

This rare species is typical inhabitant of the lower courses of the South-Bulgarian rivers from Aegean Sea catchment area – Struma River, Maritsa River, Tundzha River, Vacha River, and Kamchia River (VELCHEVA & MEHTEROV, 2005; STEFANOV, 2007; KARAPETKOVA & ZHIVKOV, 2010; KOLEV, 2014). The conservation status of *A. aspius* in Bulgaria is as follows: the species is included in the Bulgarian Biodiversity Act, Annex II of Article 6 (1): Species, which such status require the designation of protection areas for their habitat conservation (BBA, 2002) and the Bulgarian Red Data Book, vulnerable (VU) category (GOLEMANSKI *et al.*, 2011). International conservation status of *A. aspius* includes: the species is included in the IUCN Red List (IUCN, 2018), DD category – data deficiency, the Bern Convention – Convention on the conservation of European wildlife and natural habitats (Bern Convention, 1979), Annex III (Protected species) and the Habitat Directive – Council Directive 92/43/EEC (21.05.1992) on the conservation of natural habitats and of wild fauna and flora (DCE'92/43, 2006), Annex II (Animal and plant species of community interest whose conservation requires the designation of special areas of conservation).

In our previous work (ZHELEV *et al.*, 2018), in which the results were collected in 4 years time period (2009-2012) we did not register the presence of *A. aspius* in Sazliyka River. In the summer of 2018 the seven Asp specimens were captured in no more than 40 kilometers distance from the mouth of Sazliyka River into Maritsa River (south of the town of Simeonovgrad). This serves as a strong reason to think that the species might be a permanent inhabitant of the river, rather than a temporary migrant from Maritsa River. In both cases the presence of *A. aspius* in Sazliyka River, enhances the conservation importance of the river.

Acknowledgements

This study was supported by the project of Plovdiv University "Evaluation of the anthropogenic stress on the wetlands of South Bulgaria", № FP17-BF-001.

References

BBA. 2002. Bulgarian Biodiversity Act. *State Gazette*, № 77/9.08.2002. (In Bulgarian).

Bern Convention. 1979. *Convention on the Conservation of European Wildlife and Natural Habitats,* Bern, 19.IX.1979. Accessible on-line at: [http://conventions.coe.int/Treaty/en/Treaties/Html/104.htm].

DCE'92/43. 2006. *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.* Amended by Council Directive 2006/105/EC of 20 November 2006), accessible on-line at: [http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:01992L0043-20070101:EN:NOT].

GOLEMANSKI V., P. STOEV, D. DOBREV, P. BERON, M. ZHIVKOV, A. POPOV, V. POPOV, V. BESCHKOV, CH. DELTSHEV, T. MICHEV, N. SPASSOV (Eds.). 2011. *Red Data Book of the Republic of Bulgaria.* Volume 2. Animals. IBER-BAS & MOEW, Sofia.

KARAPETKOVA M., M. ZHIVKOV. 2010. *Fishes of Bulgaria.* Gea-Libris, Sofia. 215 p. (In Bulgarian).

KOLEV V. 2014. Research on the ichthyofauna in the lower Tundza River in relation to alternative forms of tourism in the region of Yambol and Elhovo. *Management and sustainable development*, 6(49): 94-102. (In Bulgarian, English summary).

KOTTELAT M., J. FREYHOF. 2007. *Handbook of European freshwater fishes.* Kottelat Cornol & Freyhof, Berlin. 646 p.

IUCN. 2018. IUCN Red List of Threatened Species. Version 2018.2. Accessible on-line at: [www.iucnredlist.org].

STEFANOV T. 2007. Fauna and distribution of fishes in Bulgaria. *In*: Fet, V., A., Popov (Eds.), *Biogeography and Ecology of Bulgaria, Series: Monographiae Biologicae,* Vol. 82. Springer, pp. 109-139.

VELCHEVA I.G., N.H. MEHTEROV 2005. A study on the ichtyocenosis diversity in the downstream of the Maritsa River. *Scientific Studies of the University of Plovdiv*, *Biologie, Animalia*, 41: 69-78. (In Bulgarian, English summary).

ZHELEV ZH., P. BOYADZHIEV, M. ANGELOV. 2015a. Analysis of size-age, sexual structure and condition of *Carassius gibelio* (Pisces: Cyprinidae) from two water basins in Galabovo region (Southern Bulgaria). *Trakia Journal of Sciences*, 13(2): 185-195.

ZHELEV ZH., P. BOYADZIEV, N. MEHTEROV. 2015b. Assessment of ecological conditions in two water basins in the region of Galabovo (South Bulgaria) on the basis of developmental stability of *Carassius gibelio* (Pisces: Cyprinidae). *Bulgarian Journal of Agricultural Science*, *Supplement* 1(21): 76-85.

ZHELEV ZH., D. MOLLOVA, P. BOYADZIEV. 2016. Morphological and hematological parameters of *Carassius gibelio* (Pisces: Gyprinidae) in conditions of anthropogenic pollution in Southern Bulgaria. Use hematological parameters as biomarkers. *Trakia Journal of Sciences*, 14(1): 1-15.

ZHELEV ZH. M., A.G. TSEKOV, G.S. POPGEORGIEV, M.V. ANGELOV, P.S. BOYADZHIEV, T.R. STEFANOV. 2018. Ichthyofauna in the lower course of Sazliyka River (Southern Bulgaria): composition, diversity, seasonal dynamics and conservation significance. *Acta Zoologica Bulgarica*, 70(3): 331-338.

Accepted: 30.10.2018
Published: 19.11.2018

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 45

Боян Петров - In Memoriam

Димитър Н. Бечев

През 2018 г. остана в любимите си планини колегата зоолог, известен алпинист, много добър приятел и човек, Боян Петров.

Боян, наричан от приятелите Съни, е роден на 7 февруари 1973 г. в София. През 1997 г. завършва Софийски университет „Св. Климент Охридски“ със специалност зоология и екология. Работи в Националния природонаучен музей при Българска академия на науките. Области на научните му изследвания са таксономия и зоогеография на псевдоскорпионите; пещерна фауна; фауна на високите планини; разпространение и биология на земноводните и влечугите; разпространение, биология и екология на прилепите. В тези области има десетки научни публикации и проекти за опазване на биологичното разнообразие.

Събрал и донесъл в музея много животни от пещери и планини, на негово име са наречени редица животински видове – мокрицата *Trichoniscus petrovi* Andreev, 2002; стоножките *Balkanopetalum petrovi* Stoev & Enghoff, 2003 и *Metonomastus petrovi* Antić et al., 2018; дървеницата *Scirtetellus petrovi* Simov, 2006 (от Каракорум); бръмбарите *Gueorguievella petrovi* Giachino & Gueorguiev, 2006 и *Eustra petrovi* Gueorguiev, 2014 (от Китай); водният охлюв *Belgrandiella petrovi* Georgiev, 2014; паяка *Harpactea petrovi* Lazarov & Dimitrov, 2018.

Спелеолог и световно известен алпинист. Боян изкачи осемхилядниците Гашербрум I (8068 m), Канчендзьонга (8586 m), Броуд пик (8047 m), K2 (8611 m), Манаслу (8163 m), Анапурна I (8091 m), Макалу (8485 m), Нанга Парбат (8126 m), Гашербрум II (8035 m), Дхаулагири (8167 m) и много други високи върхове.

Боян не се завърна от поредния осемхилядник Шиша Пангма и остана в планината. Остава и в сърцата на колегите и приятелите си, а с интересния си и активен живот и на много, много хора.

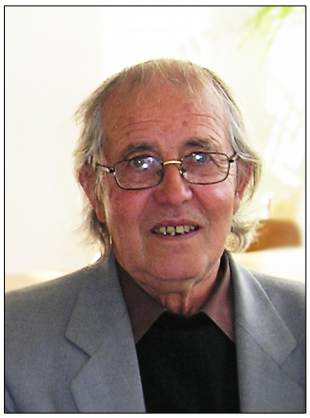
Адрес на автора:
ПУ “Паисий Хилендарски, Биологически факултет, Катедра “Зоология”, ул. “Цар Асен” №24, BG-4000, гр. Пловдив, e-mail: dbechev@abv.bg

Regional Natural History Museum – Plovdiv
University of Plovdiv Publishing House

Bulletin of the Natural History Museum - Plovdiv
Bull. Nat. Hist. Mus. Plovdiv, 2018, vol. 3: 47

Андон Даракчиев (1934–2018) - In Memoriam

Димитър Н. Бечев



Доц. д-р Андон Даракчиев е известен български орнитолог. Роден е през 1934 г. в с. Малки Цалим, Благоевградско. Завършва Софийския университет "Св. Климент Охридски" през 1956 г. Като преподавател в Пловдивския университет "Паисий Хилендарски" (от 1963 г.) защитава докторска дисертация на тема "Птиците на Чернатица" (1970 г.). От 1979 г. е доцент в ПУ, където чете лекции по дисциплините Зоология на гръбначните животни, Орнитология, Поведение на животните. Автор е на учебници и учебни ръководства по орнитология: Орнитология (ДИ "Наука и изкуство", 1987 г.), Ръководство по орнитология. Определителни таблици (ДИ "Наука и изкуство", 1988 г.). Съавтор е на учебници за средното училище.

Заместник декан на Химико-биологичен факултет при Пловдивския университет от 1979 г. до 1987 г.

Научните му изследвания са главно върху биологията, екологията и поведението на птиците, върху които има публикувани над 80 научни труда.

Особено ценна е работата на Андон Даракчиев със студентите. През 1979 г. създава кръжок по орнитология в Пловдивския университет. През кръжока минават повече от 40 студенти, които защитават дипломни работи, стават научни работници, работят в областта на опазване на природата и биологичното разнообразия. Под негово ръководство са защитени една докторска и над 200 дипломни работи. Екипът на доц. Даракчиев още преди 1989 г. предложи обявяването на 6 нови защитени територии, между които резерват Атанасовско езеро. Членове на кръжока основаха една от най-големите природозащитни организации у нас – "Зелени Балкани".

Не случайно много от бившите му студенти го наричат "Учителю".

Адрес на автора:
ПУ "Паисий Хилендарски, Биологически факултет, Катедра "Зоология", ул. "Цар Асен" №24, BG-4000, гр. Пловдив, e-mail: dbechev@abv.bg

Regional Natural History Museum – Plovdiv
University of Plovdiv Publishing House

BULLETIN OF THE NATURAL HISTORY MUSEUM – PLOVDIV
INSTRUCTIONS FOR AUTHORS

General information

Submissions to Bulletin of the Natural History Museum – Plovdiv (Bull. Nat. Hist. Mus. Plovdiv) accepts submissions of original studies in the field of paleontology, natural history, geology and speleology, zoology, botany, ecology, biogeography, museology, history of natural studies, information about museum collections, etc. *The Editorial Board reserves its right to reject publication of any manuscript that does not fit the aim and scope of the journal or does not comply with these instructions!*

Manuscript submission

The following types of manuscripts are accepted: short research notes (up to 4 pages), research articles (4 to 10 pages) and review papers (10 to 20 pages). Short research notes are shorter submissions of a preliminary nature or those including new records or observed phenomenon, etc. Research articles should present significant original research in the various fields, mentioned above. Review papers should deal with topics of general interest or of contemporary importance, being synthetic rather than comprehensive in emphasis. Authors of Review papers should consult with the Editor before submission. The Editor may also invite review articles concerning recent developments in particular areas of interest. The Editor reserves the right to decide if a manuscript should be treated as a Short note or Research article.

The official language of the journal is English. It is recommended for the authors to consult the translation of their manuscripts with a native speaker, before sending. The journal do not provide any translations or language corrections. If the English translation is not good enough, the manuscript will be send back to the author. Exceptions are possible, certain manuscript may be published in Bulgarian language, with extensive abstract in English.

All manuscripts must be written according to *International Code of Zoological Nomenclature* (IV edition, 1999) and *International Code of Nomenclature for algae, fungi, and plants* (2012). For the correct geographical names transcriptions, please see THIS article.

All scientific names (genus and species) must be written in *italic* font. When the name is written for first time in the manuscript it must be written in full (including author, year, etc.). Between the author's name and the year, a comma should be placed (for example *Belgrandiella pussila* Angelov, 1959).

Manuscripts must conform strictly with the instructions to authors and sent to the Editor to the journal's e-mail. Incoming manuscripts are initially judged by the Editor. Manuscripts may be rejected without peer review if they do not comply with the instructions to authors or are beyond the scope of the journal. If the manuscript is

acceptable, it will be forwarded to referees for evaluation. All manuscripts are peer-reviewed by 2 or 3 independent reviewers. After final edition and approval by the Editorial Board, the manuscript will be accepted for publication. The Editor reserves the right to make editorial changes. Authors agree, after the manuscript's acceptance, with the transfer of copyright to the publisher.

Legal requirements

Bulletin of the Natural History Museum in Plovdiv (BNHMP) follows the standards for Ethics and Publication Malpractice set by the Committee on Publication Ethics (COPE). Conformance to standards of ethical behavior is therefore expected of all parties involved: Authors, Reviewers, Editors, and the Publisher. Submission of a manuscript implies: that the work described has not been published previously (except in the form of an abstract, or as part of a published lecture, or thesis); that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities - tacitly or explicitly - at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

Technical requirements

The following formats are accepted: *.doc, *. docx or *.rtf. The text should be all with same font (with no bold font, no uppercase, except for abbreviations), no footnotes, no following intervals, no brakes and unnecessary formatting). The title, authors' names, address, abstract, key words, the chapters and the subchapters, also the references should be separated with a blank row. Italic font should be used only for the genus or the species names.

The citations in the text and the authors' names in the references list (but not the authors of the taxa) should be written in SMALL CAPITALS - for more information on SMALL CAPITALS and how to make them in Word).

Page and text formatting

Page size should be 17.6x25.01 cm (ISO B5), margins 1.5 cm from left and right and 2 cm from top and bottom. Garamond font, 12pt, with single spacing. Do not use software for hyphenation, additional spaces and tabulators. In case of inserting a symbol, please use font Symbol. Pages should not be numbered and with no additional information in the header and footer.

Manuscript formatting

The manuscripts should conform to the following format:

Title: Provide a title that is concise, but also an informative synthesis of the study. Where appropriate, include mention of the family or higher taxon.

Author(s): Full first name(s), middle initials and surname(s). The corresponding author should be marked with the *-symbol.

Affiliation: As complete as possible. Also include postal address. E-mail address is given

only for the corresponding author.
Abstract: Maximum length 300 words. The abstract should state briefly the objective of the research, the primary results and major conclusions, with no description of methods, discussions, references and abbreviations.
Key words: Usually 3–6 words suitable for information-retrieval system.

The standard order of sections should be: Abstract, Key words, Introduction, Material and Methods, Results, Discussion (or Results and Discussion), Conclusions (optional), Acknowledgements (optional) and References.

The *Introduction* has to explain the actuality of the researched problem and give the aim of the study. *Materials and Methods* have to provide sufficient information to permit repetition of the experiment and/or fieldwork. The technical description of study methods should be given only if such methods are new; otherwise a short presentation is enough. The *Results* section must be a concise presentation of the finding of the study. Avoid presentation of the same information as text and/or figure and/or table. *Discussion* section should be separate from the results section at full length papers and should deal with the significance of the results and their relationship to the aims of the paper. Also include how the findings of the paper will change or influence the state of our knowledge about the topic at hand. In separate cases a joint section "Results and Discussion" is allowed, but not preferable. *Conclusions* should shortly describe the main contributions and recommendations of the study without including citations and statistics. In the *Acknowledgements* section all persons and organizations that helped during the study in various ways, as well as the organization that financed the study must be listed.

Short Notes (generally less than four-five manuscript pages) should be produced as continuous text, preceded by an abstract of no more than 150 words. Key words are also included.

Tables: The tables must not repeat information already presented in the figures or in the text. Each table must be self-explanatory and as simple as possible. No fold-outs (landscape oriented tables) are accepted. Tables must be numbered consecutively. They should be placed within the text at the desired position by the author(s). An explanatory caption, located on the top of the table, should be provided. В таблиците да няма фон (shading).

Figures: They must not repeat information already presented in the tables or in the text. Lines and letters in figures must be able to be enlarged or reduced without reduction in quality. They should conform to the size of the type area. Magnification should be shown by scale bars. Colour illustrations are accepted, but will appear only in the electronic version of the journal (PDF). The illustrations in the hardcopy printed version will be greyscale. All illustrations must be sharp, of high quality with at least 300 dpi. The following formats are acceptable: JPEG, GIF, TIFF, EPS. Figures must be numbered consecutively and should be provided with an explanatory legend below them. They must

be placed within the text at the desired position by the author(s). All tables and figures must be referred to in the text! Please send all figures attached as separate files (with the same size and resolution) as well as in the text. If the figures are charts made with Excel, please provide the Excel file as well.

Citations and formatting of the references list

All references should be cited in the text in the following way: "JOSIFOV (1996)" or "(JOSIFOV, 1996)"; "JOSIFOV & KERZHNER (1995)" or "(JOSIFOV & KERZHNER, 1995)"; "GOLEMANSKY *et al.* (1993)" or "(GOLEMANSKY *et al.,* 1993)". Citations in brackets should be divided with semicolons and the author's name and the year of publication with comma (example: CARLIN, 1992; BROOKS & CARLIN, 1992; SHAPIRO *et al.,* 1968). Where there more than two authors "*et al.*" in *italic* font is added after the name of the first author.

References at the end of the paper should be listed in alphabetical order by the first author's family name and chronologically. If there is more than one work by the same author or team of authors in the same year, a, b, etc. is added to the year both in the text and in the list of references. Each citation in the text must be accompanied by a full reference in the list of references and vice versa. In case of papers written in other than Latin letters, if there is an English (or German, or French) title in the summary, it is recommended to be used. If there is not such a summary, the author's names must be transcribed and the title of the paper must be translated into English and put in square brackets. If the name of the journal is also not in Latin letters it also should be transcribed (not translated). This should be noted in round brackets at the end of the paragraph, for instance: (In Bulgarian, English summary).

Examples:

Article in Cyrillic, without summary in western language:

JOAKIMOFF D. 1899. Contribution to the insect fauna of Rila Mountain. *Periodichesko spisanie na Balgarskoto Knizhovno Druzhestvo,* 60: 858-884 (in Bulgarian).

Article in Cyrillic, with summary in western language:

POPOV S. 1999. Species of family Tipulidae (Diptera) known to the fauna of Bulgaria till 1998. *Travaux Scientifiques de l'Universite de Plovdiv, Biologie, Animalia,* 35: 33-36 (in Bulgarian, English summary).

Journal article:

THEOWALD B., P. OOSTERBROEK. 1986. Zur Zoogeographie der westpalacarctischen Tipulidae. VII Die Tupilidae der Balkanhalbinsel (Diptera, Tipulidae). *Tijdschrift voor Entomologie,* 129(1): 1-13.

Book:

EVENHUIS N.L. 1994. *Catalogue of the fossil flies of the world (Insecta: Diptera).* Backhuys Publishers, Leiden, 600 p.

Book chapter:
KRIVOSHEINA N.P. 1988. Family Diadocidiidae. *In:* Soos, A., L. Papp. (Eds.), *Catalogue of Palaerctic Diptera. Vol. 3. Ceratopogonidae - Mycetophilidae*. Akadeiai Kiado, Budapest, pp. 210-211.

Internet site:
OOSTERBROEK P. 2004. Fauna Europaea: Tipulidae. *In:* de Jong, H. (Ed.), *Fauna Europaea: Diptera: Nematocera. Fauna Europaea* version 1.3. Available at: http://www.faunaeur.org. (Accessed on 13 March 2009).

Software:
STATSOFT INC. 2004. STATISTICA (Data analysis software system), Vers. 7. Computer software. Available at: http://www.statsoft.com.
GARMIN LTD. 2007. MapSource, Vers. 6.12. Computer software. Available at: http://www.garmin.com.

Unpublished theses (BSc, MSc, PhD, DSc) are not considered officially published scientific literary sources, therefore they are not allowed. If you absolutely must cite such a source, you may site it as an exception as "personal communication".

Citing references that are still "in press" is also considered frown upon, but not forbidden. If possible, please avoid using such references.

Ethics
The authors of articles that are based on experiments that caused injuries or death of animals should explain and justify the grounds of the study and state that the scientific results of the study is at least in trade-off with the sufferings caused. In the Materials and Methods section of the manuscript, the authors should detail as precisely the conditions of maintenance, transport, anesthesia, and marking of animals. When available, references should be added to justify that the techniques used were not invasive. When alternative non-harming techniques exist, but were not used, the manuscripts may not be considered for publication.

Proofs and Reprints
Proof will be sent to the first (or corresponding) author for checking (a PDF file) only once and it should be returned without delay. Corrections should be limited to typographical errors. No additional changes of the manuscript are allowed. Following publication, the first (or corresponding) author will be provided with electronic copy (PDF) of the article.

E-mail: bnhm_plovdiv@abv.bg