FORESTRY IDEAS, 2020, vol. 26, No 1 (59): 77–96

ECOLOGICAL, FAUNISTIC AND ZOOGEOGRAPHICAL NOTES ON THE GROUND BEETLES (COLEOPTERA: CARABIDAE) FROM THE EASTERN RHODOPE MTS. OF BULGARIA

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Received: 20 January 2020 Accepted: 14 March 2020

Abstract

The present study adds new data to the list of Carabidae species from the Eastern Rhodope Mts. of Bulgaria, and reveals some patterns of the species composition from zoogeographic, ecological and conservation point of view. A total of 5915 specimens of 138 species belonging to 50 genera and 19 tribes are found, including 13 endemic species and subspecies, one relict and some rare and stenotopic species. This represents, respectively, 18.5 % of all established for the Bulgarian carabid fauna species and 40 % of the genera. Eleven genera (*Acupalpus* Latreille, 1829, *Anchomenus* Bonelli, 1810, *Anisodactylus* Dejean, 1829, *Carterus* Dejean & Boisduval, 1829, *Demetrias* Bonelli, 1810, *Elaphrus* Fabricius, 1775, *Gynandromorphus* Dejean, 1829, *Olisthopus* Dejean, 1828, *Parophonus* Ganglbauer, 1891, *Tachys* Dejean, 1821 and *Tachyura* Motschulsky, 1862) are new for the Eastern Rhodope Mts. Two of the genera (*Carterus* and *Gynandromorphus*) are also new for the whole Rhodope Mts. The subgenus *Philochthus* Stephens, 1828 is new for the Eastern Rhodopes and subgenus *Phyla* Motschulsky, 1844 is new for the whole Rhodope Mts. Among the species, 60 species are new for the Eastern Rhodopes, and 24 species of them are new for the whole Rhodope Mts. The richest tribes are Harpalini (46 species), Amarini (14 species), Lebiini (11 species) and Carabini and Sphodrini (10 species each). Pterostichini and Bembidiini are represented with nine species each. Zoogeographical analysis shows that the Mediterranean faunal type prevailed. In relation to their life forms, zoophagous carabids predominate, presented by 78 species (56.5 %). Mixophyitophagous are 60 species (43.5 %). Most of the ground beetles are mesoxerophilous (51 species, 37 %).

Key words: carabids, endemism, life forms, zoogeography, new data.

Introduction

From the beginning of the 20th century until now, about 40 studies concerning the carabid fauna of the Eastern Rhodope Mountains have been published. According to the latest survey of the carabid fauna on the territory of the mountain (Guéorguiev 2004), 146 species (20 % of all Bulgarian Carabidae species) occur in the Bulgarian part of the Eastern Rhodopes. So far, 156 species (21 % of all Bulgarian Carabidae species) are surely known, 54 species are likely to be found there and another

seven species are probably doubtfully established for that region (Teofilova and Guéorguiev unpublished results). Considering the degree of research, dimensions of the region and the habitat diversity, which it suggests, it can be argued that the expected real number of carabid species is about 250, or one-third of those known from Bulgaria (Guéorguiev 2004, Teofilova and Guéorguiev unpublished results).

The Eastern Rhodopes occupy the lower part of the Rhodope Mts. A variety of habitats occur on their territory: oak forests, beech forests (limited to the southernmost parts of the mountain), coniferous and broadleaved plantations, bushes, riparian woods and bushes, grasslands, pastures, rocky habitats, inland standing and running surface waters, as well as many artificial landscapes – villages, chalets, huts, etc. This fact is a prerequisite for the occurrence of species from different faunistic complexes, which are more or less attached to a particular setting of natural conditions.

The Eastern Rhodope Mts. are among the sites of highest biodiversity in Bulgaria. Within its territory fall several protected areas with different designation – 'Valchi Dol' Nature Reserve, four Managed Reserves ('Zhenda', 'Chamlaka', 'Boraka', 'Borovets'), 20 protected sites and several natural monuments. The mountain overlaps with some Natura 2000 zones: seven SPA (BG0002012, BG0002013, BG0002014, BG0002019, BG0002071, BG0002073, BG0002106), included in EU Directive 79/409, and three SAC (BG0000372, BG0001031, BG0001032) of Directive 92/43. In 1998, the territory of the Arda Valley was determined as a CORINE site, due to its European significance in protection of rare and endangered habitats, plants and animals. In 1997, BirdLife International pronounced the valley of the Krumovitsa River as an Important Bird Area.

The aim of the present study is to add new data to the list of Carabidae species from the Eastern Rhodope Mts. of Bulgaria, and to reveal some patterns of the species composition from zoogeographic, ecological and conservation point of view.

Material and Methods

Field work was carried out in two periods: 2005–2006 and 2019, in parallel with the conduction of monitoring researches in some target areas. Ground beetles were collected by hand picking, and terrestrial 'pitfall' traps made of plastic bottles, buried at the level of the ground surface. Table 1 contains detailed information about the individual localities, periods and collectors of the material.

Collected material was deposited in the Carabidae collection of the Institute of Biodiversity and Ecosystem Research (Bulgarian Academy of Sciences, Sofia).

According to their zoogeographical belonging, the ground beetles were separated in zoogeographical categories and complexes according to Kryzhanovskij (1965, 1983, 2002), Vigna Taglianti et al. (1999) and Kodzhabashev and Penev (2006), with some changes and adjustments, made by the authors of the present study.

According to their ecological requirements in terms of humidity, established carabid species were divided into six categories: hygrophilous, mesohygrophilous, mesophilous, mesoxerophilous, xerophilous and eurybionts.

Categorization of the species in respect of their life forms follows the classification of Sharova (1981). The following codes were used: Life form class 1. Zoo-

Table 1. List, average altitude and description of the sampling sites, methods and dates of visiting.

Code	Locality	Altitude, m a.s.l.	GPS coordinates	Habitat	Traps [number of traps, fixative, collector(s)]	Hand picking
				2005–2006		
AT_A	S Krumovgrad, Ada Tepe Hill	270	N 41°26‘24“ E 25°39‘14’’	Black locust (*Robinia pseudoacacia* L.) plantation	25.IV–6.VI, 6.VI–7.VII, 7.VII–12.VIII, 12.VIII–18.IX, 18.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18.VI–VIII.2006 [6, formaldehyde, NK]	
AT_O	S Krumovgrad, Ada Tepe Hill	390	N 41°26‘18“ E 25°39‘15’’	Xerothermic oak (*Quercus* sp.) forest	25.IV–6.VI, 6.VI–7.VII, 7.VII–12.VIII.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18.VI – VIII.2006 [6, formaldehyde, NK]	
AT_O1	Ada Tepe Hill, near the top	480	N 41°26‘14“ E 25°39‘13’’	Xerothermic oak forest	6.IX–21.X.2005; 21.X.2005–14.IV.2006; 15.IV–17.VI.2006 [5, formaldehyde, DC&ML]	
AT_Pn	S Krumovgrad, Ada Tepe Hill	480	N 41°25‘59“ E 25°39‘27’’	Black pine (*Pinus nigra* J.F.Arnold) plantation, probably mixed with natural black pine forest	25.IV–6.VI, 13.VIII–20.IX, 20.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18. VI–20. VIII, 20.VIII–18.IX.2006 [12, formaldehyde, NK]	
AT_M	S Krumovgrad, Ada Tepe Hill	280	N 41°26‘15“ E 25°38‘39’’	Actively grazed pasture near Pobeda vill. in the vicinity of the Kayadzhik Dere Site	25.IV–6.VI, 6.VI–7.VII, 7.VII–12.VIII, 12.VIII–21.IX, 21.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18.VI–VIII.2006 [6, formaldehyde, NK]	
AT_Ps	S Krumovgrad, Ada Tepe Hill	290	N 41°26‘13“ E 25°38‘41’’	Scots pine (*Pinus sylvestris* L.) plantation	5.VI–7.VII, 7.VII–12.VIII, 12.VIII–18.IX, 18.IX–20.X.2005; 15.IV–18.VI, 18.VI–VIII.2006 [6, formaldehyde, NK]	
KD_R	S Krumovgrad, Ada Tepe	280	N 41°26‘21“ E 25°38‘46’’	Kayadzhik Dere river, riverbank forest Hill near Pobeda vill.	13.VIII–6.IX.2005 [5, formaldehyde, DC&ML] 15.IV–17.VI.2006 [5 tree traps DC&ML]	
P_O	W Potocharka vill., near Stari Chal vill.	395	N 41°35’52’’ E 25°38’32’’	Xerothermic oak forest at the eastern border of the Valchi Dol Reserve	25.IV–6.VI, 6.VI–7.VII, 7.VII–13.VIII, 13.VIII–21.IX, 21.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18. VI – 20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	6.VI.2005 NK
P_O1	above Potochnitsa vill., near Kechi Kaya Peak	410	N 41°35‘46“ E 25°38‘30’’	Xerothermic oak forest and actively grazed pasture	23.IV–5.VI, 4.VI–3.VII, 6.XI–21.X.2005; 16.IV–17.VI.2006 [10, formaldehyde, DC&ML] 23.IV–5.VI, 14.VIII–6.IX.2005; 16.IV.2006 [10 tree traps, DC&ML]	

Code	Locality	Altitude, m a.s.l.	GPS coordinates	Habitat	Traps [number of traps, fixative, collector(s)]	Hand picking
P_SK	near Studen Kladenets vill.	195	N 41°36'31'' E 25°38'15''	Xerothermic scrub near gully with waterfall (Kodzha dere)	4.VI–3.VII, 3.VII–14.VIII, 6.IX–21.X.2005; 16.IV–19.VI.2006 [5, formaldehyde, DC&ML] 6.IX.2005–16.IV.2006 [5 tree traps, DC&ML]	
SK_R	E Studen Kladenets vill.	165	N 41°36'28'' E 25°38'33''	Grouping of poplars (*Populus* spp.), willows (*Salix* sp.) and epiphytes on the Arda River coast	25.IV–6.VI, 7.VII–12.VIII.2005 [6, formaldehyde, NK]	6.VI.2005 NK
SK_R1	NE Studen Kladenets vill.	162	N 41°36'35'' E 25°38'38''	Riverbank forest near Arda river	23.IV–5.VI, 5.VI–3.VII, 3.VII–14.VIII, 14.VIII–6.IX.2005 [5, formaldehyde, DC&ML] 6.IX.2005–16.IV.2006 [5 tree traps DC&ML]	
M_R	NW Madzharovo vill.	135	N 41°38'22'' E 25°51'18''	Arda River coast with natural riverine vegetation on sandy silt	25.IV–6.VI, 6.VI–7.VII, 7.VII–12.VIII, 12.VIII–18.IX, 18.IX–20.X.2005; 15.IV–18.VI, 20. VIII–18.XII.2006 [6, formaldehyde, NK]	
M_R1	2 km NE Madzharovo vill.	135	N 41°39'09'' E 25°52'19''	Arda River coast, riverbank forest	22.IV–5.VI, 5.VI–3.VII, 3.VII–15.VIII, 7.IX–22.X.2005; 14.IV–19.VI.2006 [5, formaldehyde, DC&ML]	
M_O	NE Madzharovo vill.	200	N 41°38'34'' E 25°52'22''	Xerothermic oak forest near dry pasture	25.IV–6.VI, 6.VI–7.VII, 7.VII–12.VIII, 12.VIII–21.IX, 21.IX–20.X.2005, 20.X.2005–15.IV.2006; 15.IV–18.VI, 18. VI–20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	
M_O1	NE Madzharovo vill.	220	N 41°38'33'' E 25°52'26''	Xerothermic oak forest	6.IX–21.X.2005 [5, formaldehyde, DC&ML]	
M_O2	2 km NE Madzharovo vill.	145	N 41°39'01'' E 25°52'20''	Xerothermic oak forest	22.IV–6.VI, 6.IX–21.X.2005 [11, formaldehyde, DC&ML]	
M_O3	2 km NE Madzharovo vill.	190	N 41°38'34'' E 25°52'22''	Xerothermic oak forest	5.VI–4.VII, 4.VII–15.VIII, 15.VIII–7.IX.2005 [10, formaldehyde, DC&ML]	
M_Ps	SE Madzharovo vill.	210	N 41°36'55'' E 25°52'40''	Scots pine (*Pinus sylvestris* L.) plantation mixed with sprout linden (*Tilia* sp.) forest	7.VII–12.VIII, 12.VIII–18.IX, 18.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18. VI–20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	
M_M	SE Madzharovo vill.	420	N 41°35'56'' E 25°52'51''	Very old mixed mesophylous forest near never failing brook	13.VIII–21.IX, 21.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18.VI–20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	

Code	Locality	Altitude, m a.s.l.	GPS coordinates	Habitat	Traps [number of traps, fixative, collector(s)]	Hand picking
M_D	SE Madzharovo vill.	210	N 41°37‘38“ E 25°52‘18”	Lawn at the place of a recycled slag-depot	5.VII–15.VIII, 15.VIII–7.IX, 7.IX–22.X.2005 [5, formaldehyde, DC&ML] 5.VII–15.VIII, 7.IX–22.X.2005; 22.X.2005–14.IV.2006, 14.IV–19.VI.2006 [5 tree traps DC&ML]	
B_S	SW Borislavtsi vill.	180	N 41°39‘27“ E 25°55‘24”	Abandoned pasture with Jerusalem thorn (*Paliurus spina-christi* Mill.) on well drained eroded terrain	15.IV–18.VI, 18.VI–20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	
B_DG	SE Dolni Glavanak	320	N 41°40‘45“ E 25°49‘33”	Pasture with shrubs, grazed in summer and autumn, near xerophilous oak forest	25.IV–5.VI, 5.VI–7.VII, 7.VII–13.VIII, 13.VIII–21.IX, 21.IX–20.X.2005; 20.X.2005–15.IV.2006; 15.IV–18.VI, 18. VI–20.VIII, 20.VIII–18.XII.2006 [12, formaldehyde, NK]	
B_DG1	1 km S Dolni Glavanak vill.	350	N 41°40‘43“ E 25°49‘28”	Xerothermic woods	25.IV–6.VI, 6.VI–3.VII, 3.VII–14.VIII, 14.VIII–7.IX., 7.IX–22.X.2005 [5, formaldehyde, DC&ML]	
				2019		
O_P	NW Obichnik vill.	612	N 41°30‘17“ E 25°28‘36”	Actively grazed pasture with scattered groups of oak trees and bushes of Jerusalem thorn, hawthorn (*Crataegus* spp.) and dog rose (*Rosa canina* L.)	17.VI–29.VII.2019 [5, salt-vinegar saturated solution, TT&KD]	17.VI., TT
O_O	NW Obichnik vill.	570	N 41°30‘07“ E 25°28‘43”	Sparse pubescent oak (*Quercus pubescens* Willd.) forest with grazed glades	17.VI–29.VII.2019 [5, salt-vinegar saturated solution, TT&KD]	17.VI., TT
O_m	N Obichnik vill.	600	N 41°30‘04“ E 25°29‘12”	Forest habitat with Hungarian oak (*Quercus frainetto* Ten.), black pine and smoke tree (*Cotinus coggygria* Scop.)	15.VI–31.VII.2019 [8, salt-vinegar saturated solution, TT&KD]	15.VI., TT
Ru_R	W Ribino vill.	430	N 41°24‘43“ E 25°31‘02”	Vast meadow with bushes and single trees and adjoining pond, and oak and pine forests	16.VI–30.VII.2019 [10, salt-vinegar saturated solution, TT&KD]	
R_AY	SE Rozino vill.	286	N 41°26‘13“ E 25°55‘04”	Along the Arpa Dere River (full-water river with rich vegetation) and Yuren Dere River (almost dry gully with puddles and rich vegetation), and the adjoining well preserved oak forests	18.VI–30.VII.2019 [12, salt-vinegar saturated solution, TT&KD]	18.VI., TT

Code	Locality	Altitude, m a.s.l.	GPS coordinates	Habitat	Traps [number of traps, fixative, collector(s)]	Hand picking
R_RF	SW Rozino vill.	365	N 41°26'00" E 25°53'33"	Rocks near mesoxerophilic oak forest and pseudomaquis with Jerusalem thorn, ashes (*Fraxinus* spp.), *Pistacia terebinthus* L., etc.	19.VI–30.VII.2019 [6, salt-vinegar saturated solution, TT&KD]	19.VI., TT
B_BR	NW Byalgradets vill.	197	N 41°25'34" E 25°54'02"	Dry stony riverbed of the Byala Reka River branch with tamarisk (*Tamarix* sp.) and surrounding poplar–willow stands	19.VI–31.VII.2019 [6, salt-vinegar saturated solution, TT&KD]	
Kr	Krumovgrad	265	N 41°28'15" E 25°39'41"	House yard near densely vegetated shore of a tributary of the river of Krumovitsa		18.VI., TT
Mo	Momchilgrad	263	N 41°31'50" E 25°24'16"	City park		31.VII., TT

Note: Collectors: DC – Dragan Chobanov, ML – Mario Langourov, NK – Nikolay Kodzabashev, TT – Teodora Teofilova, KD – Krasimir Donchev.

phagous. Life form subclass: 1.1 – Phytobios; 1.2 – Epigeobios; 1.3 – Stratobios; 1.4 – Geobios. Life form groups: 1.1.2 – stem-dwelling hortobionts; 1.1.3 – leaf-dwelling dendrohortobionts; 1.2.2 – large walking epigeobionts; 1.2.2(1) – large walking dendroepigeobionts; 1.2.3 – running epigeobionts; 1.2.4 – flying epigeobionts; 1.3(1) – series crevice-dwelling stratobionts; 1.3(1).1 – surface & litter-dwelling; 1.3(1).2 – litter-dwelling; 1.3(1).3 – litter & crevice-dwelling; 1.3(1).4 – endogeobionts; 1.3(1).5 – litter & bark-dwelling; 1.3(1).6 – bothrobionts; 1.3(2) – series digging stratobionts; 1.3(2).1 – litter & soil-dwelling; 1.3(2).2 – litter & crevice-dwelling; 1.4.2(1) – small digging geobionts. Life form class *2.* Mixophytophagous. Life form subclass: 2.1 – Stratobios; 2.2 – Stratohortobios; 2.3 – Geohortobios. Life form groups: 2.1.1 – crevice-dwelling stratobionts; 2.2.1 – stratohortobionts; 2.3.1 – harpaloid geohortobionts; 2.3.1(1) – crevice-dwelling harpaloid geohortobionts; 2.3.2 – zabroid geohortobionts; 2.3.3 – dytomeoid geohortobionts. The first figure in the index shows the class of life form, the second – the subclass, the third – the life form group. In brackets after the subclass the series is shown, when it exists.

The systematic list follows Kryzhanovskij et al. (1995).

Results and Discussion

During the field work were captured 5915 specimens of 138 species belonging to 50 genera and 19 tribes of ground beetles. This represents, respectively, 18.5 % of all established for Bulgarian carabid fauna species and 40 % of the genera (Teofilova and Guéorguiev un-

published results). During the first study (2005–2006) were captured 120 species (5688 specimens), and another 18 species (227 specimens) were added with the recent samplings (2019). The complete check-list of the established species with zoogeographic category, life form and ecological group in relation of the humidity is given in the Appendix.

Our study presents eleven new genera for the Eastern Rhodopes (*Acupalpus*, *Anchomenus*, *Anisodactylus*, *Carterus*, *Demetrias*, *Elaphrus*, *Gynandromorphus*, *Olisthopus*, *Parophonus*, *Tachys* and *Tachyura*) Two of the genera (*Carterus* and *Gynandromorphus*) are also new for the whole Rhodope Mts. The subgenera *Philochthus* and *Phyla* (both from the genus *Bembidion* Latreille, 1802) are new for the Eastern Rhodopes, and *Phyla* is also new to the whole Rhodope Mts. Sixty species are new for the Eastern Rhodopes; 24 species of them are new for the whole Rhodope Mts. The record of *Clivina fossor* (Linnaeus, 1758) gives confirmation for the presence of this species in this part of the mountain. All new species are marked in the Appendix.

The richest tribes were Harpalini (46 species), Amarini (14 species), Lebiini (11 species) and Carabini and Sphodrini (10 species each). Pterostichini and Bembidiini tribes were represented with nine species each. Harpalini and Amarini tribes include mostly ecologically plastic carabids. Carabini and Pterostichini are typical forest dwellers; most of them are stenotopic and any impact on the forest habitats where they occur, also affects the structure of their communities. Sphodrini tribe includes both forest dwellers and open living species. The increased richness of the tribes Lebiini and Bembidiini could be resulting from the fact that a significant part of the material was collected by hand and with tree traps, since most of these beetles are rarely found in the pitfall traps.

Genera most rich in species were *Harpalus* Latreille, 1802 (25 species), *Amara* Bonelli, 1810 (11 species) and *Carabus* Linnaeus, 1758 (eight species). Genera *Ophonus* Dejean, 1821, *Calathus* Bonelli, 1810 and *Bembidion* were represented by six species each.

New highest altitudes were found in the distribution of five species: *Amara parvicollis* Gebler, 1833 – so far known only from the Black Sea coast and Eastern Danube Plain under 50 m a.s.l., now found in localities M_R and M_R1 (for locality codes see Table 1), at 135 m; *Anisodactylus intermedius* Dejean, 1829 – so far known only under 300 m a.s.l., now found in locality P_O1, at 410 m; *Brachinus brevicollis* Motschulsky, 1844 – so far known only under 300 m a.s.l., now found in locality B_DG, at 320 m; *Calathus cinctus* Motschulsky, 1850 – so far known only under 300 m a.s.l., now found in locality AT_O, at 390 m; *Poecilus anatolicus* (Chaudoir, 1850) – so far known only under 400 m a.s.l., now found in locality Ru_R, at 430 m. It is hard to claim if these new findings are evidences for the real movement of the species in height. They are probably resulting of the less knowledge about the ecology of these species and their distribution in Bulgaria.

We found some species with conservation value. Our study reports one Tertiary relict (*Myas chalybaeus* (Palliardi, 1825)) and 14 endemic species and subspecies, of which Balkan endemics are 10 taxa (two species and eight subspecies), Bulgarian endemics are two taxa (one species and one subspecies), and one species and one subspecies are subendemic (Table 2).

Table 2. List of the endemic ground beetles found in the Eastern Rhodope Mts. in 2005–2006 and 2019.

Species/subspecies	Level
Tapinopterus balcanicus balcanicus Ganglbauer, 1891	Bulgarian
Zabrus balcanicus Heyden, 1883	Bulgarian
Carabus scabriusculus bulgarus Lapouge, 1908	Balkan
Carabus montivagus montivagus Palliardi, 1825	Balkan
Carabus wiedemanni wiedemanni Ménétriés, 1836	Balkan
Carabus scabrosus scabrosus Olivier, 1790	Balkan
Cychrus semigranosus balcanicus Hopffgarten, 1881	Balkan
Trechus subnotatus subnotatus Dejean, 1831	Balkan
Molops dilatatus Chaudoir, 1868	Balkan
Laemostenus cimmerius weiratheri J. Müller, 1932	Balkan
Zabrus graecus subtilis Schaum, 1862	Balkan
Licinus graecus Apfelbeck, 1901	Balkan
Myas chalybaeus (Palliardi, 1825)	Balkan subendemic
Platynus scrobiculatus purkynei Obenberger, 1917	Balkan subendemic

Carabus intricatus Linnaeus, 1760 is included in the IUCN Red List as 'Near Threatened'. Along with *Calosoma sycophanta* (Linnaeus, 1758), it is included in the Annexes of CORINE and ESC Red List. *Carabus scabrosus* Olivier 1790, is enlisted in the Red Data Book of Bulgaria as 'Vulnerable' (Golemanski et al. 2015).

Some rare and stenotopic species occur in the studied region: *Amara saphyrea* Dejean, 1828, *Calathus micropterus* (Duftschmid, 1812), *Calosoma sycophanta*, *Lebia marginata* (Geoffroy, 1785), *Pedius inquinatus* (Sturm, 1824), *Platynus scrobiculatus* (Fabricius, 1801), *Zabrus graecus* Dejean, 1828, most of the endemites. Some of the species (e.g. *Carabus intricatus* and *Carabus scabrosus*) have become rare under the influence of anthropogenic pressures and changes in their primary habitats. *Calosoma inquisitor* (Linnaeus, 1758), *Calosoma sycophanta* and some of the *Carabus* species are usually highly sensitive to chemical agents, which affects their ranges and numbers (Huusela-Veistola 2000).

Zoogeographical analysis showed that the Mediterranean (*sensu lato*) complex prevailed (47 species, 34 %). It was followed by the European-Asiatic (35 species, 25 %) and Northern Holarctic and European-Siberian complexes (31 species, 23 %). European complex consisted of 17 species (12 %) and Endemic complex – eight species (6 %) (Fig. 1). Mediterranean species are distributed in the so-called region of the 'Ancient Mediterraneum' (Popov 1927, Kryzhanovskij 1965, 1983, 2002). European-Asiatic species ranges lie between the Eurosiberian and Mediterranean zones. Northern Holarctic and European-Siberian complex includes species distributed mainly in the northern regions of the Holarctic, mostly in Europe and Siberia. European complex includes mostly forest dwelling species connected to the middle and southern part of Europe.

Greatest number of species had the European-Central Asian, European-Neareastern, Palaearctic, Balkan-Neareastern and Northmediterranean zoogeographic categories (Table 3). The predominance of the Mediterranean species is not typi-

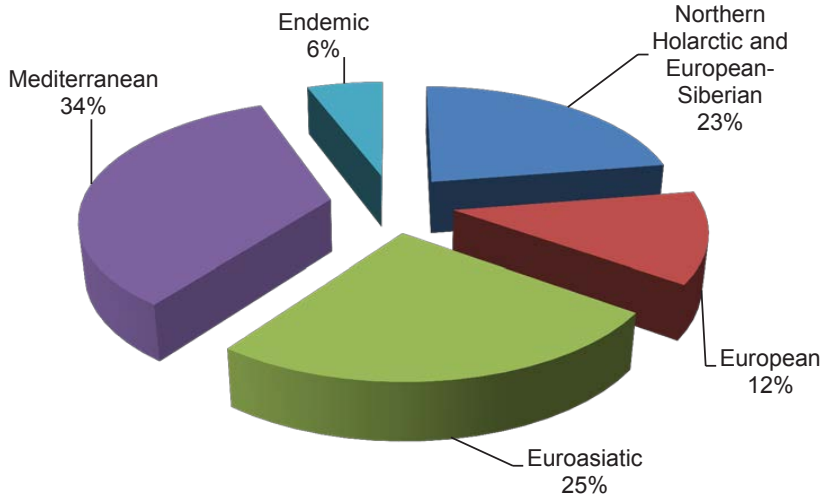

Fig. 1. Distribution of the carabid species among the zoogeographical complexes.

cal for the other mountain regions in Bulgaria (e.g. Kostova 2009, Teofilova 2016, Teofilova 2019b), but it is common for the habitats near the Black Sea coast (Popov and Krusteva 1999, Teofilova et al. 2015). The specific geographic position and climatic conditions are a precondition for the development of respective vegetation and habitat types, determining the composition of the carabid coenoses.

Table 3. Zoogeographical categories of the ground beetles in the Eastern Rhodope Mts. (on species level).

Zoogeographical complex	Code	Zoogeographical element	Species, No	Species, %
Northern Holarctic and European-Siberian	OLA	Holarctic	5	4
	PAL	Palaearctic	14	10
	WPAL	Western Palaearctic	6	4
	E-SI	European-Siberian	5	4
	E-WSI	European and West Siberian	1	1
European	EUR	European	5	4
	CE-PAS	Central European and Neareastern	6	4
	CEE-PA	Central and Eastern European and Neareastern	3	2
	CE-E	Central and Eastern European	3	2
Euroasiatic	E-AS	Euroasiatic steppe and forest-steppe complex	2	1
	E-CAS	European and Central Asian	16	12
	E-PAS	European-Neareastern	15	11
	B-CAS	Balkan and Central Asian	2	1

Zoogeographical complex	Code	Zoogeographical element	Species, No	Species, %
Mediterranean	E-CA-M	European-Central Asian-Mediterranean	9	7
	E-PA-M	European-Neareastern-Mediterranean	9	7
	MED-PA	Mediterranean-Neareastern	2	1
	MED	Mediterranean	3	2
	EMED	Eastmediterranean	1	1
	NM-CAS	Northmediterranean-Central Asian	1	1
	NMED	Northmediterranean	10	7
	P-SMED	Pontic-Submediterranean	1	1
	B-PAS	Balkan-Neareastern	11	8
Endemic	BAL-K	Balkan subendemic (+ Balkan-Carpathian)	3	2
	BAL	Balkan endemic	4	3
	BGE	Bulgarian endemic	1	1

The ground beetles established during the study related to two classes of life forms proposed by Sharova (1981), with a predominance of class Zoophagous, presented by 78 species (56.5 %). Mixophyitophagous were 60 species (43.5 %). This ratio is most similar to that in the meadow steppes from the Forest-steppe zone of Eurasia (Sharova 1981), habitats near Cape Emine at the Black Sea coast (Teofilova et al. 2015) and unvegetated, sparsely vegetated, and bryophyte- or lichen-vegetated cliffs, rock faces and rock pavements in the inland areas in Bulgaria (Teofilova 2019c), and differs from the established in other mountain regions in Bulgaria (e.g. Teofilova 2016, Teofilova 2018, Teofilova 2019b).

There were 21 life forms of ground beetles – 15 zoophagous and six mixophytophagous. Zoophagous life form groups are normally more numerous, especially in stable ecosystems (Sharova 1981) and in forest regions, as it was found in 'Leshnitsa' Reserve (Teofilova 2016), Vrachanska Planina Mts. (Teofilova 2019b) and in the Western Rhodope Mts. (Teofilova 2018, Teofilova 2019a). The largest share of the species belonged to the specialised phytophagous harpaloid geohortobionts from Class Mixophytophagous (32 species, 23 %), followed by the crevice-dwelling surface & litter stratobionts (20 species, 14 %) from Class Zoophagous (figs 2 and 3).

The harpaloid geohortobionts were also dominating in the Western Rhodope Mts. (Teofilova 2018, Teofilova 2019a) and Vrachanska Planina Mts. (Teofilova 2019b). Surface & litter dwelling stratobionts are most of the *Bembidion* and *Agonum* Bonelli, 1810 species, *Notiophilus* Duméril, 1806, *Chlaenius* Bonelli, 1810. They were also found as the most species rich zoophagous category in the Western Rhodope Mts. (Teofilova 2018, Teofilova 2019a) and Vrachanska Planina Mts. (Teofilova 2019b).

In the studied part of the mountain, according to their ecological preferences, mesoxerophilous (51 species, 36 %) ground beetles prevailed (Fig. 4). Mesophilous were 37 species (27 %), hygrophilous were 18 species (13 %), mesohygrophilous were 15 species (11 %), 12 species were xerophilous (9 %), and only five species (4 %) were eurytopic.

These results showed the predom-

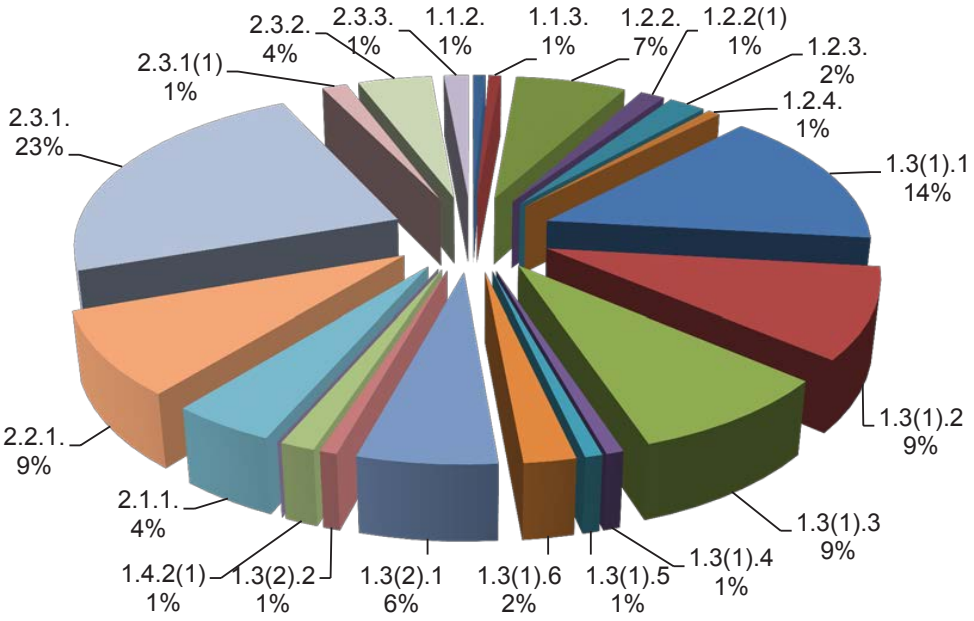

Fig. 2. Life forms of the ground beetles from the Eastern Rhodope Mts.
Note: Explanations of the codes are given in the Material and Methods section.

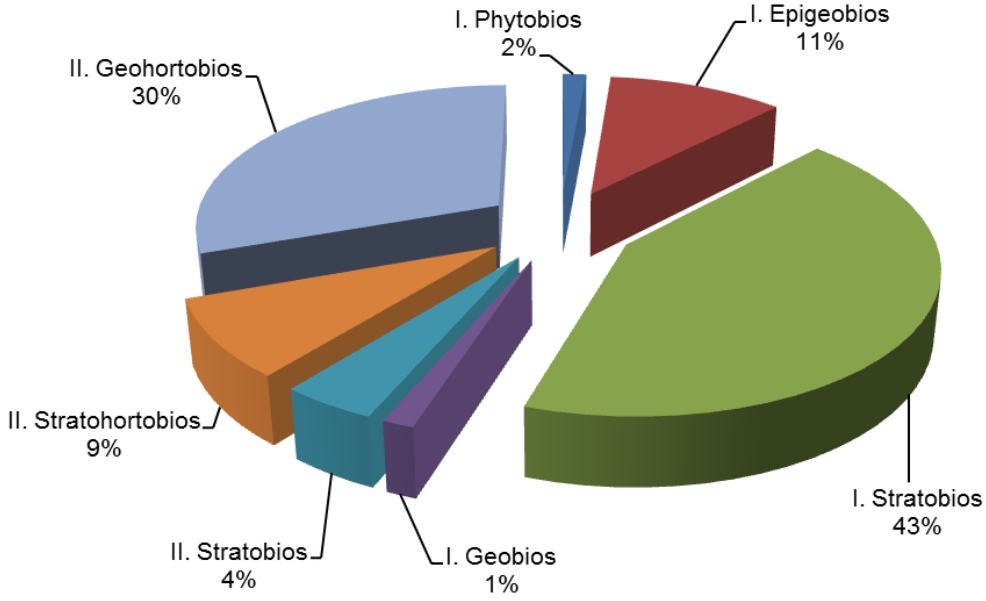

Fig. 3. Proportions of the subclasses of life forms in the carabid complex.
Note: I – class Zoophaga, II – class Mixophytophaga.

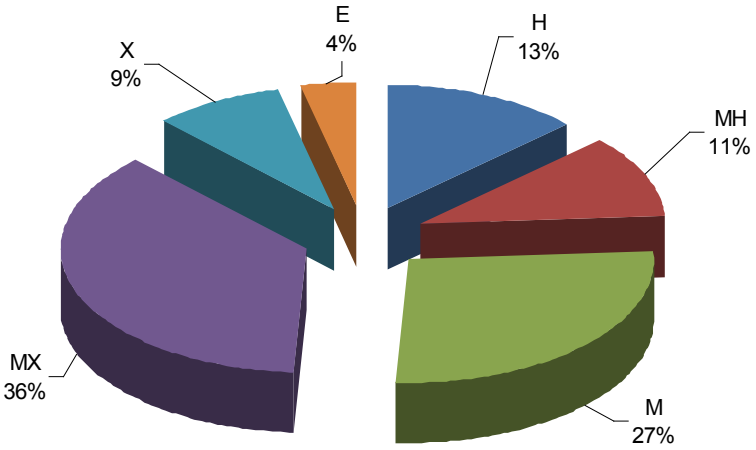

Fig. 4. Humidity preferences of the carabids from the Eastern Rhodope Mts. (number of species).

Note: H – hygrophilous, MH – mesohygrophilous; M – mesophilous, MX – mesoxerophilous, X – xerophilous, E – eurybiont.

inantly mesoxerophilous nature of the habitats, in contrast of the predominantly mesophilous conditions in the Western part of the Rhodope Mts. (Teofilova 2018, Teofilova 2019a) and Vrachanska Planina Mts. (Teofilova 2019b), probably resulting from the typical forest-mountain condition in those territories.

Conclusions

The large number of the found new species shows the great variety of the ground beetle fauna in the Eastern Rhodope Mts. As the studied area provides various and diverse habitats, and considering the general richness of the carabids and the lack of targeted methodical studies, it is quite possible that the carabid fauna is even more diverse. For general conclusions, however, more localities have to be examined systematically.

Zoogeographical analysis shows a predominantly Mediterranean nature of the established carabid fauna, which is in accordance with the life forms structure, and the preference of the carabids for more mesoxerophilous habitats.

The region of the Eastern Rhodope Mts. is treasuring specific assemblages and species with conservation significance, and the preserving of their characteristic habitats is a keystone for their conservation, especially in that favoured mining prospecting region.

Acknowledgments

Authors express their gratitude to Dr. Dragan Chobanov, Dr. Mario Langourov and Krasimir Donchev for their help with the collection of the material. We also thank to both reviewers for their fast reviews.

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Table A1. Systematic list of the ground beetles found in the Eastern Rhodopes in 2005–2006 and 2019.

No	Species	ZC	LF	HP	Locality code, material
1.	**Cicindela* (s.str.) *sylvicola* Dejean, 1822	CE-PAS	1.2.4	MX	R_RF, 1ex.[h]
2.	*Leistus* (*Pogonophorus*) *rufomarginatus* (Duftschmid, 1812)	EUR	1.3(1).1	M	AT_O, 3♂; AT_O1, 1♂; AT_Pn, 2♀1♂; AT_M, 1♂; AT_Ps, 2♂; M_O, 1ex.; B_DG, 1♂; B_DG1, 1♀; NA 1♂
3.	*Nebria* (s.str.) *brevicollis* (Fabricius, 1792)	E-PAS	1.3(1).1	MH	Ru_R, 2♀; B_BR, 1♀; AT_A, 4♀11♂; AT_O, 10♀17♂; AT_O1, 1♀; AT_Pn, 1♂; AT_M, 8♀6♂3ex.; AT_Ps, 1♀1♂; P_O, 3♀1♂[h]; SK_R, 3♂2♀[h]; SK_R1, 4♀5♂; M_R, 4♀7♂; M_R1, 1♀; M_O, 1♀; B_DG, 167♀154♂5ex.; B_DG1, 1♀
4.	**Notiophilus biguttatus* (Fabricius, 1779)	WPAL	1.3(1).1	M	P_O, 1♀
5.	**N. substriatus* G. R. Waterhouse, 1833	E-PA-M	1.3(1).1	M	O_m, 1♀; AT_O, 1♀; NA 1♀
6.	*N. rufipes* Curtis, 1829	E-PAS	1.3(1).1	M	R_AY, 1♂; AT_A, 3♀3♂; AT_O, 1♂; AT_Pn, 2♀; AT_M, 1♂; M_O, 2♀; B_DG, 1♀1♂; B_DG1, 1♀3♂
7.	*Calosoma* (s.str.) *sycophanta* (Linnaeus, 1758)	PAL	1.2.2(1)	M	O_O, 1ex.[h]; P_O, 1♀; P_O1, 1♂[t]; M_O, 1♂
8.	*C.* (s.str.) *inquisitor* (Linnaeus, 1758)	PAL	1.2.2(1)	MX	O_m, 1♂[h]; O_O, 1 ex.[h]; AT_O, 1♀2♂; AT_O1, 1♀; P_O, 1♀; P_O1, 1♀; M_O1, 1♀1♂; M_R, 2♀2♂; B_DG1, 1♂
9.	*Carabus* (*Trachycarabus*) *scabriusculus* Olivier, 1795	CE-PAS	1.2.2	X	P_SK, 3♀2♂
10.	*C.* (*Archicarabus*) *montivagus* Palliardi, 1825	CE-E	1.2.2	M	AT_O, 1♀; M_M, 2♀1♂
11.	*C.* (*Archicarabus*) *wiedemanni* Ménétriés, 1836	B-PAS	1.2.2	MX	O_O, 1ex.[h]; Ru_R, 3♀1♂; R_AY, 3♀4♂; R_RF, 1♂; B_BR, 3♂; AT_A, 12♀19♂5ex.; AT_O, 10♀3♂1ex.; AT_Pn, 143♀125♂16ex.; AT_M, 1♀3♂; AT_Ps, 41♀32♂10ex.; P_O, 15♀15♂3ex.; P_O1, 12♀7♂; P_SK, 3♀2♂; M_Ps, 6♀6♂; B_S, 3♀; B_DG, 1♀4♂; B_DG1, 3♀5♂; KD_R, 1♂; NA 7♀2♂
12.	*C.* (*Tomocarabus*) *convexus* Fabricius, 1775	E-PAS	1.2.2	MX	Ru_R, 1♀; R_AY, 12♀9♂3ex.; O_m, 1♀1♂; P_SK, 1♂; P_O, 9♀9♂; P_O1, 2♀3♂; M_R, 2♂; M_R1, 1♀; M_O, 1♀1♂; M_O1, 3♀3♂; M_Ps, 2♀4♂; M_M, 3♀2♂; B_S, 1♀1♂; B_DG, 1♀4♂; B_DG1, 18♀13♂; NA 1♀1♂
13.	*C.* (*Chaetocarabus*) *intricatus* Linnaeus, 1760	EUR	1.2.2	MH	O_O, 1ex.[h]; R_RF, 1ex.[h]; R_AY, 1ex.
14.	*C.* (*Pachystus*) *morio* Mannerheim, 1830	B-PAS	1.2.2	MX	P_SK, 2♀; AT_A, 3♀1♂6ex.; AT_O, 1♀1♂; AT_Pn, 1♂; P_O, 2♀, 1♀[h]; P_O1, 1♀2♂; P_SK, 2♀; M_R1, 1♀; M_O, 15♀6♂2ex.; M_O1, 9♀4♂; M_D, 2♀1♂; B_DG, 2♂1ex.; NA 1♀5♂

No	Species	ZC	LF	HP	Locality code, material
15.	*C.* (*Procrustes*) *coriaceus* Linnaeus, 1758	E-PAS	1.2.2	E	R_AY, 1♀[h]; R_AY, 3♀3♂; P_SK, 4♀2♂; AT_A, 30♀24♂6ex.; AT_O, 19♀16♂6ex.; AT_O1, 1♀1♂; AT_Pn, 67♀73♂9ex.; AT_M, 32♀25♂17ex.; AT_Ps, 35♀43♂17ex.; P_O, 91♀69♂9ex., 1♂[h]; P_O1, 25♀17♂; P_SK, 2♀4♂; SK_R, 3♀; M_R, 2♀1♂1ex.; M_R1, 1♀1♂; M_O, 8♀5♂1ex.; M_Ps, 79♀119♂14ex.; M_M, 8♀7♂9ex.; B_S, 2♀3♂; B_DG, 22♀23♂5ex.; B_DG1, 3♀1♂; NA 7♀6♂1ex.
16.	*C.* (*Procerus*) *scabrosus* Olivier, 1789	B-PAS	1.2.2	M	Kr, 1ex.[h]; M_O, 1♂; M_Ps, 1♂; M_M, 6♂; B_DG, 1♀4♂
17.	*Cychrus semigranosus* Palliardi, 1825	BAL-K	1.2.2	M	M_Ps, 5♀7♂9ex.; M_M, 3♀3♂6ex.
18.	**Elaphrus* (*Elaphroterus*) *aureus* P. W. J. Müller, 1821	EUR	1.2.3	H	M_R, 2♂
19.	*Clivina* (s.str.) *fossor* (Linnaeus, 1758)	PAL	1.4.2(1)	MH	B_BR, 2♀
20.	**C.* (s.str.) *collaris* (Herbst, 1784)	E-PAS	1.4.2(1)	MH	M_R, 1♀; M_R1, 3ex.
21.	*Trechus* (s.str.) *quadristriatus* (Schrank, 1781)	E-CA-M	1.3(1).2	MX	O_O, 1♂; O_m, 1♀1♂; P_SK, 1♂; AT_O, 1ex.; AT_O1, 1♀1♂; AT_M, 1♀1♂; P_O, 2♂; P_O1, 1♂; P_SK, 1♀[t]; M_M, 1♀2♂; M_D, 4♀1♂, 1♀[t]; B_DG, 2♀3♂
22.	*Tr.* (s.str.) *crucifer* Piochard de la Brûlerie, 1876	B-PAS	1.3(1).2	M	AT_A, 1♂; AT_O, 2♂; AT_Pn, 2♀
23.	*Tr.* (s.str.) *subnotatus* Dejean, 1831	NMED	1.3(1).2	M	R_AY, 1♂
24.	***Tachys* (*Paratachys*) *bistriatus* (Duftschmid, 1812)	E-PA-M	1.3(1).4	H	P_SK, 1♀
25.	**Tachyura* (s.str.) *quadrisignata* (Duftschmid, 1812)	E-PA-M	1.3(1).1	H	SK_R, 1♀1♂
26.	**Asaphidion flavipes* (Linnaeus, 1760)	WPAL	1.2.3	MH	M_R, 5♀2♂; M_R1, 1♀
27.	***A. flavicorne* (Solsky, 1874)	B-CAS	1.2.3	MH	M_R, 1♂
28.	**Bembidion* (*Metallina*) *properans* (Stephens, 1828)	E-WSI	1.3(1).2	M	B_DG, 1♀
29.	***B.* (*Phyla*) *tethys* Netolitzky, 1926	MED	1.3(1).1	H	B_BR, 6♀6♂
30.	**B.* (*Philochthus*) *guttula* (Fabricius, 1792)	PAL	1.3(1).1	H	B_BR, 2♀1♂; B_DG, 1♂
31.	**B.* (*Peryphus*) *subcostatum* (Motschulsky, 1850)	B-PAS	1.3(1).1	H	B_BR, 2♀3♂; M_R, 2♀2♂; M_R1, 3♀1♂
32.	**B.* (*Peryphanes*) *deletum* Audinet-Serville, 1821	E-PA-M	1.3(1).1	H	R_AY, 1♀[h]
33.	**B.* (*Peryphanes*) *stephensii* Crotch, 1866	EUR	1.3(1).1	MH	R_AY, 1♂[h]
34.	*Sinechostictus* (s.str.) *effluviorum* Peyron, 1858	CEE-PA	1.3(1).2	H	B_BR, 3♀1♂

No	Species	ZC	LF	HP	Locality code, material
35.	*Myas* (s.str.) *chalybaeus* (Palliardi, 1825)	BAL-K	1.3(2).1	M	O_O, 1ex.[h]; O_O, 1♀; O_m, 1♂; P_O, 1ex.; M_R, 1♀; M_O, 3♀3♂3ex.; M_O1, 3♀; M_Ps, 61♀66♂19ex.; M_M, 11♀17♂5ex.; B_DG, 8♀14♂2ex.; B_DG1, 16♀6♂
36.	****Poecilus** (s.str.) *anatolicus* (Chaudoir, 1850)	B-PAS	1.3(2).1	MX	Ru_R, 2♀9♂
37.	*Pedius inquinatus* (Sturm, 1824)	B-PAS	1.3(2).1	MX	Ru_R, 1♂
38.	***Pterostichus** (*Argutor*) *leonisi* Apfelbeck, 1904	CE-E	1.3(2).1	H	B_BR, 3♀
39.	*Pt.* (*Platysma*) *niger* (Schaller, 1783)	E-AS	1.3(2).1	MH	M_R, 1♀
40.	*Pt.* (*Pseudomaseus*) *nigrita* (Paykull, 1790)	E-SI	1.3(2).1	H	SK_R, 1♂[h]; B_BR, 1♀1♂
41.	****Pt.** (*Phonias*) *ovoideus* (Sturm, 1824)	E-SI	1.3(2).1	MH	M_M, 1♀1♂
42.	***Molops** (s.str.) *dilatatus* Chaudoir, 1868	BAL	1.3(2).1	M	P_O, 9♀11♂, 2♀2♂[h]; P_O1, 2♀6♂; M_O, 1♂; M_M, 4♀9♂
43.	*Tapinopterus* (s.str.) *balcanicus* Ganglbauer, 1891	BAL	1.3(2).2	M	M_M, 2♀
44.	***Calathus** (s.str.) *distinguendus* Chaudoir, 1846	B-PAS	1.3(1).2	MX	O_P, 1♂; P_O1, 5♀1♂
45.	*C.* (s.str.) *fuscipes* (Goeze, 1777)	PAL	1.3(1).2	E	O_P, 1♀1♂; Ru_R, 1♀6♂; B_BR, 4♀3♂; AT_A, 4♀1♂4ex.; AT_O, 2♀1ex.; AT_Pn, 2♀1♂; AT_M, 33♀50♂47ex.; AT_Ps, 1♀2♂2ex.; P_O, 1♀9ex.; P_O1, 4♀, 1♂[t]; SK_R, 1♀1♂; SK_R1, 1♂; M_R, 8♀3♂7ex.; M_R1, 1♂; M_O, 1♀; M_Ps, 1♀2♂; M_D, 1♀1♂[t]; B_S, 4♀1♂4ex.; B_DG, 93♀85♂52ex.; B_DG1, 5♀; KD_R, 1♀, 1♂[t]; NA 2♀2♂
46.	*C.* (*Neocalathus*) *ambiguus* (Paykull, 1790)	E-CAS	1.3(1).2	MX	M_D, 25♀10♂, 2♀[t]
47.	*C.* (*Neocalathus*) *melanocephalus* (Linnaeus, 1758)	PAL	1.3(1).2	M	M_R, 1♀; NA 1♀1♂
48.	****C.** (*Neocalathus*) *cinctus* Motschulsky, 1850	E-PAS	1.3(1).2	MX	AT_O, 1♂; P_SK, 1♀1♂; M_D, 1♂
49.	****C.** (*Neocalathus*) *micropterus* (Duftschmid, 1812)	E-SI	1.3(1).2	MX	AT_M, 1♀1♂
50.	****Laemostenus** (s.str.) *venustus* (Dejean, 1828)	NMED	1.3(1).6	M	B_DG1, 1♀
51.	*L.* (*Pristonychus*) *terricola* (Herbst, 1784)	WPAL	1.3(1).6	M	P_O, 9♀1♂; M_R, 1♀; M_Ps, 4♀1♂1ex.; M_M, 1♂2ex.; B_DG, 1♀
52.	*L.* (*Pristonychus*) *cimmerius* (Fischer von Waldheim, 1823)	P-SMED	1.3(1).6	M	O_P, 1♀; Ru_R, 1♂; O_m, 1♀; AT_A, 1♂; P_O, 12♀13♂22ex.; P_O1, 1♀4♂, 1♀[t]; M_R, 1♂; M_O, 8♀6♂12ex.; M_O1, 3♀2♂; M_Ps, 163♀74♂11ex.; M_M, 6♀1♂8ex.; B_S, 1♀2♂; B_DG, 12♀8♂5ex.; B_DG1, 5♀2♀; NA 1♀
53.	*Synuchus* (s.str.) *vivalis* (Illiger, 1798)	E-SI	1.3(1).2	M	M_R, 1♂
54.	****Agonum** (*Olisares*) *duftschmidi* J. Schmidt, 1994	E-SI	1.3(1).1	H	B_BR, 7♀9♂

No	Species	ZC	LF	HP	Locality code, material
55.	*Platynus* (*Batenus*) *scrobiculatus* (Fabricius, 1801)	BAL-K	1.3(1).1	M	M_M, 1♂
56.	**Anchomenus dorsalis* (Pontoppidan, 1763)	PAL	1.3(1).1	E	M_R, 4♀3♂; B_DG, 33♀43♂
57.	***Olisthopus glabricollis* (Germar, 1817)	NMED	1.3(1).2	M	P_O, 3♂[h]
58.	**Amara* (*Zezea*) *tricuspidata* Dejean, 1831	E-CA-M	2.2.1	M	P_O, 1ex.
59.	*A.* (s.str.) *aenea* (De Geer, 1774)	OLA	2.3.1	MX	AT_A, 1♀; AT_M, 2♀4♂; P_O, 3♀1♂[h]; SK_R, 1♀1♂[h]; SK_R1, 1♀; M_R, 11♀2♂1ex.; M_D, 1♂[t]; B_DG, 4♀2♂
60.	**A.* (s.str.) *anthobia* A. Villa et G. B. Villa, 1833	E-PAS	2.1.1	MX	AT_A, 27♀26♂; AT_M, 3♀2♂; AT_Ps, 1♂; P_O, 1♀; SK_R, 3♀2♂; M_R, 3♀9♂; M_R1, 2♀2♂; B_DG, 17♀27♂
61.	**A.* (s.str.) *eurynota* (Panzer, 1796)	OLA	2.3.1	M	M_Ps, 1♀
62.	*A.* (s.str.) *lucida* (Duftschmid, 1812)	E-PA-M	2.3.1	MH	AT_M, 1♀; B_DG, 1♀2♂
63.	**A.* (s.str.) *ovata* (Fabricius, 1792)	PAL	2.3.1	M	AT_A, 2♀2♂; AT_O, 2♀; B_DG, 1♀1♂
64.	*A.* (s.str.) *saphyrea* Dejean, 1828	CE-E	2.3.1	MX	AT_A, 9♀8♂; AT_O, 1♂; AT_O1, 1♀2♂; P_O, 5♀1♂2ex.; P_O1, 2♀2♂; M_R, 2♂; M_R1, 1♀1♂; B_DG, 17♀10♂; B_DG1, 1♂; NA 1♀
65.	*A.* (s.str.) *similata* (Gyllenhal, 1810)	E-CA-M	2.3.1	MH	AT_A, 1♀
66.	**A.* (*Paracelia*) *serdicana* Apfelbeck, 1904	B-PAS	2.3.1	X	P_O, 2♀[h]; M_D, 1♀
67.	*A.* (*Bradytus*) *apricaria* (Paykull, 1790)	OLA	2.3.1(1)	MX	M_D, 1♀, 1♀[t]
68.	*A.* (*Amathitis*) *parvicollis* Gebler, 1833	E-CAS	2.3.1(1)	M	M_R, 1♀1♂; M_R1, 1♀
69.	*Zabrus* (s.str.) *tenebrioides* (Goeze, 1777)	E-CAS	2.3.2	MX	M_D, 1♂[t]
70.	*Z.* (*Pelor*) *graecus* Dejean, 1828	BAL	2.3.2	M	M_R, 1♀; M_O, 1♂
71.	*Z.* (*Pelor*) *balcanicus* Heyden, 1883	BGE	2.3.2	M	P_O1, 1♂; B_DG, 1♂
72.	***Anisodactylus* (*Pseudodichirius*) *intermedius* Dejean, 1829	MED-PA	2.3.1	H	P_O1, 2♀
73.	***Gynandromorphus etruscus* (Quensel en Schönherr, 1806)	NMED	2.2.1	MX	P_O, 1♂[h]
74.	*Stenolophus* (s.str.) *teutonus* (Schrank, 1781)	EMED	2.1.1	MH	SK_R, 5♂[h]
75.	*St.* (s.str.) *discophorus* (Fischer von Waldheim, 1823)	CE-PAS	2.1.1	H	M_R, 2♂
76.	**Acupalpus* (s.str.) *flavicollis* (Sturm, 1825)	E-CAS	2.1.1	MH	B_BR, 1♀
77.	***A.* (s.str.) *meridianus* (Linnaeus, 1760)	E-PAS	2.1.1	H	SK_R1, 1♀ [t]
78.	***A.* (s.str.) *exiguus* Dejean, 1829	E-CAS	2.1.1	H	B_BR, 1♀
79.	***Parophonus* (s.str.) *maculicornis* (Duftschmid, 1812)	E-PAS	2.2.1	M	AT_M, 6♀2♂; M_R, 2♀3♂; B_DG, 2♀1♂

No	Species	ZC	LF	HP	Locality code, material
80.	****P.** (s.str.) *planicollis* (Dejean, 1829)	NMED	2.2.1	M	AT_A, 1♂
81.	****P.** (s.str.) *laeviceps* (Ménétriés, 1832)	B-PAS	2.2.1	M	SK_R, 1♀1♂[h]; B_S, 1♂
82.	****Harpalus** (*Semiophonus*) *signaticornis* (Duftschmid, 1812)	PAL	2.2.1	MX	AT_M, 2♀11♂; SK_R1, 1♂
83.	*H.* (*Pseudophonus*) *rufipes* (De Geer, 1774)	PAL	2.3.1	E	AT_A, 3♀2♂; AT_M, 2♂; AT_Ps, 1♀; P_O, 1♂; SK_R1, 1♀; M_R, 2♀1♂; M_D, 1♂[t]; B_DG, 2♂
84.	**H.* (*Pseudoophonus*) *griseus* (Panzer, 1796)	PAL	2.3.1	MX	AT_M, 1♂; SK_R, 1♂
85.	**H.*(*Pseudoophonus*) *calceatus* (Duftschmid, 1812)	PAL	2.3.1	X	M_D, 1♀
86.	**H.* (*Cryptophonus*) *tenebrosus* Dejean, 1829	E-CA-M	2.3.1	MX	Mo, 1♀[h]; B_DG, 1♀
87.	*H.* (s.str.) *honestus* (Duftschmid, 1812)	E-PAS	2.3.1	MX	AT_A, 4♀10♂; AT_M, 1♀; P_O, 2♀; M_O, 1♂; B_DG, 1♂
88.	*H.* (s.str.) *sulphuripes* Germar, 1823	CEE-PA	2.3.1	M	O_O, 1♀; O_m, 1♂; P_SK, 1♀; AT_A, 1♀1♂; SK_R, 1♀1♂; SK_R1, 1♀; M_O, 1♂; M_O1, 1♀; NA 1♂
89.	*H.* (s.str.) *rubripes* (Duftschmid, 1812)	OLA	2.3.1	MX	O_P, 1ex.[h]; AT_A, 4♀8♂; AT_O, 1♂; AT_M, 4♀1♂; P_O, 1♀2♂; P_O1, 1♂; B_DG, 3♀2♂
90.	*H.* (s.str.) *attenuatus* Stephens, 1828	E-PA-M	2.3.1	MX	O_m, 1♂[h]; Ru_R, 1♂; AT_M, 1♂; P_O, 1♀; P_SK, 1♀; M_R, 1♀; M_O, 1♂; B_S, 1♀2♂; B_DG, 1♂
91.	*H.* (s.str.) *atratus* Latreille, 1804	E-CAS	2.3.1	MX	R_AY, 1♂; AT_A, 1♀1♂; AT_O, 7♂; AT_Pn, 1♀; P_O, 3♀2♂; P_O1, 1♀; M_O, 1ex.; M_Ps, 1♂; M_M, 1♀6♂; B_DG, 1♂;
92.	*H.* (s.str.) *serripes* (Quensel, 1806)	WPAL	2.3.1	MX	Ru_R, 1♀[h]; AT_A, 9♀17♂; AT_M, 18♀39♂; SK_R, 3♀8♂[h]; M_R, 21♀27♂; B_DG, 13♀12♂
93.	**H.* (s.str.) *flavicornis* Dejean, 1829	CE-PAS	2.3.1	MX	P_SK, 1♀; AT_A, 1♀2♂; AT_M, 3♀6♂2ex.; P_O, 1♀2♂; SK_R, 1♀3♂[h]; M_R, 1♀; B_S, 3♀9♂; B_DG, 32♀43♂
94.	*H.* (s.str.) *pumilus* Sturm, 1818	E-CAS	2.3.1	MX	AT_M, 2♂; M_R1, 1♂; B_DG, 1♀
95.	*H.* (s.str.) *subcylindricus* Dejean, 1829	E-CAS	2.3.1	X	AT_A, 1♀1♂1ex.; AT_M, 1♀; SK_R, 1♂[h]; B_S, 1♀
96.	*H.* (s.str.) *tardus* (Panzer, 1796)	E-CAS	2.3.1	MX	Kr, 1ex.[h]; O_P, 1♀[h]; B_BR, 1♂; O_m, 2♀1♂; P_SK, 1♀; AT_A, 109♀316♂; AT_O, 12♀18♂; AT_O1, 4♀1♂; AT_M, 18♀39♂; P_O, 5♀5♂2ex.; P_O1, 3♀3♂; M_R, 2♀2♂; M_R1, 1♀; M_O, 1♀2♂; M_O1, 2♀; M_M, 7♀3♂; B_S, 1♀5♂; B_DG, 22♀18♂8ex.; B_DG1, 4♀2♂; NA 1♂
97.	**H.* (s.str.) *albanicus* Reitter, 1900	E-PAS	2.3.1	X	AT_A, 6♀9♂1ex.; AT_M, 3♂; P_O, 1♂; B_S, 2♀; B_DG, 2♀1♂1ex.
98.	**H.* (s.str.) *smaragdinus* (Duftschmid, 1812)	E-AS	2.3.1	X	M_D, 1♀1♂
99.	*H.* (s.str.) *autumnalis* (Duftschmid, 1812)	E-CAS	2.3.1	MX	B_BR, 5♀4♂; AT_M, 1♂; M_R, 8♀19♂1ex.; M_R1, 1♀2♂
100.	**H.* (s.str.) *cupreus* Dejean, 1829	NMED	2.3.1	MX	Ru_R, 1♀

No	Species	ZC	LF	HP	Locality code, material
101.	*H.* (s.str.) *dimidiatus* (P. Rossi, 1790)	E-PAS	2.3.1	MX	O_O, 1♂; Ru_R, 6♀18♂2ex.; B_BR, 1♂; AT_Pn, 1♀1♂; AT_M, 26♀83♂2ex.; AT_Ps, 1♀3♂; P_O, 3♀6♂1ex., 1♀[h]; P_O1, 4♀3♂; SK_R, 1♀5♂[h]; M_R, 1♂; M_O, 2♀1♂; B_S, 1♀1♂; B_DG, 25♀43♂3ex.
102.	*H.* (s.str.) *pygmaeus* Dejean, 1829	NMED	2.3.1	MX	AT_M, 1♀1♂
103.	*H.* (s.str.) *hospes* Sturm, 1818	CE-PAS	2.3.1	X	P_O1, 1♂
104.	*H.* (s.str.) *affinis* (Schrank, 1781)	E-CAS	2.3.1	MX	P_O, 1♀7♂[h]; SK_R1, 2♂
105.	*H.* (s.str.) *distinguendus* (Duftschmid, 1812)	PAL	2.3.1	E	SK_R, 1♀[h]
106.	*H.* (s.str.) *saxicola* Dejean, 1829	CEE-PA	2.3.1	MX	B_DG, 1♂
107.	**Ophonus* (*Metophonus*) *laticollis* Mannerheim, 1825	E-CAS	2.2.1	MX	Ru_R, 2♀1♂; O_m, 1♀; AT_A, 20♀19♂; AT_O, 1♀; AT_O1, 1♀; AT_M, 1♂; P_O, 1♂; P_O1, 1♀; M_R, 1♂; M_R1, 1♂; M_O, 2♀9♂; M_O1, 2♀3♂; M_M, 2♂; B_S, 1♀1♂; B_DG, 16♀34♂2ex.; B_DG1, 1♂
108.	**O.* (*Metophonus*) *rufibarbis* (Fabricius, 1792)	WPAL	2.2.1	M	B_DG, 6♀3♂
109.	*O.* (*Metophonus*) *parallelus* (Dejean, 1829)	EUR	2.2.1	MX	AT_M, 1♀
110.	*O.* (*Hesperophonus*) *azureus* (Fabricius, 1775)	E-CA-M	2.2.1	MX	AT_M, 2♀2♂; AT_Ps, 1ex.; P_O, 1♀; P_O1, 1♂; P_SK, 1♂; M_D, 1♂[t]; B_S, 1♀; B_DG, 4♀3♂
111.	*O.* (*Hesperophonus*) *subquadratus* (Dejean, 1829)	E-PA-M	2.2.1	MX	M_R, 1♀1♂; M_R1, 1♀
112.	*O.* (*Hesperophonus*) *cribricollis* (Dejean, 1829)	E-CAS	2.2.1	MX	AT_A, 2♀; AT_M, 2♀2♂; P_O, 1♀; M_O, 1♀1♂; B_DG, 1♀1♂; NA 1♀
113.	*Acinopus* (s.str.) *picipes* (Olivier, 1795)	NMED	2.3.2	MX	Ru_R, 1♂; AT_M, 1♀4♂; P_O1, 1♀, 1♂[t]; M_D, 4♀3♂2ex. [t]; SK_R1, 1♀; B_DG, 2♀1♂
114.	*A.* (*Osimus*) *ammophilus* Dejean, 1829	CE-PAS	2.3.2	X	M_D, 1♂[t]
115.	***A.* (*Oedematicus*) *megacephalus* (P. Rossi, 1794)	NMED	2.3.2	MX	AT_M, 1♂; M_D, 2♂[t]
116.	***Carterus* (s.str.) *dama* (P. Rossi, 1792)	MED	2.3.3	X	AT_M, 1♀
117.	*Dixus obscurus* (Dejean, 1825)	NM-CAS	2.3.3	X	AT_A, 12♀3♂5ex.; AT_M, 4♀1♂6ex.; P_O, 1ex.; M_R, 3ex.; M_O, 3♀1♂5ex.; B_DG, 4♂3ex.; KD_R, 1ex.
118.	*Chlaenius* (s.str.) *festivus* (Panzer, 1796)	E-CAS	1.3(1).1	H	SK_R, 2♂[h]
119.	*Chl.* (*Chlaeniellus*) *vestitus* (Paykull, 1790)	WPAL	1.3(1).1	H	B_BR, 1♀; SK_R, 2♀[h]
120.	*Chl.* (*Trichochlaenius*) *aeneocephalus* Dejean, 1826	B-PAS	1.3(1).1	M	Ru_R, 1♀; B_DG, 1♀
121.	*Licinus* (s.str.) *graecus* Apfelbeck, 1901	BAL	1.3(1).1	X	P_O, 1♂

No	Species	ZC	LF	HP	Locality code, material
122.	*L.* (s.str.) *silphoides* (P. Rossi, 1790)	NMED	1.3(1).1	MX	AT_M, 1ex.
123.	**Lebia* (s.str.) *marginata* (Geoffroy, 1785)	E-PAS	1.1.3	X	SK_R1, 1♂
124.	***Demetrias* (s.str.) *atricapillus* (Linnaeus, 1758)	E-CA-M	1.1.2	MH	B_DG, 1ex.
125.	*Paradromius (Manodromius) linearis* (Olivier, 1759)	E-PAS	1.3(1).5	MH	P_O, 1♂[h]
126.	*Syntomus obscuroguttatus* (Duftschmid, 1812)	E-PA-M	1.3(1).3	M	Ru_R, 1♂; R_AY, 1♂; AT_M, 2♀3♂; M_R, 1♂; M_R1, 1♀; B_DG, 4♀3♂
127.	**S. pallipes* (Dejean, 1825)	E-CA-M	1.3(1).3	MX	Ru_R, 2♀1♂; AT_A, 3♀6♂; AT_M, 3♀3♂; SK_R, 2♀1♂; SK_R1, 1♀; M_R, 1♂; B_DG, 6♀4♂
128.	***S. impressus* (Dejean, 1825)	MED	1.3(1).3	M	B_BR, 1♂; AT_M, 1♀
129.	**Microlestes fissuralis* (Reitter, 1901)	E-CAS	1.3(1).3	M	O_P, 1♂; B_S, 1♀; M_D, 1♂
130.	**M. minutulus* (Goeze, 1777)	OLA	1.3(1).3	MX	Ru_R, 1♀1♂; AT_A, 1♂; AT_M, 1♀2♂; P_O, 1♀[h]; P_O1, 2♀; B_DG, 1♀1♂6ex.
131.	*Microlestes negrita* (Wollaston, 1854)	MED-PA	1.3(1).3	MX	B_DG, 2♂
132.	*Lionychus* (s.str.) *quadrillum* (Duftschmid, 1812)	E-PAS	1.3(1).1	H	B_BR, 4♀; AT_M, 1♀; M_R, 1♂
133.	*Cymindis* (s.str.) *axillaris* (Fabricius, 1794)	E-PA-M	1.3(1).3	MX	O_P, 1♀
134.	*Brachinus* (s.str.) *crepitans* (Linnaeus, 1758)	PAL	1.3(1).3	MX	AT_A, 4♀4♂; AT_M, 1♀; P_O, 1♂; SK_R, 1♀[h]; M_M, 1♀1♂1ex.; B_DG, 82♀30♂
135.	**Br.* (s.str.) *psophia* Audinet-Serville, 1821	E-CA-M	1.3(1).3	MX	B_DG, 1♀1♂
136.	***Br.* (*Brachynidius*) *brevicollis* Motschulsky, 1844	B-CAS	1.3(1).3	MX	AT_M, 1♀; B_DG, 2♂
137.	***Br.* (*Brachynidius*) *bodemeyeri* Apfelbeck, 1904	E-CA-M	1.3(1).3	M	Ru_R, 1♀
138.	*Br.* (*Brachynidius*) *explodens* Duftschmid, 1812	E-CAS	1.3(1).3	MX	AT_A, 34♀, 32♂; AT_M, 5♀4♂; P_O, 4♀2♂[h], P_O1, 1♀, 1♀[t]; SK_R, 5♀4♂[h]; M_R, 1♀; B_S, 2♀2♂6ex.; B_DG, 18♀12♂

Note: * – new species for the Eastern Rhodope Mts.; ** – new species for the whole Rhodope Mts. ZC – zoogeographic category (explanations are given in Table 3 the Results section of the main paper); LF – life form (explanations are given in the Material and Methods section of the main paper); HP – humidity preference (H – hygrophilous, MH – mesohygrophilous; M – mesophilous, MX – mesoxerophilous, X – xerophilous, E – eurybiont); ♀ – female, ♂ – male, ex. – not determined; [h] – hand collection; [t] – tree trap; NA – label destroyed, material collected in 2005–2006. Locality codes are given in Table 1.