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## Research article

# New data about Bulgarian ground beetles from subfamilies Nebriinae, Carabinae and Cicindelinae (Coleoptera: Carabidae)

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**Abstract:** Bulgarian ground beetle (Coleoptera: Carabidae) fauna is relatively well studied but there are still many species and regions in the country which are not well researched. The present study aims at complementing the data about the distribution of the carabids from the subfamilies Nebriinae, Carabinae and Cicindelinae, which contain some of the most attractive Palaearctic carabids. Currently, 13 species of Nebriini, ten species of Notiophilini, one species of Cychrini, 28 species of Carabini and 15 species of Cicindelini are known to occur in Bulgaria. The paper gives new information and new records on 37 carabid species and 25 zoogeographical regions in Bulgaria. Beetles are collected in the period from 1976 to 2021 by different collectors and sampling methods. Six species are recorded for the first time in different regions. Four species are reported for the second time in the regions where they have currently been collected. Fourteen species haven't been reported for more than 20 years from the Middle and Western Stara Planina Mts, Western Bulgaria Region, Kraishte Region, Boboshevo-Simitli Valley, Vitosha Mts, Plana Mt, Lyulin Mts, Rila Mts and Pirin Mts.

**Keywords:** addition, Bulgaria, carabids, distribution

## Introduction

Ground beetles (Coleoptera: Carabidae) represent one of the largest beetle families with cosmopolitan distribution and with decisive importance for the functioning of ecosystems. The representatives of the studied tribes Nebriini, Notiophilini, Cychrini, Carabini and Cicindelini are among the most attractive Palaearctic carabids, and often occur in many collections. In Bulgaria, most of these beetles are montane and forest dwellers or intra- and extrazonal ecotone and riparian species (e.g. Kryzhanovskij, 1983). They are mostly stenotopic or polytopic, non-flying zoophages, adapted to more mesophilic conditions, which is limiting their mass spreading and survival in anthropogenically modified ecosystems (e.g. Kryzhanovskij, 1983). Probably, due to that fact, there are still many regions and taxa continuing to surprise us with new records.

Ground beetles are relatively well studied in Bulgaria, but many regions are still poorly researched, and there are still many gaps in our knowledge,

especially about the endemic taxa. According to the last edition of the Palaearctic Catalogue of the Ground Beetles, in Bulgaria currently 12 species of Nebriini, ten species of Notiophilini, one species of Cychrini, 24 species of Carabini and 16 species of Cicindelini are known (Löbl & Löbl, 2017). However, according to our own recent estimations (Teofilova & Guéorguiev, unpublished results) these numbers are not accurate, because *Cicindela (Sophiodela) virgula* Fleutiaux, 1894 never occurred in Bulgaria, but is included in the Palaearctic catalogue (probably by a technical mistake). Furthermore, *Leistus (Leistus) piceus* Frölich, 1799, *Carabus (Carabus) menetriesi* Faldermann in Hummel, 1827, *C. (Archicarabus) nemoralis* O. F. Müller, 1836, *C. (Pachystus) hungaricus* Fabricius, 1792, and *C. (Oreocarabus) linnei* Panzer, 1810 are missing for Bulgaria in the Palaearctic catalogue, but they are proved in the country (Guéorguiev & Guéorguiev, 1995a; Turin et al. 2003; Teofilova et al. 2020; Teofilova & Guéorguiev, unpublished results). Therefore, the total number of the species currently known in Bulgaria should be 13

species of Nebriini, ten species of Notiophilini, one species of Cychrini, 28 species of Carabini and 15 species of Cicindelini.

The present study is the last part from the complex work concerning the unpublished data about Bulgarian carabids (Teofilova, 2021a, 2021b, 2021c, 2021d, 2021e). It aims at complementing the data about the distribution of the ground beetles from the subfamilies Nebriinae, Carabinae and Cicindelinae in Bulgaria by adding new records for 5% of the 747 species in Bulgarian carabid fauna (Teofilova & Guéorguiev, unpublished results), collected in 25 zoogeographical regions and subregions (using the same zoogeographical division as in the last catalogue of Bulgarian carabids (Guéorguiev & Guéorguiev, 1995a).

## Material and methods

The majority of the material for this study came from a field work carried out in different localities in Bulgaria in the period from 1976 to 2021. This material was collected through different sampling methods, such as handpicking, pan, Malaise, or pitfall trapping, and has not been published so far. All specimens are stored in the author's collection in the Institute of Biodiversity and Ecosystem Research (BAS, Sofia).

The following abbreviations of the collectors' names are used in the text: AV – A. Valkov, DC – Dragan Chobanov, DS – Desislava Stoyanova, EM – E. Markova, GH – Georgi Hristov, IG – Iliya Gyonov, IT – Ivaylo Todorov, IV – Ilko Vassilev, KD – Krasimir Donchev, MN – Maria Naumova, MP – Magdalena Popova, NKar – Nikolay Karaivanov, NK – Nikolay Kodzhashev, NS – Nikolay Simov, OI – Ognyan Iliiev, OT – Ognyan Todorov, PBe – Petar Beron, PB – P. Blagoev, RT – R. Todorov, SL – Simeon Lukanov, SSSt – Stilian Stefanov, TL – Toshko Ljubomirov, TT – Teodora Teofilova, YG – Yuli Ganey, VG – Vasil Genchev, VGu – Vyara Gusseva, VP – Vlada Peneva (Radkova), VS – Vladimir Sakalian.

The abbreviations of the zoogeographical regions and subregions (eastern, western or middle part) are as follows: BS – Black Sea Coast, DE – Eastern Danubian Plain, PRM – Middle Pre-Balkan (Predbalkan), PRW – Western Pre-Balkan (Predbalkan), SPE – Eastern Balkan (Stara Planina) Mts, SPM – Middle Balkan (Stara Planina) Mts, SPW – Western Balkan (Stara Planina) Mts, SGS – Sashtinska Sredna Gora Mts, SGI – Ihtimanska Sredna Gora Mts, WB – Western Bul-

garia, K – Kraishte Region, OP – Osogovska Planina Mt, MPO – Maleshevska Planina Mt and Ograzhden Mt, BSM – Boboshevo-Simitli Valley, SPT – Sandanski-Petrich Valley, L – Lyulin Mts, V – Vitosha Mts, PL – Plana Mt, R – Rila Mts, P – Pirin Mts, T – Thracian Lowland, ST – Sakar-Tundzha Region, RDW – Western Rhodope Mts, RDE – Eastern Rhodope Mts, S – Strandzha Mts.

The material was determined by the author unless otherwise noted in the text. All specimens determined by others were re-examined by the author. The nomenclature follows the last edition of the Catalogue of the Palearctic ground beetles (Löbl & Löbl, 2017).

## Results

The present study is based on various field observations and contains data about 37 Bulgarian carabid species from tribes Nebriini (7), Notiophilini (6), Cychrini (1), Carabini (19) and Cicindelini (4), collected in 25 zoogeographical regions and subregions in Bulgaria. There are six species recorded for the first time in different subregions. Four species are reported for the second time in the regions where they were currently collected. Fourteen species haven't been reported for the given regions for more than 20 years.

### Species list

Nebriinae Laporte, 1834

Nebriini Laporte, 1834

1. *Leistus (Leistus) ferrugineus* (Linnaeus, 1758). Material examined: V (“Vitocha”, 1 ♀, no date, leg. VGu, det. O. Kryzhanovskij).

2. *Leistus (Pogonophorus) magnicollis* Motschulsky, 1866. Material examined: RDW (SE Pavelsko Vill., 41°50'52"N, 24°43'08"E, 1100 m, forest ecotone, 1 ♂, 17.V.2016, leg. TT).

3. *Leistus (Pogonophorus) rufomarginatus* (Duftschmid, 1812). Material examined: V (“Vitocha”, 1 ♂, 19.IX.1980, leg. IV, det. O. Kryzhanovskij).

4. *Leistus (Pogonophorus) spinibarbis rufipes* Chaudoir, 1843. Material examined: SPM (Leshnitsa Reserve, NW Yasenovo Vill., 42°42'22"N, 25°13'14"E, 658 m, beech forest, 1 ♂, 1 ♀, 9.V–3.IX.2014, leg. TT); V (“Vitocha”, 1 ♂, 19.IX.1980, leg. IV, det. O.

Kryzhanovskij; Bay Krastyo Site, about 1400 m, 1 ♂, IX.1979, 1 ♀, 13.V.1980, leg./det. VP).

5. *Nebria (Boreonebria) gyllenhali gyllenhali* Schönherr, 1806. Material examined: R (Parangalitsa Reserve, above 1400 m, 1 ♀, 26.VII.1980, 2 ♂♂, 23.V.1982, leg. IV, det. A. Dostal; Parangalitsa Reserve, 1430 m, near Bistritsa River, 1 ♂, 30.IV.1981, leg./det. VP).

6. *Nebria (Eunebria) jockischii jockischii* Sturm, 1815. Material examined: V ("Vitoscha", 1600 m, 1 ♀, 27.VII.1983, 1500 m, 1 ♂, 6.VIII.1983, leg. VGu, det. O. Kryzhanovskij).

7. *Nebria (Nebria) brevicollis* (Fabricius, 1792). Material examined: BS (Irakli Site, near Vaya River, 42°45'14"N, 27°52'50"E, 10 m, 1 ex., 11.V.2021, leg. MN); PRW (Reselets Vill., 1 ♂, 20.VI.1981, leg. IV, det. unknown); SGI (SE German Vill., 42°36'03"N, 23°26'34"E, 790 m, 1 ♀, 2.VI.1999, leg./det. NK); K (Razhdavitsa Vill., about 500 m, meadow, 2 ♂♂, X.1984, leg. VS); V (Knyazhevska Gora Park, about 800 m, 1 ♀, 16.IV.1980, leg./det. VP); RDW (Dobra Voda Hut, 42°04'22"N, 24°14'54"E, 730 m, 1 ♀, 10.VII.1983, leg. PB, 1 ♀, leg. EM, det. unknown).

#### Notiophilini Motschulsky, 1850

8. *Notiophilus aestuans* Dejean, 1826. Material examined: BSM (Selishte Vill., 1 ex., 14.IX.1978, leg. VP, det. O. Kryzhanovskij).

9. *Notiophilus biguttatus* (Fabricius, 1779). Material examined: PRW (Reselets Vill., 1 ♀, 20.VI.1981, leg. IV, det. A. Dostal); SPM (near Mazalat Hut, 42°45'44"N, 25°08'03"E, 1412 m, 1 ex., 6.IX.2012, leg. TT&NK); V ("Vitoscha", 1200 m, 1 ♀, 28.IX.1985, leg. VGu, det. O. Kryzhanovskij).

10. *Notiophilus laticollis* Chaudoir, 1850. Material examined: BS (SW Balchik, 43°23'49"N, 28°06'06"E, 218 m, 1 ♀, 17.IV–10.V.2018, pitfall traps, leg. TL); MPO (Ograzhden Mts, 1 ♂, 20.IV.1982, leg. YG, det. A. Dostal).

11. *Notiophilus palustris* (Duftschmid, 1812). Material examined: V ("Vitoscha", 2000 m, 1 ♂, 4.VIII.1983, leg. VGu, det. O. Kryzhanovskij); R (Slavovo Vill., 1150 m, 1 ♀, 31.X.1981, leg. VP, det. NK).

12. *Notiophilus rufipes* Curtis, 1829. Material examined: SPM (near the town of Shipka, about 700 m, 1 ♂, 2 ♀♀, 25.V.1998, leg. AV); K (Razhdavitsa Vill., about 500 m, 1 ♂, 3.III.2001, leg. IG).

13. *Notiophilus substriatus* G.R. Waterhouse, 1833. Material examined: T (Yagodovo Vill., 42°06'38"N, 24°51'04"E, 159 m, house yard, 1 ♀, 11–20.VI.2020, leg. VG).

#### Carabinae Latreille, 1802

##### Cychrini Laporte, 1834

14. *Cychrus semigranosus balcanicus* Hopffgarten, 1881. Material examined: SPM (S Prestoy Vill., 42°50'20"N, 25°30'26"E, 709 m, 1 ♀, 1.VI.2012, leg. OT; S Yovovtsi Vill., 42°48'08"N, 25°26'36"E, 698 m, 1 ♂, 6.IX.2012, leg. OT); L (Lyulin Mts, 1 ♀, 7.VII.1999, leg./det. NK).

##### Carabini Latreille, 1802

15. *Calosoma (Calosoma) inquisitor inquisitor* (Linnaeus, 1758). Material examined: SPT (Tisata Reserve, 41°43'31"N, 23°08'53"E, 230 m, 1 ♂, 26.IV.2014, leg. TT); RDW (W Asenovgrad, 42°00'42"N, 24°51'34"E, 307 m, 2 ♀♀, 19.V.2002, leg. VG); S (S Kraynovo Vill., 41°59'11"N, 26°51'35"E, 480 m, 2 ♂♂, 30.VII.1989, leg. VG).

16. *Calosoma (Calosoma) sycophanta sycophanta* (Linnaeus, 1758). Material examined: RDE (Studen Kladenets Vill., 1 ♀, 18.V.1989, leg. RT).

17. *Calosoma (Caminara) denticolle* Gebler, 1833. Material examined: BS (Cape Maslen Nos, 42°18'27"N, 27°47'34"E, 15 m, at light, 1 ♂, 24.VIII.1997, leg. NS).

18. *Carabus (Archicarabus) montivagus montivagus* Palliardi, 1825. Material examined: P (E Mozgovitsa Site, 41°40'50"N, 23°24'40"E, 1520 m, 1 ex., 14.V.2014, leg. KD).

19. *Carabus (Archicarabus) wiedemanni wiedemanni* Ménétrés, 1836. Material examined: RDE (Kroyatsi Hut near Gurgulitsa Vill., 1 ♀, 24.III.1990, leg./det. NK).

20. *Carabus (Carabus) granulatus granulatus* Linnaeus, 1758. Material examined: BS (Baltata Reserve near Balchik, 1 ♂, 23.IV.1977, leg. unknown, det. O. Kryzhanovskij; N Krapets Vill., 43°39'40"N, 28°33'58"E, 1 m, 1 ♀, 28.VIII.2020, leg. MN); DE (Srebarna Lake, 1 ♂, 10.VII.1989, leg./det. NK).

21. *Carabus (Chaetocarabus) intricatus intricatus* Linnaeus, 1761. Material examined: SPM (S Prestoy

Vill., 42°50'20"N, 25°30'26"E, 709 m, 1 ♂, 1.VI.2012, leg. OT; N Shipka Peak, 42°45'24"N, 25°19'25"E, 1160 m, 1 ♀, 6.IX.2012, leg. OT); SPW (SW Zanozhene, Varshets, 43°09'05"N, 23°13'51"E, 780 m, 1 ex., 30.IV.2014, leg. KD); SGI (SE German Vill., 42°36'03"N, 23°26'34"E, 790 m, 1 ♂, 7.IX.1999, leg./det. NK); L (Knyazhevo, 42°39'06"N, 23°13'10"E, 706 m, 1 ♀, 28.IV.2021, leg. SSt); V (Knyazhevo, 42°38'55"N, 23°13'09"E, 780 m, 1 ex., 27.IV.2021, leg. SSt); PL (Planshtitsa River, 42°33'15"N, 23°27'89"E, 724 m, 1 ♂, 24.V.2012, leg. MN); R (NW Dobarsko Vill., 41°59'13"N, 23°25'51"E, 1600 m, 1 ♂, 9.V.2020, leg. KD); RDW (SW Bachkovo Vill., 41°56'40"N, 24°50'60"N, 383 m, 1 ♂, 15.VIII.2003, forest, under lamp, leg. VG; SE Markovo Vill., 42°03'17"N, 24°43'14"E, 456 m, 1 ex., 2.IX.2018, leg. KD).

22. *Carabus (Eucarabus) ullrichi rhilensis* Kraatz, 1876. Material examined: SPW (S Dalgi Del Vill., 43°13'26"N, 22°57'53"E, 940 m, 1 ex., 25.V.2014, leg. KD); WB (Sofia City, Borisova Gradina Park, 42°40'52"N, 23°20'32"E, 577 m, 1 ♀, 5.IV.2016, 1 ♀, 18.V.2020, leg. TT); L (Knyazhevo, 42°39'06"N, 23°13'10"E, 706 m, 1 ♂, 28.IV.2021, leg. SSt); V (Knyazhevo, 42°38'55"N, 23°13'09"E, 780 m, 4 ex., 27.IV.2021, leg. SSt; Dragalevtsi, 1 ♂, 24.VI.2021, leg. VP).

23. *Carabus (Lamprostus) torosus torosus* I. Frivaldszky von Frivald, 1835. Material examined: BS (SW Balchik, 43°23'48"N, 28°06'55"E, 190 m, 1 ♀, 11.V–10.VI.2018, 1 ♀, 20.IX–11.X.2018, 43°23'49"N, 28°06'52"E, 193 m, 1 ♂, 1 ♀, 12.VI–26.VII.2018, 1 ♀, 10.V–11.VI.2018, 43°23'40"N, 28°06'34"E, 210 m, 1 ♂, 19.VIII–18.IX.2018, 1 ♂, 1 ♀, 2.IX–11.X.2018, 43°23'31"N, 28°06'24"E, 214 m, 2 ♀♀, 10.V–11.VI.2018, 2 ♀♀, 12.VI–25.VII.2018, 43°23'49"N, 28°06'20"E, 217 m, 1 ♂, 1 ♀, 17.IV–10.V.2018, 3 ♀♀, 19.VIII–18.IX.2018, 43°23'49"N, 28°06'06"E, 218 m, 1 ♂, 4 ♀♀, 10.V–11.VI.2018, 6 ♂♂, 1 ♀, 12.VI–25.VII.2018, pitfall traps, leg. TL; E Banevo, 42°37'51"N, 27°25'33"E, 168 m, 1 ♀, 5.VI.2021, leg. DC).

24. *Carabus (Megodontus) violaceus azureus* Dejean, 1826. Material examined: SPW (Petrohan Pass – Peak Kom path, 43°08'22"N, 23°06'42"E, 1530 m, ridge meadow with juniper, 1 ex., 15.IV.2016, leg. TT); SGS (Koprivshitsa, 42°38'25"N, 24°21'23"E, 1020 m, 1 ♂, 18.VIII.2016, leg. TT); SGI (SE German Vill., 42°36'03"N, 23°26'34"E, 790 m, 2 ♂♂, 7.VII.1999, leg./det. NK); R (N Yakoruda, 42°04'19"N, 23°37'52"E, 1629 m, 1 ♀, 21.V.2015, leg. DS; S

Samokov, Mala Tsarkva Vill., 45°15'14"N, 23°30'44"E, 1203 m, 1 ♂, 25–30.VI.2020, leg. IT); RDW (S Stoykite Vill., 41°38'24"N, 24°38'08"E, 1437 m, 1 ♀, 15.X.2020, leg. TT).

25. *Carabus (Morphocarabus) praecellens versicolor* I. Frivaldszky, 1835. Material examined: SPM (Gabrovo, 1 ♂, 20.V.1976, leg. unknown, det. NK).

26. *Carabus (Pachystus) hortensis hortensis* Linnaeus, 1758. Material examined: SGS (W Koprivshitsa, Karavelova Polyana Site, 42°38'03"N, 24°19'25"E, 1274 m, many beetles in an empty plastic bottle, 20.X.2013, leg. TT); V ("Vitocha", 1 ♂, 1989, leg./det. NK); R (NW Dobarsko, 41°59'00"N, 23°26'20"E, 1520 m, 1 ex., 25.VI.2019, leg. KD); P (SW Bansko, 41°46'38"N, 23°26'02"E, 1655 m, 1 ex., 16.VIII.2014, leg. KD).

27. *Carabus (Pachystus) cavernosus cavernosus* I. Frivaldszky von Frivald, 1838. Material examined: OP (on the road to Ruen Peak, 42°10'03"N, 22°32'23"E, 2099 m, open subalpine habitat, 1 ♂, 17.VI.2012, leg. TT).

28. *Carabus (Pachystus) graecus morio* Mannerheim, 1830. Material examined: BS (SW Balchik, 43°23'49"N, 28°06'52"E, 193 m, 2 ♀♀, 17–18.IV.2018, 1 ♂, 11–12.X.2018, 43°23'31"N, 28°06'24"E, 214 m, 1 ♂, 11–12.X.2018, 43°23'49"N, 28°06'06"E, 218 m, 1 ♂, 11–12.X.2018, pan traps, leg. TL; SW Balchik, 43°23'48"N, 28°06'55"E, 190 m, 1 ♂, 2 ♀♀, 17.IV–11.V.2018, 2 ♂♂, 5 ♀♀, 11.V–10.VI.2018, 43°23'49"N, 28°06'52"E, 193 m, 5 ♂♂, 5 ♀♀, 17.IV–10.V.2018, 43°23'40"N, 28°06'34"E, 210 m, 2 ♂♂, 4 ♀♀, 11.V–10.VI.2018, 7 ♂♂, 6 ♀♀, 19.VIII–18.IX.2018, 1 ♂, 9 ♀♀, 2.IX–11.X.2018, 43°23'31"N, 28°06'24"E, 214 m, 9 ♂♂, 6 ♀♀, 17.IV–10.V.2018, 1 ♂, 3 ♀♀, 10.V–11.VI.2018, 1 ♀, 12.VI–25.VII.2018, 43°23'49"N, 28°06'20"E, 217 m, 2 ♂♂, 2 ♀♀, 17.IV–11.V.2018, 1 ♂, 10.V–11.VI.2018, 2♂, 19.VIII–18.IX.2018, 8 ♂♂, 2 ♀♀, 20.IX–11.X.2018, 43°23'49"N, 28°06'06"E, 218 m, 4 ♂♂, 2 ♀♀, 17.IV–10.V.2018, pitfall traps, leg. TL); SPT (Kozhuh Mt, about 230 m, 1 ♂, 20.X.1985, leg. YG, det. O. Kryzhanovskij); P (Tisata Reserve, 41°44'14"N, 23°10'37"E, 414 m, 4 ♀♀, 25.IV–7.VI.2014, leg. TT); RDE (Studen Kladenets Vill., 1 ♂, 18.V.1989, leg. RT).

29. *Carabus (Procerus) gigas gigas* Creutzer, 1799. Material examined: WB (W Bezden Vill., 42°52'53"N, 23°05'55"E, 561 m, 2 ex., VI.2019, leg. NKar).

30. *Carabus (Procerus) scabrosus* Olivier, 1790. *Carabus (Procerus) scabrosus scabrosus* Olivier, 1790. Material examined: T (Stara Zagora, Bedechka Park, 1 ex., 21.VI.2021, leg. MP); RDE (Studen Kladenets Vill., 1 ex., 18.V.1989, leg. RT; SW Rozino Vill., 41°26'10"N, 25°53'10"E, 215 m, mesoxerophilic oak forest near a tributary of the Byala Reka River, 1 ex., 12.V.2017, leg. KD). *Carabus (Procerus) scabrosus bureschianus* Breuning, 1928. Material examined: RDW (N Grashtitsa hamlet, 41°39'16"N, 24°37'21"E, 1476 m, 1 ex., 6.V.2018, leg. TT; SE Grashtitsa hamlet, 41°38'32"N, 24°37'43"E, 1373 m, forest road, 2 larvae, 3.V.2019, leg. TT; Grashtitsa hamlet, 41°39'05"N, 24°37'12"E, 1366 m, 3 ex., 17–18.VII.2020, 41°39'05"N, 24°37'04"E, 1340 m, 1 larva, 14.X.2020, leg. TT).

31. *Carabus (Procrustes) coriaceus* Linnaeus, 1758. *Carabus (Procrustes) coriaceus cerisyi* Dejean, 1826. Material examined: SPM (N Shipka Peak, 42°45'24"N, 25°19'25"E, 1160 m, 1 ♂, 6.IX.2012, leg. OT); WB (W Bezden Vill., 42°52'54"N, 23°05'48"E, 558 m, 3 ♂♂, 1 ♀, 5.IV.2018, leg. NKar); SPT (Tisata Reserve, 41°43'31"N, 23°08'53"E, 230 m, 1 ♂, 25.IV.2014, leg. TT); L (Lyulin Mts, 2 ♀♀, 7.VII.1999, leg./det. NK); R (S Samokov, Mala Tsarkva Vill., 45°15'14"N, 23°30'44"E, 1203 m, 1 ♀, 25–30.VI.2020, leg. IT); P (Tisata Reserve, 41°44'14"N, 23°10'37"E, 414 m, 2 ♂♂, 25.IV–7.VI.2014, leg. TT). *Carabus (Procrustes) coriaceus kindermanni* Walzl, 1838. Material examined: BS (SW Balchik, 43°23'48"N, 28°06'55"E, 190 m, 1 ♀, 17.IV–11.V.2018, 1 ♂, 19.VIII–18.IX.2018, 1 ♀, 20.IX–11.X.2018, 1 ♂, 1 ♀, 11.V–10.VI.2018, 43°23'49"N, 28°06'52"E, 193 m, 1 ♂, 3 ♀♀, 12.VI–26.VII.2018, 43°23'40"N, 28°06'34"E, 210 m, 1 ♂, 3 ♀♀, 19.VIII–18.IX.2018, 1 ♂, 2 ♀♀, 2.IX–11.X.2018, 43°23'49"N, 28°06'20"E, 217 m, 2 ♂♂, 19.VIII–18.IX.2018, 2 ♀♀, 20.IX–11.X.2018, pitfall traps, leg. TL; NW Lozenets Vill., 42°12'52"N, 27°47'50"E, 11 m, 1 ♀, 23.V.2021, leg. KD); T (NW Kostievo Vill., 42°11'13"N, 24°37'02"E, 175 m, 1 ♀, 27.IV.2018, leg. TL; S Momino selo Vill., 42°17'39"N, 24°53'01"E, 177 m, 1 ♀, 12.VI.2018, pasture, pan trap, leg. TL; W Elenino Vill., 42°21'45"N, 25°34'34"E, 200 m, 1 ex., 2.X.2019, leg. KD); ST (Branitsa–Yerusalimovo road, near Harmanli, 41°56'12"N, 26°05'46"E, 207 m, 1 ex., 4.XI.2010, leg. KD).

32. *Carabus (Tomocarabus) convexus* Fabricius, 1775. *Carabus (Tomocarabus) convexus dilatatus* Dejean, 1826. Material examined: SGI (SE German

Vill., 42°36'03"N, 23°26'34"E, 790 m, 1 ♂, 1 ♀, 8.VI.1999, leg./det. NK); L (Lyulin Mts, 5 ♂♂, 15.V.1999, leg./det. NK). *Carabus (Tomocarabus) convexus gracilior* Géhin, 1885. Material examined: PRM (NE Emen Vill., kanyon of Negovanka River, 43°08'35"N, 25°22'20"E, about 190 m, forest, 1 ♂, 3.III.2001, leg. NS); SPT (Tisata Reserve, 41°45'42"N, 23°08'58"E, 230 m, 1 ♂, 3 ♀♀, 25.IV–7.VI.2014, leg. TT); ST (Sakar Mt, Kostur Vill., 41°58'22"N, 26°17'10"N, 455 m, 1 ♀, 12.IV.2012, leg. VG); S (S Kraynovo Vill., 41°59'11"N, 26°51'35"E, 480 m, 2 ♂♂, 30.VII.1989, leg. VG).

33. *Carabus (Trachycarabus) scabriusculus bulgarus* Lapouge, 1908. Material examined: WB (Chelopechene near Sofia, 1 ♀, 25.V.1993, leg. OI, det. NK).

## Cicindelinae Latreille, 1802

### Cicindelini Latreille, 1802

34. *Cicindela (Cicindela) campestris* Linnaeus, 1758. *Cicindela (Cicindela) campestris campestris* Linnaeus, 1758. Material examined: SPW (N Petrohan, 43°08'33"N, 23°07'27"E, 1400 m, clearing, 1 ♀, 15.IV.2016, leg. TT); OP (S Kyustendil, 42°10'30"N, 22°37'40"E, 1530 m, 1 ex., 16.VI.2012, leg. TT); L (Dragichevo Vill., about 750 m, 1 ♂, 30.VIII.1982, leg. IV, det. H. Freude; Knyazhevo, 42°39'06"N, 23°13'10"E, 706 m, 1 ♂, 27.IV.2021, leg. SSt); R (Skakavitsa, 1 ♂, 17.VII.1983, leg. YG; Belmeken Dam, 42°90'15"N, 23°47'22"E, 1933 m, 1 ♀, 26.IX.2014, leg. SL); P (Between Peak Vihren and Hut Vihren, 2400 m, 1 ♀, 30.VI.1971, leg. PBe, det. O. Kryzhanovskij; Dobrinishte, house yard, 13.IV.2021, leg. VP); RDW (N Grashtitsa hamlet, 1476 m, 41°39'16"N, 24°37'21"E, 1 ♀, 6.V.2018, leg. TT; Grashtitsa hamlet, 41°38'34"N, 24°37'32"E, 1350 m, 1 ex., 3.V.2019, leg. TT; NW Grashtitsa hamlet, 41°39'37"N, 24°36'14"E, 1200 m, 1 ex., 20.IV.2020, leg. TT). *Cicindela (Cicindela) campestris palustris* Motschulsky, 1840. Material examined: BS (SW Balchik, 43°23'49"N, 28°06'06"E, 218 m, 1 ♂, 17.IV–10.V.2018, leg. TL).

35. *Cicindela (Cicindela) hybrida hybrida* Linnaeus, 1758. Material examined: RDW (SE Turun Vill., 41°32'48"N, 24°52'53"E, 689 m, 2 ♀♀, 6.VIII.2018, leg. TL).

36. *Cicindela (Cicindela) sylvicola* Dejean, 1822. Material examined: SPE (S Varbitsa Vill., Varbitsa

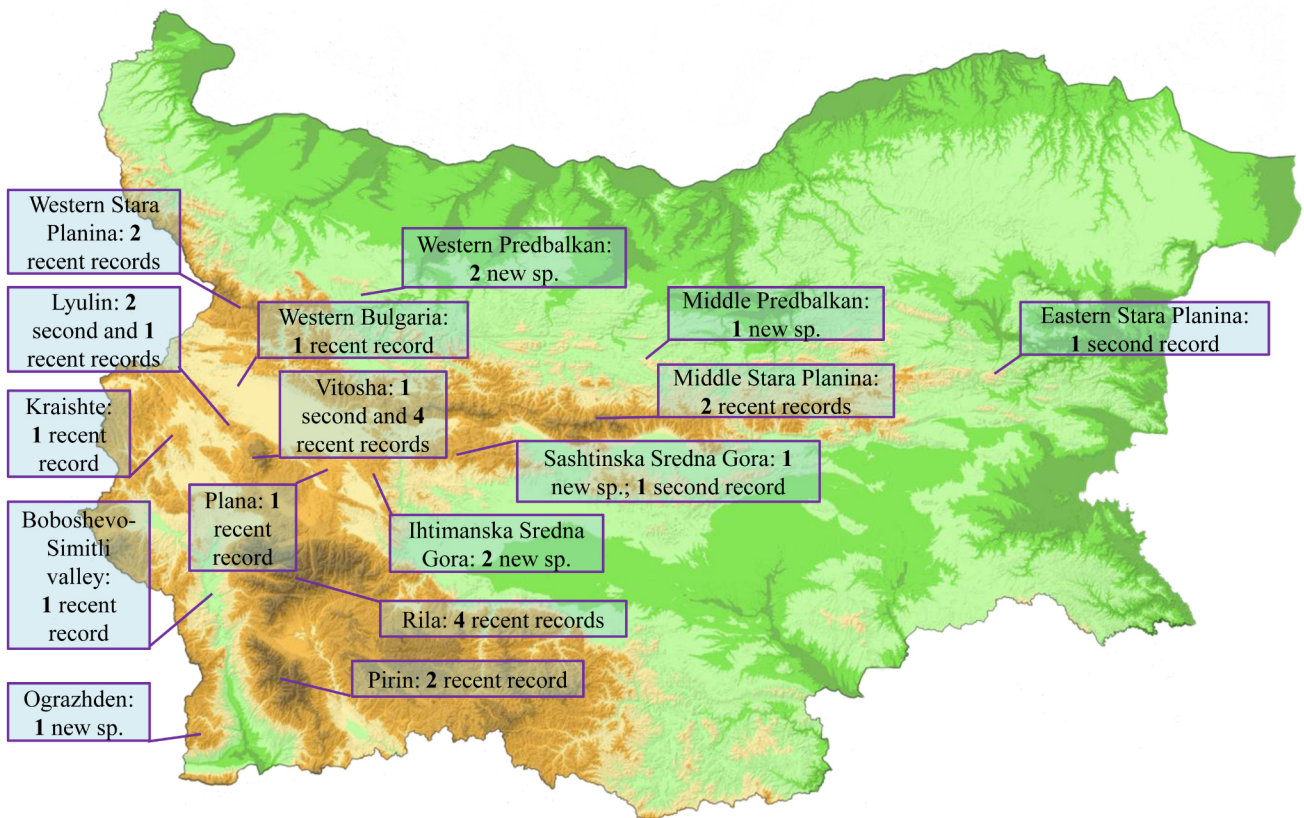


Fig. 1. Map of the regions where new data are recorded, with a respective number of the established species.

Pass, 2 ♀♀, 20.V.2011, leg. TL); SPW (N Petrohan, 43°08'33"N, 23°07'27"E, 1400 m, clearing, 2 ♂♂, 1 ♀, 13.VII.2017, leg. TT); SGI (NE Dolni Pasarel Vill., 42°33'05"N, 23°31'12"E, 967 m, 1 ♂, 30.VI.2016, leg. GH).

37. *Cylindera (Cylindera) germanica germanica* (Linnaeus, 1758). Material examined: L (Lyulin Mts, 1 ♀, 7.VII.1999, leg./det. NK).

## Discussion

The present study provides some novelty about the carabid fauna of Bulgaria, in particular, of the tribes Nebriini, Notiophilini, Cychrini, Carabini and Cicindelini. They are well studied in Bulgaria, and have a great number of species of conservation value (endemic, relict, rare and two protected species). Despite that fact, this paper gives some new data on their distribution.

Six of the presented species are recorded for the first time in different regions in Bulgaria (Fig. 1):

*Carabus convexus* is new to the Middle Pre-Balkan, and *Nebria brevicollis* and *Notiophilus biguttatus* are new both to the Western Pre-Balkan and to the whole Pre-Balkan Region; *Carabus violaceus* is new to the Sashtinska Sredna Gora Mts; *Nebria brevicollis* and *Cicindela sylvicola* are new to the Ihtimanska Sredna Gora Mts; *Notiophilus laticollis* is reported here for the first time from the Ograzhden Mts.

Four species are reported for the second time in the regions where they were currently collected (Fig. 1). *Cicindela sylvicola* is now reported for the first time in Eastern Balkan Mts, since 1904 (Apfelbeck, 1904). *Notiophilus palustris* is reported only by Stoyanov and Penev (2004) for the Vitosha Mts. *Cicindela campestris* and *Cylindera germanica* haven't been reported for the Lyulin Mt, since Kodzhabashev & Mollov (2000).

Fourteen species haven't been reported for more than 20 years from the Middle and Western Balkan Mts, Western Bulgaria, Kraishite Region, Boboshevo-Simitli Valley, Vitosha Mts, Plana Mt, Lyulin Mts, Rila Mts and Pirin Mts (Fig. 1). Guéorguiev & Guéorguiev

(1995a) are the last who recorded: *Leistus spinibarbis* for the Middle Balkan Mts; *Cicindela sylvicola* for the Western Balkan Mts; *Notiophilus rufipes* for the Middle Balkan Mts and Kraishte Region; *Carabus ullrichi* for the Western Balkan Mts and Western Bulgaria Region; *Notiophilus aestuans* for the Boboshevo-Simitli Valley; *Notiophilus biguttatus*, *Leistus ferrugineus* and *Nebria jockischii* for the Vitosha Mts; *Cicindela campestris* and *Notiophilus palustris* for the Rila Mts; *Carabus hortensis* for the Rila Mts and Pirin Mts; *Carabus intricatus* for the Rila Mts and Plana Mt.; *Carabus coriaceus* for the Lyulin Mts. Same year, *Notiophilus biguttatus* and *Leistus ferrugineus* are also recorded for the last time in the Vitosha Mts by Guéorguiev & Guéorguiev (1995b) and Krusteva et al. (1995), respectively. The last records of *Carabus intricatus* from the Vitosha Mts are by Guéorguiev & Guéorguiev (1995a) and Krusteva et al. (1995). *Carabus montivagus* haven't been reported from the Pirin Mts since 1997 (Guéorguiev et al., 1997).

Some of these newly rediscovered species are quite common in Bulgaria and their long-time absence in the given regions is probably due to the lack of more recent research (e.g. *Cicindela campestris*, *Carabus coriaceus* and *Notiophilus rufipes*), since many areas in the country are missing contemporary information about their carabid (or any) fauna. Other species are relatively rare or stenotopic and do not fall in mass collections (e.g. *Carabus montivagus*, *Leistus spinibarbis* and *Nebria jockischii*).

During the research some interesting or confirmative data were obtained. Rare stenotopic forest mesophile *Leistus magnicollis* was found in the forest ecotone near sparsely vegetated stony habitat; included in the Red Data Book of the Republic of Bulgaria as vulnerable (Guéorguiev, 2015) *Carabus scabrosus* was also established in some ecotone habitats; mesophilous nature of *Leistus spinibarbis* and *Carabus hortensis* was confirmed, as they were found in beech forests; stenotopic hygrophilous mountain species *Nebria gyllenhali* and *N. jockischii* were collected near river on 1430 m a.s.l., and on 1500–1600 m, respectively; conservationally significant forest mesophile and indicator *Carabus intricatus* (IUCN 2021 – NT) was collected in different typically montane localities; rare steppe species *Carabus torosus* was found on places where it is known it occurs; rare *Carabus cavernosus* was observed in open subalpine habitat; relict montane species *Nebria gyllenhali* and *Carabus hortensis* were

collected in their typical places of habitation. *Cylindera germanica* is widespread but rare in Bulgaria, thus every record of the species is valuable.

Although the ground beetle fauna of Bulgaria is relatively well studied, there are still some regions representing “white spots” in relation to the knowledge about their carabid species composition and community structure (e.g. many different parts of the Danubian Plain and Balkan Mts, Pre-Balkan Region and Sub-Balkan Valleys, Sakar Mts, some mountains near Sofia, Mesta River Valley), and these areas deserve some enlightening in relation to their faunas. More complete knowledge of the diversity of the studied group in the country could be revealed only after carrying out further research in the poorly-examined regions.

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